NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

2030 Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan of the Rzeszów City

rzeszów capital of innovation

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Summary

Vision for the City in 2030

The development of Rzeszów will proceed in accordance with the vision outlined in the "Development Strategy of the City of Rzeszów until 2025": Rzeszów – the growth hub of the Podkarpacie region – is a city that is friendly to people, offering and expanding numerous metropolitan functions. It is a place where it's worth living, with a high quality of life and environment, as well as comprehensive economic, social, and cultural development.

The sectoral strategic goals for the development of the City of Rzeszów, which are based on the Vision and Mission for the Development of the City, include:

1. *Smart City – creating favorable conditions for the development of Rzeszów as an attractive location for business activities, as well as for the advancement of education, higher education, science, and culture.*

The development of economic activity will lead to the creation of new jobs, which in turn will increase employment levels and contribute to income growth. This, in turn, will improve the standard of living by providing better access to services, housing, and other goods. Investments in higher education, science, and education contribute to raise the overall level of knowledge and skills among residents. The development of the cultural sector enriches the social life of residents. An increased number of cultural events, festivals, art galleries, and theaters will offer more opportunities for recreation and personal development. Culture fosters community cohesion, strengthens local identity, and encourages active engagement in public life. Access to green spaces, bicycle paths, sports events, and cultural centers fosters an active and healthy lifestyle, which in turn contributes to improved health and well-being.

2. *A socially cohesive and integrated city – improving both the living conditions of residents and public safety.*

A socially cohesive and integrated city fosters an environment where residents can experience an improved quality of life through strong social bonds, a sense of security, equal opportunities, and active participation in community life. In integrated communities, individuals are more inclined to offer help and support to one another Social cohesion promotes balanced development across different neighborhoods in the city, helping to prevent the marginalization of specific social groups. Social cohesion contributes to increased trust in public institutions such as local administration, healthcare, and education. Residents who feel heard and represented are more likely to cooperate with city authorities, leading to improved public services and more efficient city management.

3. *Urban mobility and infrastructure – development and improvement of the functioning of the transportation and technical infrastructure system.*

Systematic and well-planned development of technical infrastructure, including transportation, is essential for the city's growth and the quality of life for its residents.

4. *Utilization of resources – protecting clean energy and rich heritage, while managing the values and resources of the natural and cultural environment.*

The above has a multifaceted, positive impact on the quality of life for residents. It contributes to improving health, increase the city's attractiveness, preserving cultural identity, and promoting long- term sustainable development.

Achieving climate neutrality is one of the key and most ambitious goals, the realization of which will contribute to the city's development in line with the established vision.

City Goals: An Smart City and Socially Cohesive and Integrated Cities are fully coherent with the goals of the Mission, particularly in addressing social challenges and actively involving residents in this effort. Actions developed in collaboration with residents carry a strong social mandate, which can ensure their effective implementation.

Urban environment of Rzeszów in the context of global warming

Climate scenarios for Poland indicate that the frequency of heatwaves currently experienced in Rzeszów is expected to increase in the coming decades. Forecasts indicate a tendency for their for duration to increase, leading to the emergence of drought. Just as severe in Rzeszów are the short but very intense rainfalls that cause flooding, which may lead to more significant floods in the future.

The climate changes occurring before our eyes are impacting urban ecosystems, placing plants under increased stress, particularly due to their urban environment, which makes them more vulnerable to pests and diseases. Furthermore, warmer winters extend the growing season of plants, altering their growth cycles and thereby reducing their resistance. Climate warming is associated with an increase in insect populations and the number of fungi that can survive the winter, leading to a higher number of infection foci in the following season. The impact of climate change on the species composition and condition of urban forests is significant and will become increasingly evident. Climate change causes the displacement of native species and the migration of non-native species, including invasive ones. This leads to the decline of species that are not adapted to high temperatures and summer droughts but are resistant to winter frosts. Further actions are necessary to ensure sustainable forest management, as climate change alters species distribution, impact soil fertility and threatens biodiversity.

Analyses clearly indicate a growing issue with the impact of climate change on urban areas. Due to factors such as high population density and its enclosed, built-up nature, Rzeszów is particularly vulnerable to the increasing intensity of the urban heat island effect, heavy rainfall causing flooding, and potential future water shortages. Observed threats particularly impact the most vulnerable social groups, including the elderly, individuals with health conditions, children, pregnant women, and those affected by poverty.

The rising temperature impacts the economy through several factors, including physical performance, cognitive functioning of employees, energy demand, the quality and quantity of agricultural produce, and increased healthcare burdens due to worsened well-being, strokes, heat exhaustion, and other health issues caused by high air temperatures Extreme phenomena impact urban infrastructure, including transportation, water and wastewater systems, and energy networks, leading to economic losses, disruptions in service delivery, and threats to well-being.

United effort of the international community – conventions and agreements

To mitigate the consequences of climate change, a united effort from many countries is necessary, as they recognize the urgent need for action. The international community, recognizing the seriousness of the situation, has made a series of commitments based on the “United Nations Framework Convention on Climate Change” and the “Paris Agreement”. Both preventing climate change and adapting to a warming world are key priorities for the European Union. In 2021, the ‘European Climate Law’ was adopted, which enshrines the EU’s commitment to achieving climate neutrality by 2050. The law aims to limit global temperature rise to well below 2°C and to continue efforts to restrict it to 1.5°C.

Key role of cities

Achieving those goals requires far-reaching transformations in the functioning of all countries. A key role in those processes is played by cities, which are, on the one hand, significant emitters of greenhouse gases, and on the other hand, the primary recipients of the negative effects of climate change. The urgent necessity thus becomes the need for coordinated actions that, complementing and intersecting with each other, will guarantee a horizontal approach towards achieving neutrality and resilience in urban areas. For this reason, the activities undertaken should be implemented across various areas, including air quality, energy transformation, zero-emission transportation, waste and wastewater management, as well as green spaces and urban water retention.

Rzeszów takes on the challenge

Recognizing the need for urgent and immediate action towards achieving climate neutrality, the city of Rzeszów has joined the “100 Climate-Neutral and Smart Cities” Mission and expressed its ambition to attain climate neutrality through a just, effective, and socially acceptable transformation.

At the same time, it acknowledges the necessity of accelerating efforts to achieve climate neutrality and making it a priority in the city's policy in the City Municipality of Rzeszów.
Achieving climate neutrality will require a range of diverse actions that must be harmoniously combined and complementary to each other in order to maximize synergy in addressing the challenges posed by climate change. A joint effort and the engagement of stakeholders at various levels are crucial for achieving lasting and positive changes in both preventing the causes and adapting to the impacts of climate change. Effective management of air quality, energy transformation, transportation, as well as urban greenery and water retention, is a crucial element in creating a more sustainable and environmentally friendly city. However, it is important for the local community to also make responsible, eco-friendly choices. Responsible actions by residents, entrepreneurs, and local authorities are necessary to achieve positive outcomes for the environment and future generations. Regardless of the need for systemic changes, each of us can contribute to improving the quality of life in cities through informed decisions and changes in habits.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
IPCC	The Intergovernmental Panel on Climate Change
MPA	Urban Climate Change Adaptation Plan
GUS	Central Statistical Office
PKD	Classification of economic activities
GHG	greenhouse gas
PRIMES2007	Price-induced market equilibrium system
WEM	with existing measures
WAM	with additional measures
GIOŚ	Chief Inspector of Environmental Protection
WHO	World Health Organization
PE	primary energy
RES	renewable energy sources
BRMR	Rzeszów City Development Office
MPEC	Municipal Heat Energy Company
ZTM	Public Transport Authority
ROF	Association of the Rzeszów Functional Area
SUMP	Sustainable Urban Mobility Plan
MZD	Municipal Road Administration
MPK	Municipal Transport Company
PSZOK	Selective collection point for municipal waste
MPGK	Municipal Utility Company
MZBM	Municipal Housing Board
ZZM	Urban Greenery Authority
KŚ	Department of Climate and Environment
WI	Investment Department
GK	Department of Municipal Economy

1. Introduction

Introduction

General data

Rzeszów is a city with county rights, covering an area of 129 km². It is located in southeastern Poland, serves as the capital of the Podkarpackie Voivodeship, and is the center of the Rzeszów agglomeration. Rzeszów, with 197,268 residents, is ranked as the 14th largest city in Poland by population.

Main areas of development

Rzeszów is a rapidly growing urban center. Industry (including aerospace, information technology, electronics, pharmaceuticals, food processing, and household goods) and commerce play a significant role in the city. New investments are being created - mainly residential, but also service-commercial, road, industrial and office - including those of the "A" standard. With the aim of attracting investment and creating new jobs in the Special Economic Zones within the city (SSE "Rzeszów-Dworzysko") and in neighboring municipalities, an Investor Service Office has been established.

Position of Rzeszów locally and regionally

Rzeszów is the largest city in southeastern Poland and the capital of the Podkarpackie Voivodeship, which marks the eastern border of the European Union. It also serves as the central hub of the Rzeszów Metropolitan Area. Rzeszów is the seat of local and regional authorities, as well as government and judicial institutions. Rzeszów is a center for economic, academic, cultural, and ecreational activities in southeastern Poland.

As the capital of the region, Rzeszów plays a key role in administration, higher education, education, science, culture, sports, recreation, economic activities, and healthcare. It brings together various institutions that provide high-level services. It also serves as an important center for aviation, IT, chemical, trade, construction, and services industries.

Rzeszów is the headquarters of numerous strategic centers

The city is the seat of the local government of the Podkarpackie Voivodeship and the Podkarpackie Voivode, along with a range of subordinate institutions and other administrative units. Rzeszów also hosts offices of various non-centralized government administration bodies. Rzeszów collaborates with local governments from across the country.

Rzeszów's participation in organizations, associations, and collaborations

Rzeszów is a member of the Union of Polish Metropolises, which unites 12 Polish cities aspiring to metropolitan status. This Union supports local government and economic development, promotes initiatives related to the creation and functioning of regional and local structures, addresses specific challenges faced by large cities, collaborates with state authorities, national and international organizations, and fosters international cooperation to increase the role of metropolises within the country and in European integration.

Member of the Association of Polish Cities, which brings together over 330 cities, and Member of the Association of Polish Districts, which includes both rural districts and cities with district rights.

Rzeszów also cooperates with local governments from the voivodeship - it belongs, among others, to the Podkarpackie Association of Local Governments, an organization that brings together local governments from the Podkarpackie voivodeship, which aims for integration and social, economic, and cultural development.

Rzeszów is also developing cooperation with neighboring municipalities through the Rzeszów Functional Area Association, which it leads and which brings together 15 municipalities surrounding Rzeszów.

Rzeszów in Eurocities

Rzeszów is a member of the Eurocities association, which brings together more than 140 cities from 39 countries. Its main goal is to improve the quality of life for residents of European cities through the promotion of integrated urban policy and the involvement of cities in political processes. Cooperation with 18 partner cities plays an important role for Rzeszów. They include: Bielefeld (Germany), Buffalo, Gainesville (USA), Ivano-Frankivsk, Lviv, Lutsk, Chernihiv, Konotop, Truskavets (Ukraine), Klagenfurt

(Austria), Košice (Slovakia), Lamia (Greece), Nyíregyháza (Hungary), Satu Mare (Romania), Fangchenggang (China), Split (Croatia), Rushmore (UK), and Sacheon (South Korea). Furthermore, Rzeszów has established cooperation with Hamburg (Germany), Uzhhorod (Ukraine), Graz (Austria), Roeselare (Belgium), Miskolc (Hungary), Presov (Slovakia), Telavi (Georgia), and the Corrèze Department (France). The cooperation includes, among others, mutual promotion, exchange of development experiences, as well as cultural activities. Joint festivals and other cultural events, study visits, and business events and forums are organized, among other things.

Rzeszów as a leader in efforts towards climate neutrality

Rzeszów is an active city with the potential to influence other decision-makers in the region, country, and worldwide. Rzeszów, as the capital of the voivodeship, can become a model for other cities in the region. Through active participation in national and international associations and unions, successes in the field of climate transformation it can inspire neighboring municipalities to implement similar actions. Regional cooperation in climate initiatives can lead to greater collaboration between municipalities and districts, resulting in more effective and integrated environmental protection solutions. Successes and challenges of Rzeszów in climate transformation can influence regional policies, encouraging decision-makers at the voivodeship level to support sustainable development and ecological initiatives in other parts of the voivodeship, as well as introducing financial incentives for municipalities and districts that undertake pro-ecological actions, following the example of Rzeszów. It should be noted that in order to fully utilize the potential of Rzeszów's climate transformation, effective continuation of regional-level actions will be necessary. In summary, the climate transformation of Rzeszów can have far-reaching positive effects both for the city itself and for the entire Podkarpacie region. However, to fully leverage those opportunities, close cooperation between different levels of government, as well as adequate financial and educational support, will be essential.

Vision for the development of Rzeszów

The main governing document outlining the vision for the development of the city of Rzeszów is the "Development Strategy of the City of Rzeszów until 2025," which outlines the vision for Rzeszów's development strategy. Rzeszów – the growth hub of the Podkarpacie region – is a city that is friendly to people, offering and expanding numerous metropolitan functions. It is a place where it's worth living, with a high quality of life and environment, as well as comprehensive economic, social, and cultural development.

The sectoral strategic goals for the development of the City of Rzeszów, which are based on the Vision and Mission for the Development of the City, include:

1. Smart City – creating favorable conditions for the development of Rzeszów as an attractive location for business activities, as well as for the advancement of education, higher education, science, and culture.
2. A socially cohesive and integrated city – improving both the living conditions of residents and public safety.
3. Urban mobility and infrastructure – development and improvement of the functioning of the transportation and technical infrastructure system.
4. Utilization of resources – protecting clean energy and rich heritage, while managing the values and resources of the natural and cultural environment.

Rzeszów in the "100 Climate Neutral and Smart Cities" Mission

One of the opportunities for Rzeszów to develop into a modern, sustainable, and resident-friendly city, while securing support and cooperation at the European level, is its participation in the "100 Climate-Neutral and Smart Cities" Mission.

The city's participation in such an ambitious Mission is seen as an opportunity to gain the following benefits:

- sustainable development — by achieving an ambitious goal of reducing greenhouse gas emissions across all areas of the city's activities,
- financing and support — through access to expert/technical and advisory support from the European Union level, as well as dedicated financing, which can accelerate the implementation of pro-ecological and innovative projects,

- innovation and technology — through the implementation of smart solutions in the city's management process,
- improvement of quality of life through the implementation of activities related to climate neutrality and smart city management, leading to better air quality, reduced noise, improved infrastructure, and more efficient management of urban resources, which directly improves the quality of life for residents,
- strengthening the City's image: participation in a prestigious initiative helps build a positive image of Rzeszów as an innovative, eco-friendly city actively engaged in combating the climate crisis, which can attract investors, tourists, and new residents,
- international cooperation: enabling the establishment of contacts and collaboration with other European cities, fostering the exchange of experiences, knowledge, and best practices in city management.

Reorganization of urban structure

The city of Rzeszów is at the beginning of its journey towards achieving climate neutrality, as evidenced in the survey for cities - "Mission of Climate-Neutral and Smart Cities, Invitation to Express Interest". Recognizing the urgent need to prioritize actions aimed at climate protection and make it one of the key issues in the City's development policy, the Mayor of the City of Rzeszów decided to reorganize the structure of the Rzeszów City Office as follows:

- *by the Order of November 3, 2022,* the Department of Environmental Protection and Agriculture of the Rzeszów City Office was replaced by the Department of Climate and Environment of the Rzeszów City Office, which includes: the Division of Climate and Environment, the Division of Nature Conservation and Water Management, and the Division of Energy. In the newly established Department, climate protection and energy transformation issues are of paramount importance.
- establishment of the Climate Neutrality and Smart City Team. Currently, the Team comprises representatives from various Departments of the City Office and is supported by representatives from Municipal Companies. In the future, it will be progressively improved with external expertise (universities, businesses, NGOs) The team developed all elements of the City Climate Contract in collaboration with business representatives and universities (meetings within the framework of the Economic Council's activities under the Mayor, to establish development directions and financing opportunities), as well as with city residents (recommendations from the citizens' panel implemented as tasks in the Action Plan—expected by the residents and enjoying their strong support).
- the newly established instrument is the *Economic Council under the City Mayor's Office*. This is an advisory body that can significantly support the development of the local economy. Table C-1.2 contains a detailed description of the role, functions, potential benefits, and opportunities provided by collaboration with the Economic Council. By providing valuable analysis, recommendations, and supporting investment and innovation initiatives, the Council can contribute to the dynamic and sustainable economic development of Rzeszów, improve the quality of life for its residents, and increase the city's attractiveness on both national and international levels.
- *The position of Coordinator for Social Participation has also been created at the City Office of Rzeszów*, whose aim is to engage the local community in decision-making processes and the actions of the authorities, organize social consultations, public debates, and other forms of dialogue with residents, and conduct information campaigns to increase residents' awareness of participation opportunities.

The position of the Coordinator for Social Participation is crucial for building dialogue and cooperation between the authorities and residents, which leads to more effective and democratic management of local affairs.

Actors in the change process

The success of implementing the actions outlined in the Action Plan, as well as any other activities necessary to achieve climate neutrality by 2030, requires an integrated approach and is closely dependent on the stakeholders of this process. Stakeholder engagement requires close collaboration, communication, and coordination at various levels.

<u>The main groups that need to be included in the process are:</u>

- government and regulatory bodies (central and regional government levels, local government),

- private sector (energy and heating companies, industry and manufacturing sector, small and medium-sized enterprises)
- civil society and local government organizations (local communities, NGOs)
- scientific and research sector (research institutes and universities, experts)
- financial sector (banks and financial institutions, investment funds)
- residents.

The detailed matrix of process actors is indicated in table A-3.2. *Systems & stakeholder mapping*. The key point is that it is not a closed list. As work towards achieving climate neutrality progresses, the matrix will be supplemented with additional stakeholders, often associated with specific types of actions or activities. The process of iteration will also serve this purpose. The Action Plan, as a "living" document, will continuously respond to changes that impact the types of actions taken and the stakeholders involved. Each iteration of the Action Plan will be built based on experiences and results, allowing for gradual but effective achievement of climate neutrality.

Vulnerable groups in the transformation process

Climate transformation of a city is a process that requires the involvement of all residents, including vulnerable groups that may be particularly exposed to the effects of climate change. The participation of those groups is crucial for ensuring social justice and the effectiveness of climate actions. In Rzeszów, during the process of mapping key stakeholders, several social groups were identified as most vulnerable to the effects of climate change, including older people, people with disabilities, low-income families, children and youth, and homeless people. It is important to involve them in the transformation process. The voices of vulnerable groups are heard and taken into account in the processes of planning and making decisions regarding climate change transformation. It is necessary to organize consultation meetings, workshops, and forums that are accessible and tailored to the needs of those groups, as well as to conduct educational campaigns that raise awareness among vulnerable groups about climate change and its effects. Providing information consistently in an accessible, understandable, and tailored manner to different target groups, for example through materials in various languages or formats adapted for people with disabilities. It is important to consider creating support programs for vulnerable groups, which may include grants for improving the energy efficiency of homes, access to renewable energy sources, or support in crisis situations. During hot days, it is important to facilitate access to resources such as cool shelters during heatwaves or adapted means of transportation. Regular monitoring of the impact of climate actions on vulnerable groups and assessing their effectiveness. A just transition requires the implementation of joint projects and initiatives that integrate the perspectives and needs of different groups.

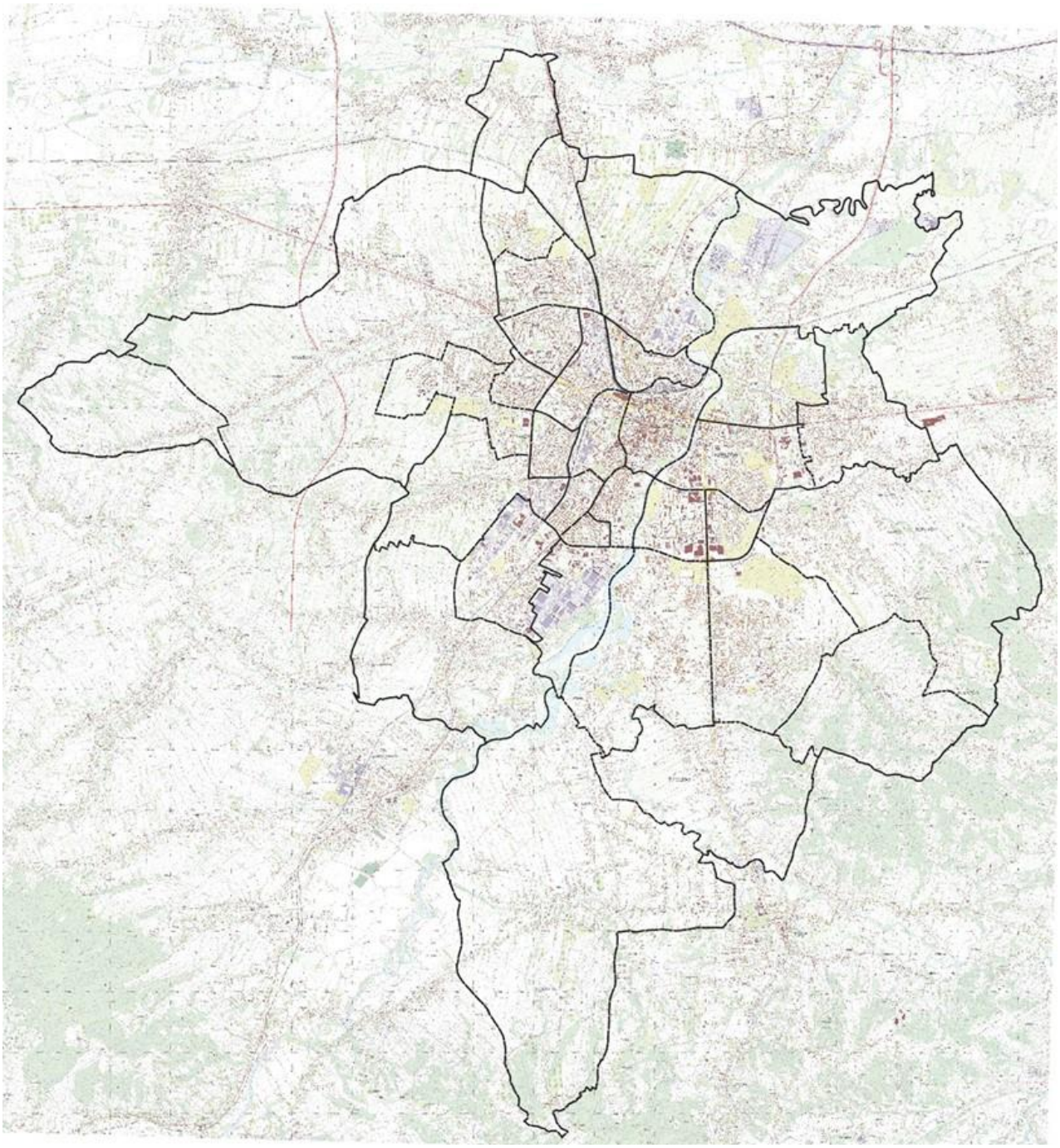
Including vulnerable groups in the city's climate transition is not only just but also increases the effectiveness of actions by incorporating diverse perspectives and needs. This way, climate actions can be more comprehensive, sustainable, and accepted by the entire community.

Sectors	Scope 1	Scope 2	Scope 3
Stationary energy	Included	Included	Included
Transport	Included	Included	Included
Waste/wastewater	Included	Not applicable	Included
IPPU	Included Included emissions from product use occurring within the city boundary (N_2O used in hospitals)	Not applicable	-

AFOLU	Excluded	Not applicable	-
Other	Not applicable	Not applicable	Not applicable
Geographical boundary	**Same as city administrative boundary**	**Smaller than city administrative boundary**	**Larger than city administrative boundary**
(Tick correct option)	X	-	-
Specify excluded/additional areas	-	Required information	Required information

Map

Map 1. Location of Rzeszów in Poland.



Map 2. Administrative boundaries of Rzeszów.

2. Part A – Current State of Climate Action

2.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

GHG Emissions Baseline inventory

The city of Rzeszów is at the beginning of its journey towards achieving climate neutrality. The first, but not very accurate (yet clearly indicating the main sources of CO_2 emissions) baseline CO_2 inventory was carried out for the purposes of the "Low-Emission Economy Plan for the Rzeszów Functional Area", adopted by the City Council of Rzeszów in 2015, and then updated for the purposes of the "Low-Emission Economy Plan for the City of Rzeszów" (adopted by the City Council of Rzeszów in 2017). The inventory was conducted with a division into the following sectors: public administration, housing (including single-family and multi-family buildings as well as municipal buildings), industry, trade and services, transportation (individual transportation and municipal transportation), street lighting. The base year adopted is 2010.

In the city of Rzeszów, the carbon dioxide emissions in the aforementioned base year amounted to 1,454,822.47 tCO_{2e} . On average, each resident of Rzeszów accounted for approximately 8.12 tCO_{2e} per year (compared to the national average in 2010, which was around tCO_{2e} per year). The residential sector had the largest share in carbon dioxide emissions in the city - 34.31% of the total balance, followed by the transportation sector - 28.38% of the total carbon dioxide emissions balance. The industrial sector accounted for 16.03%, the trade and services sector - 15.87%, the public administration sector - 4.86%, while the street lighting sector - 0.55%. Analyzing those results, the highest share in total emissions was held by Stationary Energy—about 72%—and Transport—about 28%.

In order to reduce greenhouse gas emissions and air pollution in the city of Rzeszów, the "Low-Emission Economy Plan for the City of Rzeszów" proposed the implementation of 21 corrective actions, divided into projects and tasks, which were expected to contribute to a reduction of carbon dioxide emissions by 83,045.58 tons, a decrease in final energy consumption by 274,787.66 MWh, and an increase in the share of energy from renewable sources by 178,403.41 MWh by the year 2020. Some of the actions planned for implementation were also scheduled beyond 2020, with a perspective extending to 2024. Based on the results obtained at that time, strategic goals for the city of Rzeszów were formulated for the year 2020:

- reduction of carbon dioxide emissions in the city of Rzeszów by 5.69% compared to the base year of 2010.
- reduction of final energy consumption in the city of Rzeszów by 6.55% compared to the base year of 2010,
- increase in the share of renewable energy sources in the city of Rzeszów by 4.56% compared to the base year of 2010,
- reduction of PM10 emissions in the city of Rzeszów by 6.52% compared to the base year of 2010,
- reduction of PM2.5 emissions in the city of Rzeszów by 2.81% compared to the base year of 2010,
- reduction of benzo(a)pyrene emissions in the city of Rzeszów by 2.93% compared to the base year of 2010,

The goals for 2020 have been achieved.

Today, it is very clear that the goals set at that time were completely inadequate for the needs, and all actions, both investment and non-investment ones, require significant acceleration and intensification.

There is also a recognized need for accurate inventory, which will be the starting point for planning actions to achieve climate neutrality, hence the GHG inventory for 2022 was conducted, covering the entire administrative area of the City Municipality of Rzeszów. The inventory was conducted in accordance with the guidelines outlined in the "Global Protocol for Community Scale Greenhouse Gas Inventories" and taking into account the guidelines contained in the document "Info Kit for Cities interested in participating in the call for expression of interest". The inventory was conducted according to the basic level of reporting (BASIC), with the inventory also expanded to include additional scopes that are part of extended reporting (BASIC+).

The sectors covered by the inventory are:

– stationary energy – scopes 1, 2, 3 (scope 3 from BASIC+ reporting),
– transportation - scopes 1, 2, 3 (scope three from BASIC+ reporting),
– waste (scopes 1, 3),
– industrial processes and product use (Scope 1 of BASIC+ reporting).

The agriculture, forestry and other land use (AFOLU) sector has been excluded from the inventory for 2022 because Rzeszów is not an agricultural city, the areas used in this way are small, and there is also no mass animal breeding, which according to available reports is the second largest GHG emitter in the agriculture sector. Additionally, in the near future, there are plans to expand greenhouse gas inventory from the Basic level to the Basic+ level. Planned inventory expansion will include the following sectors: Industrial Processes and Product Use (IPPU) and Agriculture, Forestry and Other Land Use (AFOLU) and additional greenhouse gases. As will be shown later in the text, the largest sources of GHG emissions for the city of Rzeszów will be Stationary Energy and Transport. Even the waste sector accounts for only 1% of the total GHG emissions from the city area.

In connection with the sectors adopted for the greenhouse gas inventory, the following greenhouse gases were included:

- CO_2 - carbon dioxide,
- CH_4 – methane,
- N_2O – nitrous oxide.

The specified values for the above greenhouse gases have been converted to CO_{2e}, which stands for carbon dioxide equivalent.

Main sources of emissions

The conducted inventory clearly identifies the main sources of emissions. The total amount of inventoried greenhouse gas emissions in carbon dioxide equivalent from the area of the City Municipality of Rzeszów in 2022 amounted to 1,395,839 tCO_{2e}. On average, each resident of the city of Rzeszów accounted for approximately 7.06 tCO_2/year. The sector with the largest share of carbon dioxide emissions in the city was the Stationary Energy sector - 74% of the total balance, followed by the Transport sector - 25% of the total carbon dioxide emissions balance. The Waste sector was responsible for approximately 1% of total emissions. The impact of the remaining sectors was negligibly small.

In terms of quantity, the emissions from individual areas are as follows:

- Stationary energy – 1,035,904 tCO_{2e},
- Transport – 344,403 tCO_{2e},
- Waste – 14,755 tCO_{2e},
- IPPU – 777 tCO_{2e}.

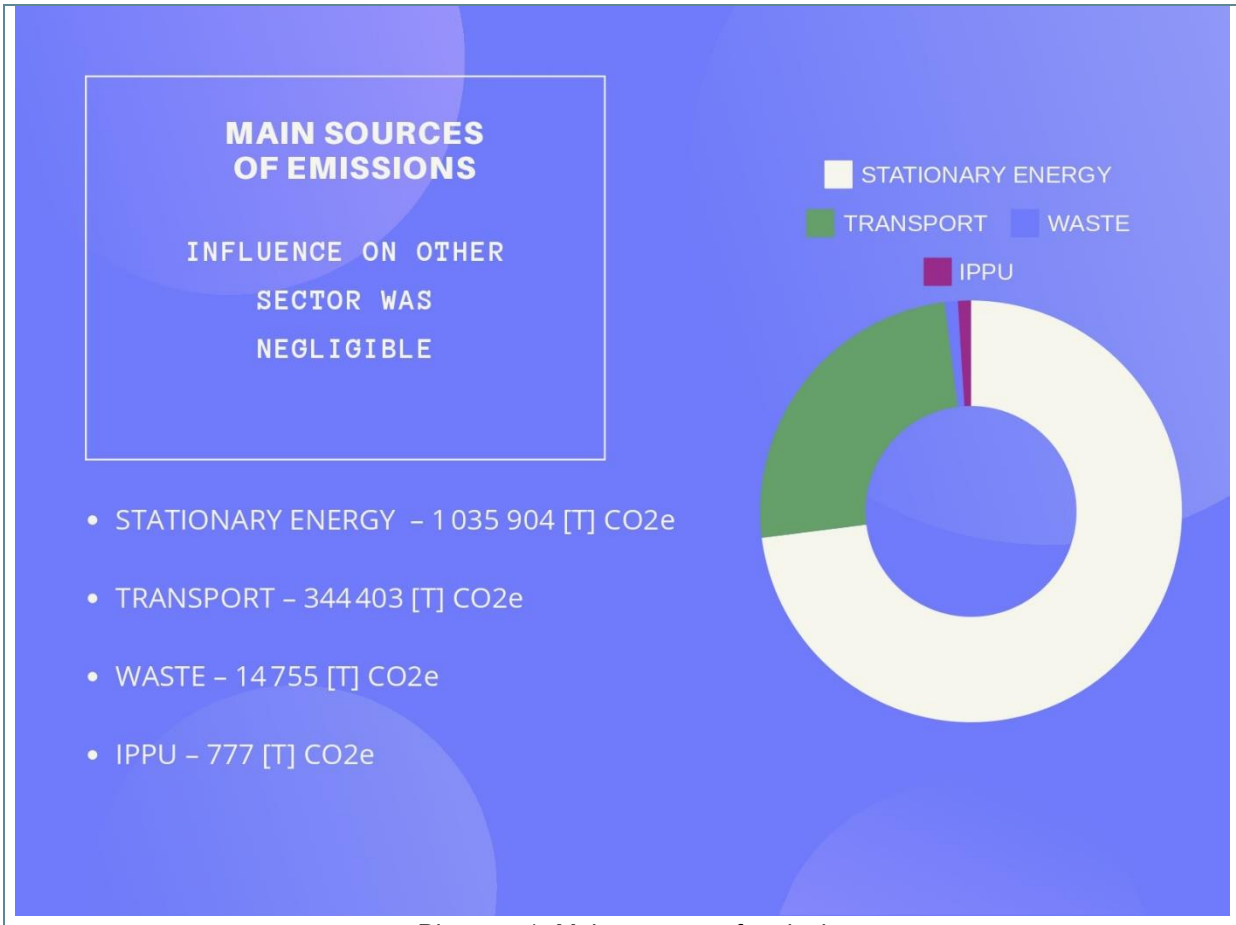


Diagram 1. Main sources of emissions

By comparing the data from 2010 with the current data, it is clear that the main sources of greenhouse gas emissions have remained unchanged. However, it should be noted that from 2010 to 2022, the city has increased its area by 12.65 km^2, and the number of residents has increased by 17,982.

At present, Rzeszów is not a member of the Covenant of Mayors, and greenhouse gas emissions are also not reported to CDP/ICLEI. In the near future, it is planned to submit to the Covenant of Mayors and report in accordance with the principles adopted there.
Accurate inventory of greenhouse gas emissions is a key step in designing climate action pathways and initiatives in Rzeszów. The carefully conducted process of gathering data necessary for the inventory allowed the trained employees of the Rzeszów City Office (with competences retained within the Office) to:

- better understand the problem through analysis of detailed data on current greenhouse gas emissions, energy consumption, air pollution levels in the city, and many other interconnected factors.
- identify areas requiring intervention and determination of priorities,
- design reduction actions,
- in the future - monitor progress and identify problem areas.

Planned level of greenhouse gas reduction

The planned tasks are very ambitious and costly. They currently allow for a reduction of emissions by 1,117,525 tCO_{2e}, which means a reduction of **80.06%**. It should be noted that at this stage, due to lack of accurate data, the reduction that may result from the task of developing and modernizing the power infrastructure in the city has not been estimated. However, considering the development plans of companies responsible for electricity and gas networks, which are very ambitious and include actions corresponding to the goal of climate neutrality, such as integration with renewable energy sources, modernizations (towards smart grids, automation, monitoring), or actions for energy efficiency (reducing

transmission losses, demand management), it can be inferred that by 2030 the task will contribute to the reduction of CO_{2e} emissions.
Divided by areas, the CO_{2e} reduction is as follows:

- Stationary energy - **81.06%** of the reduction in this area (839,717 tCO_{2e}),
- Transport - **80.05%** of the reduction in this area (275,694 tCO_{2e}),
- Waste - **14.33%** of the reduction in this area (2114 tCO_{2e}).

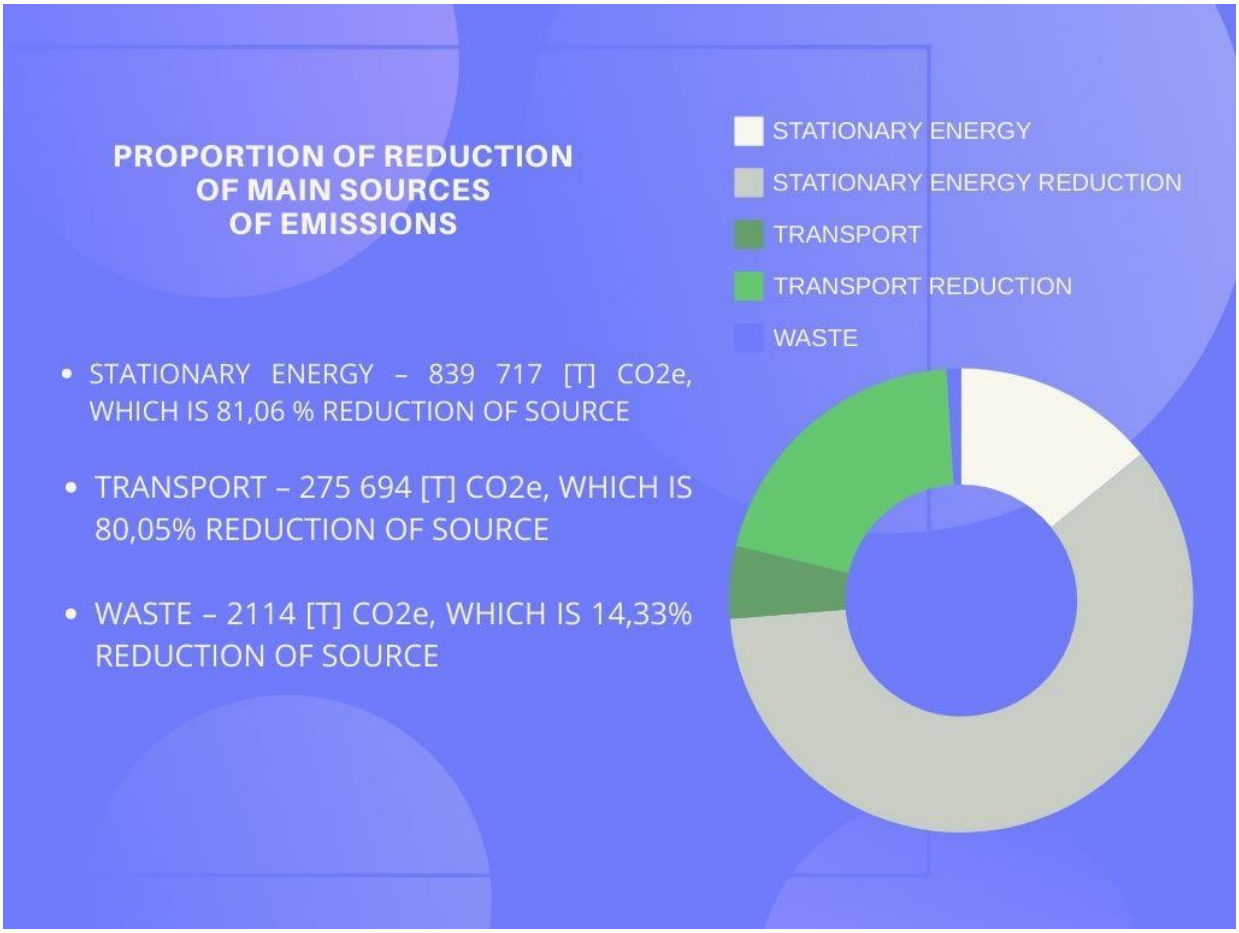


Diagram 2. Proportion of reduction of main sources of emissions

Considering the above, the residual emissions will come from the following areas: stationary energy, transportation, waste, and IPPU. It should be noted that tasks in the above-mentioned areas will be accelerated and intensified in order to achieve the greatest possible reduction of GHG emissions. Investments in green infrastructure & nature-based solutions will also be developed intensively and systematically, which, in addition to absorbing CO_2, have significant adaptive importance in a changing climate.

At the same time, existing greenery is continuously maintained due to its value.
The City also recognizes the potential for technological capture and long-term storage of carbon dioxide.

A-1.1: Final energy use by source sectors			
Base year	2022		
Unit	MWh/year		
	Scope 1	Scope 2	Scope 3
Buildings			
Hard coal	133,656.75		
Fuel oil	25,377.54		
Natural gas	592,282.00		
District heating		627,927.89	92,696.40
Biomass	21,438.00		
Liquefied petroleum gas (LPG)	1,096.37		
Solar energy-photovoltaics	37,664.10		
Electric energy		663,697.00	34,155.35
Ambient energy - heat pump	9,158.40		
Transport			
Gasoline	461,795.00		
ON	695,367.96		
LPG	162,477.00		
CNG	6,587.96		
Electric energy	4,132.91		226.7
Waste	0 because energy consumption is measured in buildings	-	0 because energy consumption is measured in buildings
(Fuel type/ energy used)	-	-	-
Industrial Process and Product Use (IPPU)	-	-	-
(Fuel type/ energy used)	-	-	-
Agricultural, Forestry and Land Use (AFOLU)	-	-	-
(Fuel type/ energy used)	-	-	-

A-1.2: Emission factors applied						
For calculation in t or MWh of primary energy						
Indicators consistent with IPCC 2013, IPCC Fifth Assessment Report: Climate Change 2013. To determine CH_4 and N_2O - according to 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)
Hard coal	94.77 kg/GJ					
Fuel oil	74.1 kg/GJ					

Natural gas	55.33 kg/GJ					
Liquefied petroleum gas (LPG)	63.1 kg/GJ					
District heating MPEC	108.83 kg/GJ					
EDISON district heating	141.621 kg/GJ					
PGE district heating	100.07 kg/GJ					
Electric energy	685 kg/MWh					
Green waste		4 kg/Mg	0.24 kg/Mg			
Biodegradable kitchen waste		4 kg/Mg	0.24 kg/Mg			
Solid waste disposed in landfills.		42.2112 kg/Mg				
Sewage		0.2 kg/kg COD; 0.5 kg/kg BOD	0.00707 kg/kg N			
Passenger cars						
Gasoline	1,582 kg/vehicle	0.008 kg/vehicle	0.02 kg/vehicle			
ON	2,669 kg/ vehicle	0.03 kg/vehicle	0.11 kg/vehicle			
LPG	2,067 kg/ vehicle	0.17 kg/vehicle	0.05 kg/vehicle			
Trucks						
Gasoline	3,678 kg/ vehicle	0.11 kg/vehicle	0.07 kg/vehicle			
ON	4,735 kg/ vehicle	0.03 kg/vehicle	0.14 kg/vehicle			
LPG	2,067 kg/ vehicle	0.17 kg/vehicle	0.05 kg/vehicle			
CNG	55.33 kg/GJ					

A-1.3: GHG emissions by source sectors					
Base year		2022			
Unit		Mg CO_2/year			
		Scope 1	Scope 2	Scope 3	Total
Buildings		270,348	705,183	60,373	1,035,904
Transport		341,416	2,831	156	344,403
Waste		8,829	-	5,926	14,755
Industrial Process and Product Use (IPPU)		777	-	-	777
Agricultural, Forestry and	Sources (positive emissions)	-	-	-	-

Land Use (AFOLU)	Sinks (negative emissions)	-	-	-	-
Total	-	621,370	708,014	66,455	1,395,839

A-1.4: Activity by source sectors.			
Base year 2022			
	Scope 1	Scope 2	Scope 3
Sector: Buildings			
Number of residential buildings using coal as a heating source.	5,189 pcs.		
Number of residential buildings with a biomass-fired heating source.	1,191 pcs.		
Number of residential buildings with an LPG-fired heating source.	38 pcs.		
Number of residential buildings with an oil-fired heating source.	48 pcs.		
Number of residential buildings with solar collectors.	954 pcs.		
Number of residential buildings with a heat source in the form of heat pumps.	954 pcs.		
Power of prosumer photovoltaic installations.		41,849 kW	
Use of fuels and energy in residential buildings supplied by networks.	425,536 MWh of gas	300,912.22 MWh of district heating, 134,292 MWh of electricity.	
Losses in energy/heat transmission.			12.83% in MPEC district heating networks, 16.987% in PGE district heating networks, 3.67% in power networks.
Use of fuels and energy in service and industrial buildings supplied by networks.	166,719 MWh of natural gas	282,506.78 MWh of district heating through the MPEC network, 39,710 MWh of district heating through the EDISON NEXT Poland network, 4,799 MWh of district heating through the PGE network, 529,404.59 MWh of electrical energy.	

Fuels burned by the service and industry sector.	105 MW of hard coal, 2067 tons of fuel oil, 394 tons of wood, 42 tons of LPG.		
Emissions from natural gas distribution.	235.58 Mg CO_2 and 351.99 Mg NH_4		
Sector: Transport			
Number of passenger and commercial vehicles powered by gasoline .	69,372		
Number of passenger and commercial vehicles powered by ON .	53,643		
Number of passenger and commercial vehicles powered by LPG .	17,856		
Fuel and energy consumption for bus transportation.	26,008 MWh in ON, 6,588 MWh in CNG.	649 MWh for electric buses	
Energy consumption for railway transportation.		3,393.5 MWh for electric trains and railway infrastructure.	
Electricity losses in the network.			5.2% of the supplied energy
Electricity supplied to charging stations.		90.4 MWh	
Amount of fuel for off-road transportation.		928.56 MWh	
Sector: Waste			
Amount of green waste collected and composted in the city.	5,567.99 Mg		
Amount of biodegradable kitchen waste undergoing biodegradation collected and composted in the city.	4,126.28 Mg		
Amount of solid waste transferred to landfills outside the city.			5,014.22 Mg
Amount of municipal wastewater from the city area treated at the wastewater treatment plant located within the	16,184,000 m^3		

city.			
Amount of municipal wastewater from outside the city area treated at the wastewater treatment plant located within the city.	1,316,000 m^3		
Amount of industrial wastewater from the city area treated at the wastewater treatment plant located within the city.	647,100 m^3		
Sector: Industrial Process and Product Use (IPPU)			
Amount of N_2O from medical use.	2.9 Mg		

2.2 Module A-2 Current Policies and Strategies Assessment

A-2.1: Description & assessment of policies

Well-designed policies and strategies are crucial in striving for climate neutrality, as they shape the legal, economic, and social frameworks that enable the reduction of greenhouse gas emissions and promote sustainable development. Below are presented local, regional, national, and EU policies that have a particular impact on the issue of achieving climate neutrality in the city.

Local policies

- Development Strategy of the City of Rzeszów until 2025.
- Study of Conditions and Directions for Spatial Development of the City of Rzeszów.
- Assumptions for the plan of supplying heat, electricity, and gas fuel for the City of Rzeszów. Update for the years 2023 - 2026
- Low-Emission Economy Plan for the City of Rzeszów.
- Climate Change Adaptation Plan for the City of Rzeszów until 2030.
- Environmental Protection Programme for the City of Rzeszów.
- Sustainable development plan for public collective transportation for the years 2021-2030 with elements of electromobility development strategy for the city of Rzeszów and neighboring municipalities.
- Update of the Air Protection Program for the Rzeszów City Area.
- Resolution on introducing restrictions on fuel combustion installations in the Podkarpackie Voivodeship

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Development Strategy of the City of Rzeszów until 2025

The document, taking into account in particular the strategic diagnosis presented in the City Report and the Catalog of key phenomena constituting opportunities and threats, as well as the strengths and weaknesses of Rzeszów's development in 2015, and the opinions expressed by residents in the survey conducted for the purpose of updating the Strategy, adopts the following vision of the Development Strategy of Rzeszów. Rzeszów – the growth hub of the Podkarpacie region – is a city that is friendly to people, offering and expanding numerous metropolitan functions. It is a place where it's worth living, with a high quality of life and environme nt, as well as comprehensive economic, social, and cultural development. Four sectoral strategic goals have been adopted, relating to the city's environment and subsystems:

1. Smart City – creating favorable conditions for the development of Rzeszów as an attractive location for business activities, as well as for the advancement of education, higher education, science, and culture.
2. A socially cohesive and integrated city – improving both the living conditions of residents and public safety.
3. Urban mobility and infrastructure – development and improvement of the functioning of the transportation and technical infrastructure system.
4. Utilization of resources – protecting clean energy and rich heritage, while managing the values and resources of the natural and cultural environment.

Four horizontal strategic goals related to the city management subsystem have also been adopted:

1. Territorial coherence - rational spatial and architectural development of the city's territory. Conducting pro-development, sustainable spatial management, which is one of the main tasks of the municipality.
2. Rich (Affluent) City - ensuring the ability to finance the development of the City using public and private funds. Utilizing support instruments for development included in the cohesion policy of the European Union and the Partnership Agreement, as well as other public and public-private instruments available within state policies.
3. City of cooperation - ensuring efficient social communication and cooperation between the City and public, economic, social entities and residents. Creating an institutional management system for the City in accordance with the EU cohesion policy, taking into account multi-level and multi-entity governance.
4. The "Rzeszów" Brand – developing a nationally and internationally recognizable image of Rzeszów as a center for economic and social innovation, a hospitable city, and friendly to visitors. Utilizing territorial marketing to stimulate development processes and improve the quality of life for residents.

Importance

The Development Strategy of the City of Rzeszów until 2025 is a document that defines the directions of the city's development. Sustainable development, prioritization of environmental protection issues, including mitigation and adaptation to climate change, promotion of low- and zero-emission economy, investment in research and innovation, and raising awareness of residents and ecological education can significantly contribute to the reduction of greenhouse gas emissions and help achieve climate neutrality.

Study of Conditions and Directions for Spatial Development of the City of Rzeszów.

The Study of Conditions and Directions for Spatial Development of the City of Rzeszów is the most important urban planning document, which was adopted on September 26, 2023 by the City Council of Rzeszów. The Study is the basic document shaping the spatial policy of the city. The current Study assumes a revaluation of the city's spatial policy. The current level of economic development and the expectations of the residents cause the spatial policy defined in it to focus on the current and future residents of the city, with the overriding goal of ensuring them a high quality of life, without neglecting the aspects of economic development, which are to be carried out in a sustainable and responsible manner. However, the Study continues the main assumptions of spatial development defined in the previous document, ensuring the continuity of the city's planning policy. A significant revaluation has been made in the approach to the development of transportation infrastructure and the role of urban public transportation. The creation of a multifunctional city with high accessibility to social infrastructure and public spaces has been assumed. Unfavorable demographic trends have led to a particular focus on senior policy and the needs of young people. The need for development

of the former rural areas incorporated into Rzeszów, as well as the role of the city in the structure of the Rzeszów Functional Area, assuming closer cooperation and further development of spatial connections with neighboring municipalities, has also been assigned significant importance.
The nature of the Study means that it does not have strictly defined time frames. Nevertheless, the demographic forecast and the land use balance for development have been formulated with a perspective up to the year 2045. In connection with this, the needs and development possibilities of the city have been determined for such a time horizon. Taking into account a number of strategic and implementation documents developed by the city, the provisions of the Study have been formulated. The Development Strategy of the City of Rzeszów until 2025 plays a particularly important role here.
Taking into account the need to link the spatial policy of the Study with the one included in the Strategy and other socio-economic policy documents of the city, the directional part of the Study was given some characteristics of a strategic document, presenting key issues in the form of sectoral policies, as well as formulating a vision of development and defining the main goal. This approach allows for an attempt to comprehensively formulate the spatial policy of the city. It also meets the long-planned reform of integrating spatial planning and socio-economic systems, including close links between strategic documents and spatial planning acts. Given the nature and objectives of the Study, the sectoral policies have been focused solely on their spatial dimension.
One of the most important goals of Rzeszów's spatial policy is to shape the natural environment in such a way that residents can live healthier and more comfortably, that it promotes the development of the city and the settlement of new residents, while at the same time limiting their migration from the city to suburban areas. In the Study, spatial policy directions were adopted, in line with general principles of environmental protection, which allow for the protection of its resources. This approach aims to promote sustainable urban development, defined as socio-economic development in which there is a process of integrating not only political, economic, and social actions, but also maintaining a balance of nature in order to guarantee the ability to meet the basic needs of the current community and future generations.
The adopted directions of spatial policy actions take into account the need to prevent the negative effects of climate change and facilitate the city's adaptation to ongoing climate changes. As part of the spatial policy “environment and climate resilience”, the following main objectives and resulting directions of action are outlined. Main goals of the policy:

- sustainable development of the city, including maintaining ecological balance to ensure the ability to meet the needs of current residents as well as future generations,
- protection of environmental resources and valuable natural areas,
- shaping and protecting elements of the city's natural and climate system,
- reducing the risk of natural and anthropogenic hazards,
- minimizing and mitigating the effects of climate change by creating and strengthening tools and capabilities for adapting the city to such changes; reducing the city's negative impact on the climate.

Directions of activities:

- nature conservation,
- development of green areas,
- shaping ecological areas,
- shaping green areas as a key element of the natural-climatic system,
- protection, use and development of agricultural and forest areas,
- shaping allotment garden areas as a part of the city's natural system,
- protection of natural resource deposits,
- protection of the quality of surface and groundwater,
- air protection,
- protection of the acoustic climate,
- protection against the effects of geodynamic processes,
- protection against industrial threats,
- flood protection,
- increasing the city's resilience to ongoing climate change.

Importance

The Study of Conditions and Directions for Spatial Development of the City of Rzeszów is a key planning tool determining the character of the city. Spatial planning plays a crucial role in achieving climate neutrality by influencing various aspects of spatial management, infrastructure, and resources. Optimizing space utilization, sustainable transportation development, energy efficiency, support for renewable energy sources, preservation and development of green areas, water resource management and waste management as priorities for the sustainable development of Rzeszów and setting the direction of the city's development in accordance with the above assumptions will contribute to achieving the climate neutrality of the City.

Assumptions for the plan of supplying heat, electricity, and gas fuel for the City of Rzeszów. Update for the years 2023 – 2026

The document is a strategic act based on the provisions of the Energy Law. This is a document prepared for at least 15 years and subject to updates every three years. Its aim is to analyze and evaluate the projected changes in heat demand, electricity demand, and gas fuel demand, as well as to assess the level of energy security of the municipality and provide suggestions for actions aimed at its improvement. The energy demand has been calculated based on assumptions resulting from the directions of development specified in the "Study of Conditions and Directions for Spatial Development". The development assumptions resulting from the aforementioned document were taken into account and the demand was balanced, taking into account the planned development areas. When conducting the energy balance of the City of Rzeszów, the focus was on the consumption of final energy in the form of three types of energy used by the residential sector, public sector, trade and services sector, and companies: heat, electricity, and energy from gas fuel. The analysis is based on the current energy demand in the City developed for the year 2022. An estimated forecast of the demand for final energy carriers was developed for the perspective of 2037. The forecast has been prepared for three forecast scenarios. The most appropriate option was considered to be the balanced variant, which includes, among others:

- stable development and moderate growth in demand for thermal and electrical energy,
- stable development and relatively high growth in demand for natural gas,
- slight increase in the number of residents according to GUS forecasts,
- modernization of heat sources with optimal use of energy carriers, where district heating will play a greater role, followed by natural gas, as well as gradual introduction (according to existing conditions) of renewable energy sources,
- new buildings put into use in the city will be constructed in accordance with the currently applicable energy-saving requirements, with about 20% of them being built in the highest energy class,
- a slowdown in the demand for gas until 2025, followed by an increase in demand, which will be partially supplemented by biomethane (starting from 2025),

The analysis results for the sustainable variant (with energy type breakdown) are presented in the table below.

Table 1. Projected energy demand in the city [MWh/year]

	2022	**2027**	**2032**	**2037**
Heat	1,463,939	1,447,254	1,437,945	1,429,250
Electric energy	674,904	677,985	677,985	683,068
Natural gas	633,360	637,045	655,270	660,168
Total	**2,772,203**	**2,762,283**	**2,771,200**	**2,772,486**

Source: Assumptions for the plan of supplying heat, electricity, and gas fuel for the City of Rzeszów. Update for the years 2023 – 2026

Importance

The integrated approach and consistent implementation of the provisions of the analyzed document will allow for significant environmental, economic, and social benefits for the City of Rzeszów. These actions will contribute to reducing GHG emissions by reducing fossil fuel consumption, increasing energy efficiency, and promoting renewable energy sources.

Low-Emission Economy Plan for the City of Rzeszów

The low-emission economy plan is a strategic document that focuses on increasing energy efficiency, increasing the use of renewable energy sources, and reducing greenhouse gas emissions. The essence of the Plan is to achieve economic, social, and environmental benefits resulting from actions reducing greenhouse gas emissions. The strategic goal of the Low-Emission Economy Plan for the City of Rzeszów has been presented in the following form:The city of Rzeszów is a leader in activities aimed at improving air quality, including rational energy consumption and the use of low-emission and renewable energy technologies. The goal will be achieved through the following specific objectives:
- reduction of carbon dioxide emissions in the city of Rzeszów by 5.69% compared to the base year of 2010,
- reduction of final energy consumption in the city of Rzeszów by 6.55% compared to the base year of 2010,
- increase in the share of renewable energy sources in the city of Rzeszów by 4.56% compared to the base year of 2010,
- reduction of PM10 emissions in the city of Rzeszów by 6.52% compared to the base year of 2010,
- reduction of PM2.5 emissions in the city of Rzeszów by 2.81% compared to the base year of 2010,
- reduction of benzo(a)pyrene emissions in the city of Rzeszów by 2.93% compared to the base year of 2010,

As part of improving air quality in the city of Rzeszów, 21 corrective actions have been proposed for implementation, divided into projects and tasks, which together contributed to a reduction of carbon dioxide emissions by 83,045.58 tCO_e, a decrease in final energy consumption by 274,787.66 MWh, and an increase in the share of energy from renewable sources by 178,403.41 MWh in 2020. Some actions are scheduled to be implemented after 2020, with a timeline extending to 2024.

Importance

The Low-Emission Economy Plan for the City of Rzeszów is a key tool in reducing greenhouse gas emissions by promoting renewable energy sources, improving energy efficiency, developing sustainable mobility, and educating and engaging the local community. It is a document focused on actions, the implementation of which directly translates into the goal of achieving climate neutrality.

Climate Change Adaptation Plan for the City of Rzeszów until 2030

The Climate Change Adaptation Plan for the City of Rzeszów until 2030 was developed in response to one of the most important environmental issues: climate change and the need to adapt to its effects. The plan outlines a vision, overarching goal, and specific objectives for adapting the city to climate change, which should be achieved through the implementation of selected adaptation actions in four of the city's most vulnerable sectors: public health/vulnerable groups, water management, transportation, and tourism, specifically in recreational areas.

The adaptation plan is aligned with climate change adaptation documents at the international, community, national, and regional levels. Adaptation actions are consistent with the EU and national climate change adaptation policies. Here is a refined version of your sentence: They also align with the development policy of Rzeszów, as outlined in the strategic and planning documents applicable in the city. The adaptation plan aims to prepare the city for climate change, reduce its vulnerability to extreme events, and increase its capacity to manage the impacts of those events and their consequences.

The adaptation plan includes a diagnostic section that describes the climate phenomena and their impacts on the city, assesses the city's sensitivity to those phenomena, and evaluates the city's ability to independently manage the consequences of climate change. In response to the risks identified in the diagnostic section of the document, adaptive actions necessary to increase the city's resilience to current and future phenomena have been outlined. The plan includes three types of actions:

- informational and educational actions,
- organizational actions,
- technical actions.

The plan of adaptation also specifies the rules for implementing adaptation measures (responsible entities, financing framework, monitoring indicators, evaluation assumptions, and document updates).
The main objective indicated in the Plan is the development and increased attractiveness of Rzeszów through improving the state of the environment and increasing adaptive capacity, taking into account the principle of sustainable development in the conditions of climate change. The main goal of the Plan, on the other hand, is to increase the city's resilience to the predicted increase in the frequency and intensity of heatwaves and dry periods with high temperatures by 2030, as well as the increase in the frequency and intensity of heavy rainfalls resulting in flooding, and to the occurrence of smog through the implementation of multiple adaptive actions that have a synergistic effect. Adaptation measures will help the city to adjust to climate change by reducing the vulnerability of the following sectors: public health/vulnerable groups, water management, transportation, and tourism understood as recreational areas in the city. The selection of adaptive actions was made in such a way that each adaptive goal was achieved in an optimal manner, taking into account, among others, the criteria of sustainable development, cost-effectiveness, and the synergistic impact of action effects in also reducing other threats. Increasing readiness and capacity to respond to the effects of climate change described by specific objectives requires action in various areas of the city's functioning - its organization, education, warning residents about hazards, and technical solutions in urban space. Organizational activities concern changes in local law in areas such as spatial planning, organization of public space, development of guidelines for dealing with climate threats, improvement of the functioning of municipal services or systems warning against hazards. Information and educational activities are actions that support and raise climate awareness and promote good adaptive practices. They allow to make the city and its residents resilient through appropriate educational programmes and intensified informational activities.Technical actions are investment activities involving the construction of new or modernization of existing infrastructure that contribute to protecting the city from the negative effects of climate change.

Importance

The climate change adaptation plan is crucial in the context of climate change adaptation by identifying investments in climate-resilient infrastructure, ecosystem protection, social education, and adaptation of energy infrastructure. Through those actions, the plan contributes both to the adaptation of the local community to climate change and to the reduction of greenhouse gas emissions, which aligns with global efforts to combat climate change.

Environmental Protection Programme of the City of Rzeszów

The document sets forth the primary objective as “The development of the city of Rzeszów through continued efforts to improve the state of the environment, guided by the principle of sustainable development”. It encompasses the analysis and evaluation of the environmental state within the city of Rzeszów, addressing intervention areas for which the following strategic objectives have been defined:

- climate and air quality protection: improving air quality and effective energy management,
- noise hazards: reducing the negative impact of noise on the residents of the city of Rzeszów and the natural environment,
- water and wastewater management: modernization and development of water and wastewater infrastructure in the city of Rzeszów, as a part of efforts to improve the condition of groundwater and surface water,
- waste management and waste prevention: implementing actions aimed at improving the waste management system,
- natural resources: preserving the richness of nature and the landscape values of urban spaces.

The above strategic objectives define the main direction of actions in the aforementioned areas of intervention and comprehensively describe the tasks planned for implementation in the years 2021 - 2024. The implementation of strategic goals through the execution of planned activities under the Rzeszów City Environmental Protection Program is subject to appropriate monitoring. Its correct execution requires assigning an indicator to each task, as well as its baseline and target values. The state of the environment is presented numerically, showing the levels that should be achieved during task implementation. The proposed indicators are planned to be achieved by 2024. The implementation of actions indicated in the Environmental Protection Program of the City of Rzeszów will contribute to

the improvement of the natural environment in the city and have a positive impact on the health and lives of its residents.

Importance

The Environmental Protection Program of the City of Rzeszów aims to protect natural resources, preserve biodiversity, prevent pollution, promote sustainable development, and ensure a healthy environment for future generations, thus aligning with the goal of achieving climate neutrality.

Sustainable development plan for public collective transportation for the years 2021-2030 with elements of electromobility development strategy for the city of Rzeszów and neighboring municipalities.

The main goal of the Plan is to ensure the functioning of public transportation according to the principles of sustainable development, which is mainly manifested in cities by the share of public transportation in transportation at the level of 25-50%. The supplementary objectives of the transportation plan are as follows:

1. Ensuring the principles of accessibility to public transportation services, including for people with disabilities, required and specified in European Union directives and national regulations, as well as in so-called good practices.
2. Functioning of public transportation as a real alternative to traveling by private cars - by providing high-quality services and prioritizing collective transportation vehicles in road traffic.
3. Integration of public transportation, including urban and regional transportation - primarily in terms of fare and ticketing, schedule coordination, service information - as well as the construction of integration hubs.
4. Reducing the negative impact of transportation on the environment - by expanding the fleet of zero-emission vehicles, gradually replacing the worn-out bus fleet, and maintaining the established share of public transportation in urban transportation.

The main task of the Plan is to plan public utility transportation services within the city of Rzeszów and neighboring municipalities (with which the City Municipality of Rzeszów—acting as the transportation organizer—has signed agreements regarding local public transportation), in accordance with the principles of sustainable development. This is due to the significant importance of mobility for socio-economic development and the negative consequences of uncontrolled growth in individual motorization. The increase in awareness of the importance of transportation issues, including those related to pollution emissions and noise, has led to a change in the perception of combustion engine vehicles. Thanks to the Act on Electromobility and Alternative Fuels, the provisions of which are in line with global trends, regulations have been introduced to stimulate the development of low- and zero-emission transportation in Polish cities. Pursuant to the provisions of the aforementioned law, local governments have become one of the main participants in the process of popularizing the use of alternative fuels to meet the daily transportation needs of their residents.

Importance

Taking into account the fact that the transportation sector is a significant source of air pollution and greenhouse gas emissions, the Plan defining sustainable public transportation, not only in Rzeszów but also in neighboring municipalities, can contribute significantly to the reduction of greenhouse gases and be a key document in the context of the climate neutrality goal that needs to be achieved in the coming years.

Update of the Air Protection Program for the Rzeszów City Area.

Air protection programmes are adopted by the Voivodeship Assemblies, therefore the Update of the Air Protection Program for the Rzeszów City Area. was adopted by the Podkarpackie Voivodeship Assembly, but its implementation is the responsibility of the Mayor of Rzeszów. The program aims to identify the causes of air pollution exceedances in the area. It specifies the directions of corrective actions, the implementation of which is intended to improve air quality, and indicates the implementation of mandatory actions, such as:

- conducting oversight activities (to ensure compliance with the provisions of the resolution on introducing restrictions on fuel combustion installations in the Podkarpackie Voivodeship),
- increasing the share of greenery in the city area of Rzeszów,

- environmental education.

Importance

The Update of the Air Protection Program for the Rzeszów City Area is crucial in reducing air pollution emissions, with the main sources being low emissions and the transportation sector. These are primarily suspended particles PM10 and PM2.5, as well as benzo(a)pyrene. Given that the source of those pollutants is the burning of fuels in the municipal and household sector for heating buildings or in vehicle engines, implementing measures to reduce those pollutants will align with efforts to cut greenhouse gas emissions. Thus, the implementation of the Update of the Air Protection Program for the Rzeszów City Area. aligns with the goal of climate neutrality.

Resolution on introducing restrictions on fuel combustion installations in the Podkarpackie Voivodeship

The resolution adopted by the Voivodeship Assembly constitutes a local legal act and establishes the following obligations for the city of Rzeszów (and also for the entire Podkarpackie Voivodeship):

- From June 1, 2018, it is not allowed to burn in heating devices (boilers, fireplaces, etc.): brown coal and solid fuels produced using this coal; coal sludge and coal flotation concentrates and mixtures produced using them; fuels with a grain size below 5 mm and ash content above 12%; solid biomass with a moisture content exceeding 20% in the working state.
- Deadlines for replacing heating devices purchased before June 1, 2018:
  - until December 31, 2021, installations operated for over 10 years from the date of production or without a nameplate (not meeting any of the classes of the PN-EN 303-5:2012 standard).
  - until December 31, 2023, installations operated for 5 to 10 years from the date of production (not meeting the emission standards of any of the classes of the PN-EN 303-5:2012 standard).
  - until December 31, 2025, installations operated for up to 5 years from the date of production (not meeting the emission standards of any of the classes of the PN-EN 303-5:2012 standard).
  - from January 1, 2028, installations meeting the emission requirements of classes 3 and 4 of the standard. PN-EN 303- 5:2012.

Currently, only the operation of installations that meet the requirements of Ekoprojekt is allowed.

Importance

The anti-smog resolution aims to prevent the negative impact of fuel combustion installations on human health and the environment. Due to the indication of specific time intervals in which specific solid fuel devices are to be replaced, it is a very important operational element that enables a real reduction of greenhouse gas emissions and air pollution from the municipal and household sector.

The above policies implemented and carried out for the protection of the environment aim to prevent climate change. Some of the policies implemented recently, i.e. The Study of Conditions and Directions for Spatial Development of the City of Rzeszów or the assumptions for the plan of heat supply, electricity and gas fuel for the city of Rzeszów - Update for the years 2023-2026 clearly and unambiguously indicates the directions of actions for environmental protection and prioritizes the activities that need to be undertaken to achieve climate neutrality. The study of conditions is also an excellent example of involving residents in the process of adopting documents - far beyond the classical perception of social consultations. The Study was widely presented, residents had the opportunity to familiarize themselves with the document, as well as have direct conversations with designers and representatives of BRMR (e.g. at Urban Lab Rzeszów). Many comments were submitted, each of which was analyzed individually. Study - referred to as the “Green Constitution of Rzeszów,” aims to plan the city's future development in a manner that harmoniously incorporates the allocation of areas for green spaces, which are crucial for CO_2 absorption.

The adaptation plan to climate change for the City of Rzeszów until 2030 and the Sustainable Development Plan for Public Collective Transport for the years 2021-2030 with elements of electromobility development strategy for the city of Rzeszów and neighboring municipalities, including tasks and interventions outlined by the year 2030, indicates main and detailed goals, some of which will contribute to reducing greenhouse gas emissions. The adaptation plan to climate change for the City of Rzeszów until 2030 will be updated in 2025, due to the fact that since its adoption, the city has expanded its administrative boundaries.

On the other hand: the Development Strategy of the City of Rzeszów until 2025, the Low-Emission Economy Plan for the City of Rzeszów, and the Environmental Protection Program for the City of Rzeszów are the least up-to-date documents. The actions and goals outlined in them are planned to be achieved by 2025 at the latest, hence they will need to be redeveloped, taking into account the priority of the City's sustainable development and ambitious goals that will enable achieving climate neutrality. For those documents, the developed Climate City Contract will serve as an "umbrella", ensuring that intervention pathways and planned actions are consistent.
Finally - Update of the Air Protection Program for the Rzeszów City Area. and Resolution on introducing restrictions on fuel combustion installations in the Podkarpackie Voivodeship - are documents that are adopted by the Podkarpackie Voivodeship Assembly, while the implementation is the responsibility of the Mayor of Rzeszów. These documents are consistent with the vision of sustainable city development and correspond to the goal of achieving climate neutrality.

Regional policies

- Development strategy of the Podkarpackie Voivodeship 2030.
- Spatial Development Plan of the Podkarpackie Voivodeship - Perspective 2030.
- Voivodeship program to prevent climate change and its effects, taking into account renewable energy sources and a closed-loop economy.
- Environmental Protection Programme for the Podkarpackie Voivodeship for the years 2020–2023 with an outlook until 2027.
- Waste Management Plan for the Podkarpackie Voivodeship for the years 2020-2026 with a perspective until 2032.
- Strategic Development Programme for the Transport of the Podkarpackie Voivodeship until 2030.

Development strategy of the Podkarpackie Voivodeship 2030

This document is crucial for the regional government as it defines development trends, goals, and key actions to achieve them within a specified timeframe. The strategy will serve as a guide for actions taken by regional authorities in every area of development management. Its directions will be reflected in the provisions of other strategic and operational documents in the region, they will guide the development policy of regional authorities and local stakeholders in the process of regional development.
The document also defines the scope of cooperation with foreign local governments, including those from Slovakia, Ukraine, and the Carpathian region, as the voivodeship wants to be an active participant in cross-border relations. This development is the fourth generation of regional strategies. It fits into the idea of sustainable development, emphasizes strengthening the economic function of regional growth poles and integrating their areas of influence, involves all areas of the region in development processes, opens up development policy to various financial instruments, and also equips development policy with new tools of cooperation.
The Strategy directives are outlined in the following thematic areas

- Thematic area 1 - Economy and Science - addressing the issues of innovation culture, development of Regional Smart Specializations, strengthening the links between science and economy, waste-free economy, Industry 4.0, economic sectors - agriculture and tourism. Thematic area 2 - Human and social capital - includes issues in a horizontal approach, with a focus on the non-governmental sector and Regional Immigration Policy.
- Thematic area 3 - Infrastructure for sustainable development and the environment - recognizes the current state of transportation infrastructure and the need to strengthen accessibility in external and internal terms, covers the issues of electromobility, water management including access to water, retention and flood prevention, water and wastewater management, and climate change preventing.

- Thematic area 4 - Accessibility of services - issues of accessibility to e-services, security, regional, interregional and cross-border cooperation, as well as comprehensive support for spatial planning.
- Horizontal area - Territorial Dimension of the Strategy - includes actions aimed at balancing development processes by presenting the Regional Urban Policy based on growth poles and a hierarchical arrangement of cities, multifunctional development of rural areas, and identifying areas requiring special support to stimulate development processes.

Importance

The Development Strategy of the Podkarpackie Voivodeship until 2030 can play a key role in achieving climate neutrality by promoting renewable energy sources, improving energy efficiency, developing sustainable mobility, and monitoring progress and evaluating the effectiveness of actions. Through those actions, this strategy contributes to the creation of a more sustainable and environmentally friendly development of the Podkarpackie Voivodeship. The thematic area 3 clearly indicates the directions of interventions and actions for the entire area of the Podkarpackie Voivodeship, which should be taken to achieve climate neutrality.

Spatial Development Plan of the Podkarpackie Voivodeship - Perspective 2030

"Spatial Development Plan of the Podkarpackie Voivodeship - Perspective 2030" is the primary document outlining the goals and development directions for the region in a spatial context. The document contains external and internal conditions for the development of the voivodeship, goals and directions of spatial development, including public investments of a supra-local nature. The Plan sets out the objectives of spatial policy in the field of communication and technical infrastructure, including: efficient use of investment, improvement of quality of life and balanced development, increasing the competitiveness of the voivodeship, including promoting renewable energy based on local resources.

Expansion and modernization of district heating systems in cities are also planned, as well as increasing the use of renewable energy sources for heat production (geothermal energy, biomass energy, solar energy).

Importance

The Spatial Development Plan of the Podkarpackie Voivodeship - Perspective 2030 can play a key role in reducing greenhouse gas emissions by promoting efficient use of energy resources, limiting emissions from transportation, protecting green areas, and controlling urbanization processes. Through those actions, the Plan contributes to creating a more sustainable, ecological, and environmentally friendly spatial environment in the Podkarpackie Voivodeship.

Voivodeship program to prevent climate change and its effects, taking into account renewable energy sources and a closed-loop economy

The document has been prepared taking into account the provisions of EU and national documents, and above all the adopted Development strategy of the Podkarpackie Voivodeship 2030, as well as other regional documents. The document sets out the climate policy for the Podkarpackie Voivodeship local government, which will be aimed at achieving both the goals resulting from Poland's membership in the EU, as well as national and regional goals.

It will also serve as a basis for planning support measures in the new financial perspective. The actions specified in the document are aimed at preventing and mitigating climate change by reducing greenhouse gas emissions, improving the use of renewable energy in the overall energy balance, as well as the need to increase ecological awareness.

The most important element of the document is the directions of actions and activities that need to be taken in the future to prevent climate change.

The document does not define the investments to be carried out in the future. It does not specify investors or the location of the investment. However, it indicates the directions of future actions and goals of implemented solutions. The adopted directions of action will contribute to reducing the vulnerability of the voivodeship to climate change, increasing the efficiency of using local potential of renewable energy sources, as well as reducing energy consumption and improving the energy efficiency of buildings. The actions specified in the Program are aimed at climate change preventing and mitigation

by reducing greenhouse gas emissions, improving the use of renewable energy in the overall energy balance, as well as the need to increase ecological awareness. The document also does not define the time limits within which specific indicators are to be achieved.

It does not pose any threats of penalties or sanctions for local government units or other entities from the Podkarpackie Voivodeship. The purpose of the document is not to enforce obligations arising from EU or national law, but to facilitate the acquisition of funds for the implementation of tasks arising from EU regulations and national law (e.g. for the achievement of climate goals, such as preventing climate change, preventing the effects of climate change, preventing floods or droughts, etc.).

Importance

The voivodeship program for preventing climate change and its effects, taking into account renewable energy sources and a closed-loop economy, can play a very important role in climate protection, especially by facilitating the acquisition of funds for pro-climate investments. The document promotes solutions related to renewable energy sources, energy efficiency, and circular economy.

Environmental Protection Programme for the Podkarpackie Voivodeship for the years 2020–2023 with an outlook until 2027

In the document, an analysis and assessment of the current state of the environment in the Podkarpackie Voivodeship was carried out, as a result of which threats and environmental problems were identified in ten areas of intervention. In each of them, goals and directions of intervention as well as tasks resulting from development strategies and operational-implementation documents were specified. POŚ also specifies the schedule of implementing tasks, divided into own tasks and monitored tasks. It also indicates tools for air quality protection and improvement, as well as climate protection, such as: air protection repair programs with short-term action plans (POP); low emission reduction programs (PONE); low-emission economy plans (PGN); assumptions for heat, electricity, and gas supply plans; urban climate change adaptation plans (MPA).

The Program also indicates the need to carry out educational activities related to conducting information and educational campaigns in the field of environmental protection, campaigns promoting low-emission economy, including promoting the use of micro-installations of renewable energy sources in individual construction, the use of energy-efficient and passive construction, and the use of public transportation.

Importance

The environmental protection program for the Podkarpackie Voivodeship for the years 2020-2023 with a perspective until 2027 can play a significant role in reducing greenhouse gas emissions by promoting renewable energy sources, improving energy efficiency, protecting natural resources, and promoting sustainable mobility. Through those actions, the Program contributes to achieving the goals of reducing greenhouse gas emissions and combating climate change in the Podkarpackie Voivodeship.

Waste Management Plan for the Podkarpackie Voivodeship for the years 2020-2026 with a perspective until 2032.

"Waste Management Plan for the Podkarpackie Voivodeship for the years 2020-2026 with a perspective until 2032" concerns waste generated in the voivodeship area and brought to its territory, including municipal waste, biodegradable waste, packaging waste, and hazardous waste. The main strategic goals defined in the plan are:

- reducing the amount of waste generated, including municipal waste,
- increasing the share of recovery, particularly glass, metals, plastics, paper and cardboard recycling, as well as energy recovery from waste,
- reducing the mass of waste stored in landfills,
- eliminating the practice of illegal waste dumping,
- eliminating storage of waste that does not meet the required parameters.

Additional objectives have also been indicated, which include:

- raising awareness of society and entrepreneurs about the correct way to handle waste,
- waste reduction measures,
- maintenance of existing and creation of new repair and refurbishment points for reuse,
- collecting and reusing products that are not waste,

- creating points of reuse enabling the exchange of used items, including Selective Collection Points for Municipal Waste (PSZOK).

Importance

The Waste Management Plan for the Podkarpackie Voivodeship for the years 2020-2026 with a perspective until 2032 can play a significant role in reducing greenhouse gas emissions by promoting efficient waste management, limiting waste disposal in landfills, investing in modern waste processing technologies, and social education. By promoting such solutions, the Plan contributes to combating climate change and creating a more sustainable waste management system in the Podkarpacie region.

Strategic Development Programme for the Transport of the Podkarpackie Voivodeship until 2030

"Strategic Development Program for the Transport of the Podkarpackie Voivodeship until 2030" will be a continuation of the currently functioning Strategic Development Program for the Podkarpackie Voivodeship's Transport until 2023." The document is the basis for financing transportation investments within the financial perspective 2021-2027. The program defines objectives aimed at increasing external and internal transportation accessibility while improving the safety of road users, protecting the natural environment (including climate protection), and the efficiency of the transportation sector by creating a coherent, sustainable, and user-friendly transportation system, taking into account individual transportation branches and the division between passenger and freight transportation. The document serves two basic purposes:

- presents a comprehensive vision of the development of the transportation system (comprehensive actions within all branches of transportation, regardless of the competence system),
- constitutes the basis for financing investments within the financial perspective 2021-2027 (within the competences assigned to regional-level local government).

Importance

The Strategic Development Program for the Podkarpackie Voivodeship's Transport until 2030 can play a key role in reducing greenhouse gas emissions by promoting more environmentally friendly means of transportation, electrification of transportation, optimization of the transportation system, and monitoring and evaluation of the impact of the actions taken. Through those actions, the Program contributes to combating climate change and creating a more sustainable and environmentally friendly transportation system in the Podkarpackie Voivodeship.

Podkarpacie regional programs support the goals of climate neutrality through the integration of various actions and initiatives aimed at sustainable development, reduction of greenhouse gas (GHG) emissions, and adaptation to climate change.Integration of those activities in regional programs simultaneously supports sustainable development of local communities and improves the quality of life of residents.

National policies

- National Urban Policy 2030,
- Poland's energy policy until 2040,
- National Energy and Climate Plan for the years 2021-2030,
- Update of the National Air Protection Programme,
- Long-term strategy for building renovation until 2050,
- Strategic adaptation plan for climate-sensitive sectors and areas until 2020 with a perspective until 2030,
- State Ecological Policy 2030 - a strategy for development in the field of environment and water economy,
- Strategy for district heating until 2030 with a perspective until 2040,
- Polish Hydrogen Strategy until 2030 with a perspective until 2040,
- National Waste Management Plan 2028.

National Urban Policy 2030

The document specifies desired courses of action and proposes legal and organizational solutions. They are intended to serve the implementation of the development vision of Polish cities and functional areas based on the goals that have been identified for achievement. Challenges identified in the National Urban Policy 2030 include:

- problems of suburbanization and spatial order,
- cooperation in urban functional areas and strengthening the development capacity of cities,
- environmental quality and adaptive actions to climate change,
- mobility and road traffic safety,
- promotion of social activities, with particular emphasis on housing needs.

The document is addressed to government institutions that are responsible for programming development directions at the national level, thus creating conditions for effective action at the local level. The partners in achieving the goals of the National Urban Policy 2030 related to the principles of urban development are primarily local government units and entities from the non-governmental sector, business, science, culture, organizations representing residents, entrepreneurs, and other stakeholders in urban development.

Importance

National Urban Policy 2030 contains solutions to the problems of cities, which despite a long-lasting diagnosis, often remain unresolved. The key thematic areas addressed in the project are:

- problems of suburbanization and spatial order,
- cooperation in urban functional areas and strengthening the development capacity of cities, and urban functional areas,
- environmental quality in cities and adaptive actions to climate change,
- urban mobility and traffic safety systems,
- promotion of social activities, with particular emphasis on housing needs.

The above areas definitely correspond to the directions of interventions to achieve climate neutrality.

Poland's energy policy until 2040

The aim of the State Energy Policy is to ensure energy security, while ensuring the competitiveness of the economy, energy efficiency, and reducing the impact of the energy sector on the environment, with optimal use of domestic energy resources. Energy security means meeting the current and future needs of consumers for fuels and energy in a technically and economically justified manner, while maintaining environmental protection requirements. This means the current and prospective guarantee of the security of raw material supplies, production, transmission, and distribution of energy, i.e., the entire energy chain. Main indicators of achieving the goal of the analyzed Policy:

- not more than 56% of coal in electricity generation by 2030,
- at least 23% of RES in final gross energy consumption in 2030,
- implementing nuclear energy in 2033,
- reducing GHG emissions by 30% by 2030 (compared to 1990),
- reducing primary energy consumption by 23% by 2030 (compared to consumption forecasts from 2007).

According to the assumptions, energy policy is based on three pillars:

1. Just transformation,
2. Zero-emission energy system,
3. Good air quality.

Specific goals of Poland's energy policy until 2040:

- optimal, as long as possible utilization of own energy resources (transformation of coal regions),
- expansion of electricity generation and network infrastructure (capacity market, implementation of smart networks),
- diversification of supplies and expansion of natural gas, crude oil, and liquid fuels network infrastructure (construction of the Baltic Pipe and the second line of the Pomeranian Pipeline),
- development of energy markets (implementation of an Action Plan aimed at increasing cross-border transmission capacity of electricity, development of electromobility, gas hub),
- implementation of nuclear energy (Polish Nuclear Energy Programme),
- development of renewable energy sources (implementation of offshore wind energy),

- development of district heating and cogeneration (development of systemic district heating),
- improvement of energy efficiency (promoting the improvement of energy efficiency),
- development of the hydrogen market.

By 2040, over half of the installed capacity will consist of zero-emission sources. The implementation of offshore wind energy and the launch of a nuclear power plant will play a significant role in this process in the Polish power system. These will be two strategic new areas and branches of industry that will be developed in Poland. Parallel to large-scale energy, distributed and citizen energy will develop - based on local capital. According to PEP 2040, the use of renewable energy technologies is assumed in heat production and in transportation through the development of electro and hydrogen mobility.

Importance

Poland's energy policy until 2040 is of crucial importance in reducing greenhouse gas emissions through the transformation of the energy sector towards greater energy efficiency, increased use of renewable energy sources, and promoting sustainable transportation. Through those actions, this policy contributes to achieving climate goals and creating a more sustainable and environmentally friendly society.

National Energy and Climate Plan for the years 2021-2030

In the "National Energy and Climate Plan for 2021-2030", climate and energy goals for 2030 were formulated. They include, among others: reducing greenhouse gas emissions, increasing the share of renewable energy sources, and increasing energy efficiency. The document highlights the problem of so-called "low emissions" generated by transportation or individual heat sources. Attention is drawn to the need for the development of renewable energy sources (OZE) and support for existing installations, as well as newly emerging investments related to renewable energy.

Significant attention is given to energy efficiency. These actions aim to reduce energy consumption, as well as to limit emissions and contribute to the achievement of climate and energy goals. There is also a need to implement actions related to climate change adaptation. The Plan sets the following climate and energy goals for 2030:

- 7% reduction in greenhouse gas emissions in sectors not covered by the ETS system, in comparison to the level in 2005,
- 21-23% share of RES in final gross energy consumption (the 23% target will be achievable if Poland is granted additional EU funds, including those allocated for a just transition), taking into account:
  - 14% share of RES in transportation,
  - an annual increase in the share of RES in heating and cooling by 1.1% on average per year,
  - 23% increase in energy efficiency compared to PRIMES2007 forecasts,
  - reducing coal's share in electricity production to 56-60%.

It encompasses an integrated approach to the five dimensions of the Energy Union:

- reduction of emissions,
- energy security,
- energy efficiency,
- internal energy market,
- scientific research, innovation, and competitiveness.

Currently, the document is being updated. The future strategy for updating the National Energy and Climate Plan for the years 2021-2030 will be based on two transformation scenarios: the baseline scenario (WEM) and the ambitious scenario (WAM). The baseline scenario presents the development of the situation based on existing instruments and planned policies. The ambitious scenario assumes the implementation of new instruments of energy and climate policy, with the aim of accelerating decarbonization in a way that strengthens our economy. The update presents the first of two scenarios (i.e. WEM). It is based on implemented and planned transformation policies, therefore resulting in a scenario similar to "business as usual". This is a scenario of balanced aspirations - it shows what the effects will be if we lack pro-climate ambitions. Its result is a relatively low level of CO_2 emission reduction by 2030 and a relatively high level of coal, gas, and other fossil fuel consumption This scenario does not achieve the EU goal of reducing GHG emissions by 55% compared to 1990. Solutions enabling the achievement of the goal of reducing GHG emissions in Poland to a level similar to the EU will be

presented in a more ambitious transformation scenario (i.e. WAM), which is currently being advanced by the Ministry of Climate and Environment.
The target document that contains two scenarios: WEM and WAM will most likely be published in June 2024.

Importance

The National Energy and Climate Plan for 2021-2030 is crucial for reducing greenhouse gas emissions by setting national goals, strategies, and measures. By promoting renewable energy sources, improving energy efficiency, modernizing the energy sector, and implementing low-emission transportation solutions, such a plan contributes to the creation of a more sustainable and environmentally friendly energy policy in Poland.

Update of the National Air Protection Programme

Strategic document defining corrective actions to be implemented in the short-term perspective until 2025, medium-term perspective until 2030, and long-term perspective until 2040, which will not only be consistent with the previously implemented policy of improving air quality and preventing climate change at the national, voivodeship, and municipality levels, but above all will determine new directions of action in this area.
The document aims to coordinate actions derived from the national air quality policy framework in connection with policy areas related to the household and municipal sector, clean energy, heating, and renewable energy sources, as well as transportation.
The main goal of the Update of the National Air Protection Programme is to protect the health and quality of life of residents and the natural environment as a whole, particularly by urgently improving air quality in designated areas, where, as indicated by the annual air quality assessment conducted by GIOŚ, exceedances of permissible and target levels of certain pollutants are still observed. This goal will be achieved through the implementation of actions specified in selected intervention areas.
The anticipated key outcome of implementing this document is the improvement of air quality by bringing it to levels that comply with national and EU legislation, and, in the longer term, working towards achieving the standards recommended by the WHO.
The intervention directions leading to the achievement of specific goals, i.e., meeting and maintaining at least the air quality standards set out in EU and national legislation, will be:
- maintaining the priority of improving air quality and developing the air quality assessment system by increasing the number of monitoring stations included in air quality measurements, as part of the State Environmental Monitoring,
- reducing the volume of air pollutant emissions from the household and municipal sector,
- reducing the volume of air pollutant emissions from the road transportation sector,
- reducing the level of air pollution in cities, urban policy,
- increasing the share of clean energy, heat, development of renewable energy sources,
- environmental education,
- ensuring financing for initiatives aimed at improving air quality,
- reducing the emissions of air pollutants from other sectors that impact air quality, including actions for the residential sector to be implemented in rural areas.

Importance

The update of the National Air Protection Programme is a key tool in achieving climate goals and improving air quality. Through strict emission regulations, support for renewable energy sources, improvement of energy efficiency, development of sustainable transportation, education, and raising social awareness, this update contributes to creating a more sustainable and low-emission future.

Long-term strategy for building renovation until 2050

The document defines actions that will allow achieving high energy efficiency and low emissions in buildings in Poland by 2050. Renovation of building assets is one of Poland's biggest infrastructure challenges. Similarly to other EU member states, Polish buildings should be modernized in a way that is consistent with the transition towards a climate-neutral economy.
At the same time, national public policy must respond to the urgent need to replace the most emission-intensive heat sources in order to improve air quality, while also ensuring an improvement in the usability

of buildings. For the purpose of developing the strategy, a review of all buildings in Poland, both public and private, was conducted, which shows that there are 14.2 million buildings in Poland, of which nearly 40 percent are single-family residential buildings. A significant portion of buildings is characterized by low energy efficiency and will require urgent thermal modernization in the coming years. The data indicates a significant variation in the energy efficiency of buildings, both in terms of their purpose and the year they were commissioned. Buildings commissioned in the 21st century are characterized by relatively high energy efficiency, but older ones have a high energy demand and require thermal modernization.
From 2020 to 2030, it is planned to carry out thermal modernization of 236 k buildings annually, from 2030 to 2040 – 271 k buildings, and from 2040 to 2050 – 244,000 buildings. and from 2021 to 2050, 7.5 million thermal modernization projects have been planned.The strategy assumes an average annual rate of thermal modernization of about 3.8% with the assumption that by 2050, 65% of buildings will achieve an PE indicator of no more than 50 kWh/m^2·per year.
Strategy recommended in the action plan is to combine rapid growth in the scale of shallow thermal modernization with gradual dissemination of deep, more comprehensive thermal modernization by 2030.
Importance
The long-term strategy for building renovation until 2050 is crucial in reducing greenhouse gas emissions through improving energy efficiency, promoting renewable energy sources, incorporating ecological aspects in the construction process, and educating and engaging the local community. Through those actions, this strategy contributes to the transformation of the construction sector in a more ecological and sustainable manner, while reducing the negative effects of climate change.

Strategic adaptation plan for climate-sensitive sectors and areas until 2020 with a perspective until 2030

This is the first strategic document that directly addresses the issue of adapting to climate change. The main goal of the Plan is to ensure sustainable development and efficient functioning of the economy and society in the conditions of climate change. The document identifies priority areas for adaptive actions that need to be taken in the most climate-sensitive areas, such as: water management, agriculture, forestry, biodiversity, health, energy, construction and spatial planning, urban areas, transportation, mountainous areas, and coastal zones. One of the goals defined in the document is “Ensuring energy security and a good state of the environment”.
As part of this goal, a direction of action has been indicated - adapting the energy sector to climate change. The Plan recognizes that climate change will have an impact on the energy sector and it will be necessary to adapt the energy system to fluctuations in demand for both electricity and heat, including through the implementation of stable low-emission energy sources. It will also be important to utilize energy from renewable sources, such as solar energy, wind energy, and biomass energy.
The defined actions in the document include both technical measures (e.g., constructing necessary flood protection and coastal defense infrastructure) and changes to legal regulations (e.g., amendments to spatial planning systems limiting the development of areas at risk of floods, inundations, and landslides, more flexible procedures for rapid response to natural disasters), the implementation of monitoring systems related to various fields and areas, and widespread dissemination of knowledge about the necessary changes in economic behavior.
Importance
The Strategic Adaptation Plan for climate-sensitive sectors and areas until 2020 with a perspective until 2030 is of crucial importance for climate change adaptation through infrastructure adaptation, ecosystem protection, adaptation of economic sectors, as well as education and engagement of local communities. Through those actions, this plan contributes to increasing society's resilience to the effects of climate change and reducing greenhouse gas emissions in the future.

State Ecological Policy 2030 - a strategy for development in the field of environment and water economy

The State Ecological Policy 2030 - is a strategy for development in the field of environment and water economy. The purpose of the document is to ensure the ecological safety of the country. The main specific goals are:

- improvement of environmental quality and ecological safety,
- sustainable management of environmental resources,
- climate change mitigation and adaptation,
- management of natural disaster risk.

To achieve the set goals, intervention directions have been indicated, including:

- preventing climate change,
- adapting to climate change and disaster risk management,
- achieving sustainable water management, including ensuring access to clean water for society and the economy, as well as achieving good water status,
- eliminating or significantly reducing the impact of pollution sources on air quality,
- management of natural and cultural heritage resources, including the protection and improvement of biodiversity and landscape,
- and waste management towards a circular economy.

In the Policy – with regard to the Podkarpackie Voivodeship, it is noted that compared to the rest of Poland, the voivodeship is sparsely urbanized. Despite this, there are air pollutants typical of more urbanized areas in existing urban areas. The goals and directions set out in the document are consistent with national and international strategic documents covering environmental protection, nature conservation, and human health.

Importance

The State Ecological Policy 2030 is of significant importance in the area of climate protection through the promotion of renewable energy sources, improvement of energy efficiency, protection and revitalization of aquatic ecosystems, integration of climate goals in all policy areas, and support for technological and research innovations. Through those actions, this policy contributes to sustainable economic development and the protection of the natural environment, which is crucial for reducing greenhouse gas emissions and combating climate change.

Strategy for district heating until 2030 with a perspective until 2040

The Strategy for District Heating until 2030 with a perspective until 2040 is a sectoral planning document aimed at indicating ways to implement the provisions of national and European Union documents, while simultaneously taking into account the need to meet the overriding requirement of ensuring technical and economic security of heat supply for consumers, as well as the fundamental role of local government as the entity responsible for organizing those supplies.

The requirements posed on the sector in the context of the dynamically changing regulatory environment associated with the implementation of the so-called New Green Deal are ambitious, and the structure - both technical and organizational - requires special support in implementing changes. In view of the above fact, it is necessary to designate transformation paths for the sector. The strategy focuses on the horizon of 2030 and district heating and the supply of heat for municipal and household purposes, presenting the potential for further development of the sector until 2040.

Importance

The strategy for district heating until 2030 with a perspective until 2040 is crucial in reducing greenhouse gas emissions by indicating directions for interventions in the modernization and energy efficiency of district heating, the development of renewable energy sources, the introduction of clean technologies, and adaptive planning. Through those actions, the district heating sector will contribute to achieving climate goals and sustainable development.

Polish Hydrogen Strategy until 2030 with a perspective until 2040

The Polish Hydrogen Strategy until 2030 with a perspective until 2040 is a strategic document aimed at the development of the hydrogen economy in Poland. This strategy aims to introduce hydrogen as a key element of the energy transformation, which is intended to contribute to achieving climate neutrality, improving energy security, and supporting innovation and competitiveness of the Polish economy.

Main goals of the Polish Hydrogen Strategy:

1. Development of hydrogen technologies: promoting and supporting research and development of hydrogen production, storage, distribution, and utilization technologies. Promoting innovation and collaboration between science and industry in the field of hydrogen technologies.
2. Hydrogen production: increasing hydrogen production, including the development of green hydrogen production technologies (from renewable energy sources) and blue hydrogen (using carbon capture and storage technologies).
3. Hydrogen infrastructure: construction and development of infrastructure for the transportation, storage, and distribution of hydrogen. Development of hydrogen refueling stations network for vehicles and infrastructure for the industry.
4. Application of hydrogen: promoting the use of hydrogen in various sectors of the economy, such as energy, transportation, chemical industry, and metallurgy. Support for pilot and demonstration projects.
5. Regulations and standards: creating appropriate legal regulations and technical standards to support the development of the hydrogen economy. International cooperation in the harmonization of regulations and standards concerning hydrogen.

The strategy also takes into account the long-term perspective until 2040, assuming: a significant increase in the share of hydrogen in Poland's energy mix, further development of hydrogen technologies and their widespread commercialization, as well as the integration of the Polish hydrogen market with international markets.

Importance

The Polish Hydrogen Strategy for 2030 with a perspective until 2040 aims to implement actions that will enable the use of hydrogen as a key element in energy transformation and greenhouse gas emissions reduction. By promoting the production of hydrogen from renewable energy sources, developing infrastructure for hydrogen storage and transportation, applying hydrogen in industrial and transportation sectors, investing in research and innovation, as well as education and awareness promotion, this strategy contributes to creating a sustainable and low-emission future for Poland.

National Waste Management Plan 2028

This document defines a waste management policy in accordance with the waste hierarchy. The Plan includes an analysis of the waste management system, forecasts of changes in waste generation, goals and directions of waste management policy, as well as specified tasks for implementation by relevant organizational units subordinate to the Council of Ministers. The document identified a number of issues regarding municipal waste management, packaging waste, used electrical and electronic equipment, waste oils, and vehicles withdrawn from use, also in the context of a circular economy.

The aim of the Program includes, among others:

- striving for a recycling and preparation for reuse level of paper, metals, plastics, and glass from municipal waste streams of 55% by 2025 and 65% by 2035,
- minimizing stored waste to the level of 30% by 2025 and 10% by 2035,
- supporting actions in the field of product reuse, broadly understood waste prevention, with particular emphasis on preventing food waste,
- ensuring the maintenance of recycling performance levels for used batteries and accumulators,
- achieving the appropriate level of waste recovery and recycling from products, including packaging waste, used tires, and waste oils.

The goals and tasks presented in the National Waste Management Plan 2028 cover the years 2023-2028, but prospectively extend to the year 2035. To achieve the goals set out in the 2028 Plan, appropriate measures have been defined, including:

- educational and informational activities related to waste prevention and preventing littering,
- supporting the development of infrastructure for waste prevention and waste recycling,
- assessment of the need to create additional infrastructure for waste prevention and recycling,
- supporting research on new technologies in waste prevention and waste management,
- recommended actions regarding critical resources and measures to prevent marine and land pollution.

Importance

The National Waste Management Plan 2028 is of crucial importance in the context of proper and sustainable waste management. In proper waste management through composting, recycling, energy recovery, local processing, and waste minimization, there is a significant reduction in greenhouse gas emissions. These actions are an integral part of the strategy to combat climate change and sustainable resource management.

Poland is taking significant steps towards achieving European climate neutrality goals by creating favorable conditions for, among others, the development of renewable energy sources, increasing energy efficiency, transforming the coal sector, promoting electromobility, and improving waste management. However, this process requires further actions, investments, and support at the national and regional level to fully achieve the ambitious climate goals of the EU.

EU policies

- European Green Deal,
- REPowerEU,
- RED II Directive 2018/2001 of the European Parliament and of the Council of the European Union of 11 December 2018 on the promotion of the use of energy from renewable sources,
- Energy Efficiency Directive (EED) - on climate protection and cost savings,
- Energy Performance of Buildings Directive (EPBD),
- "A clean planet for everyone. European long-term strategic vision for a well-functioning, modern, competitive, and climate-neutral economy", communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions, and the European Investment Bank, Brussels, 28 November 2018,
- Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

European Green Deal

"The European Green Deal" is a strategy aimed at transforming the EU into a "just and inclusive" prosperous society, living in a modern, resource-efficient, and competitive economy that will achieve net-zero greenhouse gas emissions by 2050 and within which economic growth will be separated from the use of natural resources. It indicates the following areas:

- ambitious climate goals of the EU for 2030 and 2050 (achieving climate neutrality),
- clean, affordable energy (reducing the emissions of the energy system is crucial in achieving climate goals),
- transforming the industrial sector towards a clean, circular economy,
- implementation of construction and renovation works in an energy-saving and resource-efficient manner (enforcement of regulations concerning the energy performance of buildings),
- striving to achieve zero emissions for a non-toxic environment,
- conservation and protection of biodiversity,
- food system based on healthy, fair, and environmentally friendly values,
- sustainable and smart mobility (including increasing production / introducing alternative, sustainable transportation fuels, reducing emissions from transportation means).

Importance

The European Green Deal is a comprehensive plan of action aimed at reducing greenhouse gas emissions and combating climate change through the promotion of renewable energy sources, improving energy efficiency, developing sustainable transportation, international cooperation, and investing in innovation. Thanks to those actions, Europe is striving to achieve climate neutrality by 2050, which will contribute to reducing the negative impact on the natural environment and improving the quality of life for citizens.

REPowerEU

A plan for rapid reduction of dependence on Russian fossil fuels and ecological transformation (REPowerEU) in response to the difficulties and disruptions in the global energy market caused by Russia's invasion of Ukraine.
The basic assumptions of this program include:

- diversification of supplies, which is implemented through EU cooperation, with international partners,
- energy saving, which according to the European Commission can be the fastest, cheapest and safest way to reduce not only dependence on imported fossil fuels from Russia, but also to lower bills,
- replacement of fossil fuels in homes, industry, and energy production, as well as accelerating the use of energy obtained from renewable sources. This will help in building energy independence and ecological transformation.

These assumptions are to be implemented through the introduction of voluntary and mandatory actions for member states. These include changes in regulations that provide for the termination of public support for fossil fuel devices and an increase in support for the use of environmentally friendly solutions. An example of such actions is the announcement of changes regarding boilers and other devices powered by fossil fuels. Such devices are to receive the lowest energy efficiency classes, and at a later stage, the possibility of introducing them into circulation in the EU is to be terminated. In addition, Member States are encouraged to launch support programs, utilize EU financing, and introduce new rules regarding the use of fossil fuels and renewable energy sources in buildings.

Importance

REPowerEU is a key program of the European Union that contributes to the reduction of greenhouse gas emissions by promoting renewable energy sources, improving energy efficiency, electrifying transportation, investing in clean energy technologies, and international cooperation. Thanks to those actions, the European Union aims to achieve climate neutrality by 2050 and to achieve goals related to combating climate change and protecting the natural environment.

RED II Directive 2018/2001 of the European Parliament and of the Council of the European Union of 11 December 2018 on the promotion of the use of energy from renewable sources

"The RED II Directive", also known as the biofuels directive, indicates actions supporting the use of renewable energy sources. The directive sets an overall goal for 2030 – at least 32% of energy production from renewable sources.The aim is to ensure the achievement of this goal in a cost-effective manner for individual member states, by establishing a stable, market-based European approach to cost-effective and market-based financial support for electricity from renewable sources. The directive promotes the production of biofuels from waste, for example by double-counting the mass of fuel produced from waste (such as bakery waste) compared to the mass of fuel produced from natural resources (such as rapeseed, wheat, corn). The RED II Directive also applies to the production of high-quality products from plastic waste, placing great emphasis on certification according to the standards of the circular economy (based on which it can be demonstrated that a given raw material, as a semi-finished product or finished product, comes from waste). The directive sets out the targets for the use of renewable energy sources between 2021 and 2030. The document aligns with the objectives of the EU energy policy, which include, among others, supporting renewable forms of energy. It obliges Member States to "establish a framework conducive to promoting and facilitating the development of renewable energy prosumption, based on an assessment of existing unjustified barriers to renewable energy prosumption in their territory and energy networks".

Importance

The RED II Directive is a comprehensive set of regulations and guidelines aimed at promoting the use of energy from renewable sources and reducing greenhouse gas emissions throughout the European Union. By setting targets for renewable sources, supporting innovation, electrifying transportation, improving energy efficiency, and protecting the environment, this Directive contributes to the transformation of the European energy sector towards a more sustainable and low-emission development model.

Energy Efficiency Directive (EED) - on climate protection and cost savings

The document is part of the "Fit for 55" package and will replace the existing EED directive from 2018. By amending the directive on energy efficiency, the European Union aims to move closer to achieving climate neutrality by 2050. The new target, which aims for an 11.7% reduction in final energy consumption, exceeds the original proposal from the Commission in July 2021, which set the level at 9%. According to the new version of the EED directive, all EU member states will have to achieve an average annual energy savings rate of 1.49% between 2024 and 2030 (the current requirement is 0.8%). This will significantly reduce energy consumption in sectors such as construction, industry, and transportation. The directive assumes that European Union countries should prioritize improving energy efficiency for vulnerable consumers, low-income households, and people living in social housing. This is associated with new energy-saving obligations. The public sector is also subject to obligations. It aims to achieve an annual reduction in energy consumption of 1.9%. Public transportation and armed forces have been exempted from this obligation. In addition, member states will be required to renovate at least 3% of the surface area of buildings belonging to public institutions each year. Public authorities will have to take into account energy efficiency requirements when making purchasing decisions.
According to the new law, energy management systems will become mandatory for large energy consumers (exceeding 85 TJ of annual energy consumption), who will be subject to audits in case of discrepancies. Companies with energy consumption exceeding 10 TJ will be required to conduct an energy audit and prepare an action plan for each recommendation. The directive also introduces an obligation to monitor energy consumption in data centers. The new regulations also promote local heating and cooling plans in larger municipalities. Based on the revised definition of an efficient heating and cooling system, included in the EED directive, the minimum requirements will be gradually tightened in the coming years.
This will allow for the creation of fully emission-free district heating and cooling networks by 2050. The EED Directive additionally supports provisions on financing energy efficiency. EU countries are supposed to promote financing systems dedicated to investments in improving energy efficiency.

Importance

The Energy Efficiency Directive (EED) is a key legal instrument of the European Union that will contribute to climate protection by promoting energy savings and reducing greenhouse gas emissions. By introducing energy efficiency goals, improving the energy efficiency of buildings and industry, promoting energy efficiency in transportation, supporting companies and households, and monitoring progress, the EED Directive supports the pursuit of sustainable and low-emission economic development.

Energy Performance of Buildings Directive (EPBD)

The directive primarily concerns increasing the energy efficiency of buildings by improving their physical parameters, which leads to a reduction in electricity and heat supply. Thanks to this, the consumption of electricity, gas, biomass, and other energy carriers necessary for the proper functioning of the building is reduced. Main assumptions:

- lack of subsidies for boilers using fossil fuels from 2025,
- zero-emission new public utility buildings from 2028 onwards,
- mandatory photovoltaics on new non-residential and public utility buildings with an area exceeding 250 m^2,
- mandatory photovoltaics on all new residential buildings and zero-emission new residential buildings from 2030 onwards,
- reducing average primary energy consumption by at least 16% by 2030 and at least 20-22% by 2035,
- need to renovate 16% of non-residential buildings with the worst energy performance, and 26% of such buildings by 2033,
- phasing out coal-fired boilers from 2040 onwards,
- zero-emission building stock in the European Union by 2050.

Importance

The Energy Performance of Buildings Directive (EPBD) is a key legal instrument of the European Union that contributes to the reduction of greenhouse gas emissions by promoting energy efficiency and sustainable design and use of buildings. The actions taken under the EPBD aim to improve the energy efficiency of buildings, reduce the consumption of energy from fossil fuels, and increase the share of renewable energy sources, which contributes to the combating climate change and the protection of the natural environment.

The main objectives of the Directive are significant reduction of greenhouse gas emissions and energy consumption in the EU construction sector by 2030, and making it climate-neutral by 2050.

"A clean planet for everyone. European long-term strategic vision for a well-functioning, modern, competitive, and climate-neutral economy", communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions, and the European Investment Bank.

The document outlines the directions of actions until 2050, covering several strategic areas. A goal of achieving net zero greenhouse gas emissions by 2050 has also been set. It was indicated that the goal should be achieved through the implementation of appropriate actions, including:

- improving energy efficiency,
- increasing the share of renewable energy sources for decarbonization,
- development of low-emission transportation,
- achievements of a competitive industry and a circular economy,
- development of infrastructure/inter-system connections,
- development of bioeconomy,
- capture, storage, and utilization of carbon dioxide.

Importance

"A clean planet for everyone. The European long-term strategic vision of a well-functioning, modern, competitive and climate-neutral economy" is part of the combating climate change through promoting climate neutrality, increasing the share of renewable energy sources, improving energy efficiency, electrifying transportation, and international cooperation. The actions taken within this vision aim to accelerate the transformation of the economy towards a more sustainable and low-emission development model, which will contribute to the reduction of greenhouse gas emissions and the protection of the natural environment for future generations.

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008. on air quality and cleaner air for Europe

The directive sets goals for air quality, including ambitious and economically viable goals to improve human health and environmental quality. It also specifies methods for assessing those objectives and taking corrective actions in case the set standards are not met. It also provides for informing the public. The directive consolidates the majority of existing provisions on air quality into one document and includes the following key elements:

- thresholds, permissible values, and target values are established to enable the assessment of the content of each of the pollutants covered by this directive: sulfur dioxide, nitrogen dioxide, particulate matter, lead, benzene, and carbon monoxide,
- national authorities designate the appropriate bodies to carry out those assessments, using data collected at selected sampling points,
- in a situation where pollution levels in a specific area exceed the established thresholds, air protection plans must be implemented to address the situation; those plans may include specific measures to protect vulnerable social groups, such as children,
- if there is a risk that pollution levels may exceed permissible thresholds, short-term plans to reduce traffic intensity, construction work, or certain industrial activities must be implemented to prevent danger,
- national authorities must ensure that not only social organizations, but also environmental, consumer and other relevant organizations, including public health bodies and industry federations, are informed about the quality of outdoor air in their area,

- the governments of EU countries must publish annual reports on all pollutants covered by this legal act.

Work is currently underway to amend the Directive, which will lead to a significant tightening of air quality standards, particularly for PM10 and PM2.5 particulate levels. Furthermore, an air quality roadmap is to be created, which will indicate the directions of actions aimed at meeting the above-mentioned standards. The priority will be the issue of health and biodiversity, through a deep analysis of the impact of air pollution on those aspects.

Importance

The directive plays a key role in improving air quality, protecting public health and the environment, promoting innovation, and harmonizing standards at the European level. Thanks to its implementation, the EU aims to provide better living conditions for its citizens and protect the natural environment.

The European Union has significantly intensified its efforts to protect the climate and mitigate the effects of climate change by setting high goals for member states to achieve. In this context, Poland systematically adjusts its national legislation to the relevant European guidelines in the field of energy and climate.

	Baseline emissions 2022	Emissions Reduction Target 2030		Emission reduction through other Action Plans		Emissions Gap		Emissions reduction through the CCC Action Plan to address the Gap		Residual emissions	
	Total	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)
Buildings and stationary energy	1,035,904	839,717	81.06	0	0	839,717	81.06	839,717	81.06	196,187	18.94
Transport	344,403	275,694	80.05	0	0	275,694	80.05	275,694	80.05	68,709	19.95
Waste	14,755	2,114	14.33	0	0	2,114	14.33	2,114	14.33	12,641	85.67
Industrial Process and Product Use (IPPU)	777	0	0	0	0	0	0	0	0	777	100
Agricultural, Forestry and Land Use (AFOLU)	0	0	0	0	0	0	0	0	0	0	0
Total	1,395,839	1,117,525	80.06	0	0	1,117,525	80.06	1,117,525	80.06	278,314	19.94

The reductions from policies have not been included in the above table, as those reductions have been taken into account in the actions. Taking into account the assumptions of emission reduction policies would result in duplicating emission reductions.
The developed Climate Contract will take the form of a superior umbrella over the planned strategic documents of an environmental nature in the near future, especially those that will indicate specific greenhouse gas reduction targets.

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

A-3.1: Description of urban systems, systemic barriers, and opportunities

Taking into account the areas of greenhouse gas emissions in the city, the most important systems identified in the city in terms of climate neutrality goal are:

1. Technological/infrastructure systems: encompass the infrastructure related to the production, transmission, and consumption of energy, including power networks, district heating systems, gas networks, and transportation systems responsible for greenhouse gas emissions, as well as waste management systems.
2. Institutional/regulatory systems: include both legal regulations governing greenhouse gas emissions and strategic documents in this area at all levels of management, as well as institutions responsible for monitoring and controlling emissions and their competences.
3. Organizational systems: primarily concern the organization of activities aimed at reducing greenhouse gas emissions, including their planning, coordination (within the office and between institutions), education, and informing the local community about environmental protection, including climate-related issues.
4. Financial systems: financial resources dedicated to investments in low- and zero-emission technologies, support programs for households and entrepreneurs, soft actions, in particular educational and informational.
5. Political systems: understood as political decisions made at the local, regional, national, and international levels aimed at establishing a systemic approach to reducing greenhouse gas emissions.
6. Social systems: social attitudes, values, behaviors in the context of environmental protection, ecological awareness of various stakeholder groups, as well as the actions of local communities and non-governmental organizations in the reduction of greenhouse gas emissions and ecological education.
7. Behavioral systems: encompassing changes in individual behaviors and habits of residents, in the context of the need to take action to achieve climate neutrality, including the use of public transportation, waste segregation, and respect for and conservation of energy in households.
8. Spatial planning system: seems to be crucial in the context of achieving climate neutrality by ensuring sustainable development, efficient use of natural resources, and minimizing greenhouse gas emissions. The preservation and protection of green areas, as carbon dioxide sinks and from the perspective of biodiversity conservation, is also crucial. Sustainable spatial planning can also contribute to promoting energy efficiency (sustainable construction, renewable energy sources, etc.). Spatial planning also has enormous potential in terms of adapting to the effects of climate change, such as extreme weather events, flood risks, or urban heat islands.

Due to the complex nature of the challenge of achieving climate neutrality by 2030 and the necessary just transition in various systems, it is necessary to identify all barriers and gradually overcome them.

Rzeszów is at the beginning of the road to achieving climate neutrality, but there are many actions that need to be taken. In various areas, a number of barriers have already been identified, hence:

1. Insufficient level of support at the national level, lack of targeted programs - current government programs primarily focus on improving air quality, with less support for deep thermal modernization.
Rzeszów, like many other cities in Poland, is struggling with insufficient funds for infrastructure development. Insufficient government support for local investments limits the ability to attract new companies and investors. The city of Rzeszów needs greater support in terms of tax relief, grants, development programs, and the implementation of pro-ecological projects. Lack of proper coordination of national-level actions in the field of regional policy can impact the competitiveness and efficiency of the economy in Rzeszów. In summary, the insufficient level of support from the national level can be a significant obstacle to the development of Rzeszów and meeting

the needs of its residents, which emphasizes the need for greater cooperation between local governments and the central government.
Possible solution to the barrier: The response to insufficient support from the national level for the city of Rzeszów is primarily dialogue and cooperation with the government. Organizing meetings with government representatives, during which specific projects will be presented that can bring benefits to residents and the region. Establishing cooperation with non-governmental organizations, universities, and the private sector to jointly create projects that can be implemented at the local level and could receive national support. Organizing informational campaigns for residents to raise awareness about the city's needs and encourage them to actively participate in local life.

2. Local, regional, national, and European strategic documents and legal regulations - not adapted to needs, created based on outdated data, unclear, unreadable, or allowing for various interpretations, hindering or often preventing the implementation of innovative and urgently needed projects, thus completely blocking their potential. Variable political priorities.
Possible solution to the barrier: Creating and promoting demands regarding the adaptation of regulations and strategies at the regional, national, and European level. Cooperation with the relevant authorities, thanks to which they will pay attention to the specificity and needs of Rzeszów. Conducting a detailed analysis of the needs of residents and local companies, including engaging the community in the process of identifying key challenges and expectations. Organizing meetings with representatives of local institutions, non-governmental organizations, entrepreneurs, and residents.Cooperation and open dialogue will help in better understanding the local context and key issues that should be included in the strategic documents of the city of Rzeszów. Furthermore, it is necessary to establish closer cooperation with local universities, which can provide knowledge and resources in the field of creating competent and tailored documents.

3. Insufficient cooperation between local government and higher authorities, as well as poor involvement of local governments as initiators and organizers of the decarbonization process, mobilizing other partners in the city.
Poor understanding of the meaning of the climate crisis, the positive meaning of the decarbonization process, avoided costs, and direct and indirect benefits. Lack of integrated approach between different sectors and bodies. Silos mentality in management, project-oriented rather than process-oriented approach.
Lack of appropriate structures for monitoring and evaluating actions. Staff shortages and competency gaps. There are no current strategies that would indicate goals for reducing greenhouse gas emissions.
Possible response to the barrier: increasing communication and coordination through organizing regular meetings and workshops between the local government in Rzeszów and regional and national authorities, with the aim of exchanging experiences and best practices.Hiring specialists to help the city develop a decarbonization strategy and draft grant-funded projects. Additionally, organizing training sessions for employees of the Rzeszów City Office on actions related to decarbonization and raising public awareness of the benefits of decarbonization. It is also important to encourage other local governments and the private sector to collaborate with Rzeszów in implementing decarbonization projects.

4. Insufficient knowledge of modern technical solutions, complexity of the investment process with a low level of general technical culture, low awareness of financial and environmental costs and additional benefits, little interest from building managers, difficulty in reaching consensus in multi-family buildings.
Some people responsible for building management in Rzeszów do not have sufficient knowledge about available innovative technologies. This causes reluctance to take risks and invest in modern systems that could bring long-term benefits. The process of making changes in multi-family buildings is complicated. It requires collaboration from multiple parties, such as architects, engineers, material suppliers, and investors. This complexity often leads to delays and increased costs, which discourages decisions about undertaking thermal modernization. Additionally, a major problem is the low awareness of financial and environmental costs. Many people are not aware of the costs that

can be saved through building modernization, as well as the ways in which sustainable practices can impact the environment. The described barrier is complex and multifaceted. It requires taking educational actions to promote modern solutions and changes in the approach to investment management in construction in order to minimize the symptoms of the described difficulties and lead to more effective use of modern technologies.
Possible solution to the barrier: Organization of trainings and workshops for residents of Rzeszów and building managers regarding modern technical solutions. The workshops should cover technical, financial, and environmental aspects, such as energy savings, financing opportunities, and health benefits. Presentation of cases where the implementation of new technologies has brought tangible benefits. Well-documented case studies can inspire residents and building managers in Rzeszów to take similar actions. It would be helpful to conduct analyses of current maintenance and operating costs of buildings, taking into account potential savings resulting from modernization. The above actions would contribute to raising awareness of the impact of technology on the environment and the health of residents, and would help build trust between the city and building managers and residents.

5. Technological/infrastructural barriers - lack of adequate infrastructure for the production, storage, and distribution of renewable energy (or currently insufficient infrastructure, such as power networks), and the lack of technologies that enable effective management of greenhouse gas emissions. The increasing importance of RES, such as solar or wind energy, is associated with the need for energy storage.
In Rzeszow, there is a lack of appropriate storage systems, which results in the inability to effectively utilize energy. The introduction of innovative RES technologies and the modernization of infrastructure require significant investments. In Rzeszów, there are limitations in financing such projects due to a lack of financial support. Technological and infrastructural barriers in Rzeszów in the area of renewable energy are still a significant challenge that requires an integrated approach, investment, and cooperation of different sectors to achieve sustainable development goals.
Possible solution to the barrier: Expansion of power networks and implementation of smart networks, which will allow for better management of energy flow, optimization of consumption, and integration of various renewable sources. Investments in modern battery systems that will enable the storage of surplus energy produced from renewable sources and its later use when needed. Introduction of various technologies, such as thermal storage, batteries, or mechanical solutions, to minimize energy losses. In addition, it is important to organize trainings and educational programs for the residents of Rzeszów and local entrepreneurs on the benefits of renewable energy and efficient energy management. Promoting the benefits of renewable energy sources and renewable energy through informational campaigns in the city and public events. Subsidies and tax incentives play a significant role. Supporting local companies through grant programs and tax incentives for renewable energy installations, which will encourage investments in solar panels, wind turbines, and other technologies.
To sum up, in order to overcome technological and infrastructural barriers in Rzeszów, it is necessary to coordinate actions in the areas of investment, education, innovation, and cooperation between different entities. The transformation towards sustainable energy will require the involvement of local authorities in Rzeszów, residents, and the private sector.

6. Lack of financing models and business models enabling achieving large scale, with the involvement of mixed, private and public, capital without burdening users with excessive costs.
The city of Rzeszów is facing difficulties in attracting investments that would encompass both the public and private sectors. Lack of clear financial models that could attract investments leads to a situation where project initiators and entrepreneurs are unable to effectively calculate costs and benefits. Public-private cooperation requires the creation of clear structures to support projects. Without proper institutions and platforms for exchanging experiences, business models may not be able to gain popularity and efficiency. The city has a limited budget that is not sufficiently flexible to invest in new, unconventional solutions. As a result, the lack of adequate regional and local funds means that many projects have no chance of being implemented.
The above barrier is the result of a combination of various factors that can hinder the development

of innovative financing models in Rzeszów. Overcoming those limitations will require integrated strategies and cooperation between the public sector, private sector, and non-governmental organizations.

Possible solution to the barrier: Creating a platform that would connect various stakeholders, including authorities in Rzeszów, private investors, non-profit organizations, and residents. Meetings and workshops could help in identifying needs and collaboration opportunities. Projects that involve both public and private capital, such as projects related to infrastructure, sustainable development, renewable energy, or housing, should be initiated.

Additionally, the city should invest in the development of financial technologies that would enable efficient capital acquisition and cost optimization for users. Awareness and education of the local community are also important. Creating awareness about the benefits of investments and financial models that help in the development of local initiatives. Educational programs can be organized to help residents understand the benefits they can gain from those initiatives. Furthermore, supporting local entrepreneurs and start-ups through incubators, accelerators, and access to funds can stimulate the development of innovative business models. Regular assessment of the effectiveness of implemented financial and business models will allow for ongoing adjustments and adaptation of strategies to changing market conditions and community needs. Implementation of those steps, with active involvement of all stakeholders, can help overcome current barriers and create dynamic financing models in Rzeszów.

7. Too slow pace of decarbonization of private buildings (residential, commercial, etc.) - due to relatively low profitability of building modernization, low energy and process efficiency of applied solutions, technical problems (poor technical condition of buildings, historic character) and legal problems (unregulated ownership, inefficient management structures).

The fragmentation of decisions also does not favor the effect of synergy and scale. The slow pace of decarbonization of private buildings in Rzeszów, as in many other cities, can be attributed to numerous barriers. One of the key obstacles is the lack of sufficient financial resources and environmental awareness among the residents and property owners in Rzeszów. Implementation of decarbonization technologies, such as heat pumps, photovoltaic panels, or building insulation, is associated with high initial costs. Many people do not have enough savings or cannot afford to take out a loan. Although there are grant programs and tax incentives, they are not always sufficient or well-known to residents. Sometimes application procedures are complicated, which discourages people from using those opportunities. Furthermore, many people lack sufficient knowledge about the benefits of decarbonization, both financial and environmental. Information campaigns on energy efficiency and sustainable development are still insufficient.

Changes in the building infrastructure require residents of Rzeszów and property owners to make decisions about long-term investments.There is often a lack of understanding for the benefits that such changes can bring, which results in a conservative approach to building modernization.

Possible solution to the barrier: Organizing campaigns aimed at raising awareness about the benefits of decarbonization, both for the environment and for financial savings, as well as training and workshops on ecological building solutions and available support programs. The next step should be to increase the availability of grants and tax incentives for building owners who invest in low-carbon technologies such as solar panels, heat pumps, thermal insulation, and the development of low-interest credit programs for individuals wishing to invest in building renovations. Furthermore, encouraging cooperation between local government and developers to support green investments and mobilizing local businesses to engage in decarbonization projects as part of their social responsibility. Implementation of systems to monitor progress in building decarbonization and reporting this data will allow for a more accurate analysis of the effectiveness of the actions taken.

To overcome the barriers in decarbonizing buildings in Rzeszów, integrated actions are needed that combine education, financial support, legal regulations, and technological innovations. Collaboration with residents, the private sector, and public institutions will allow for faster achievement of goals related to CO_2 emissions reduction.

8. Poor public understanding of climate and environmental challenges.

Poor understanding of social climate and environmental challenges in Rzeszów affects the effectiveness of environmental protection and climate change adaptation actions. Low awareness of climate issues and their consequences results from insufficient number of appropriate educational programs and lack of engagement from residents. Furthermore, climate issues are often not present in local media, which limits the availability of information for citizens, especially in the senior group.

Possible response to the barrier: organizing educational programs aimed at different age groups, which will help increase ecological awareness. Conducting informational campaigns in local media that will explain climate-related issues and their consequences for the residents of Rzeszów. Encouraging the creation of local groups and initiatives that will take action to protect the environment, such as planting trees, cleaning green areas, etc. Establishing cooperation with non-governmental organizations dealing with ecology to jointly organize projects and events. An important issue is to enable the residents of Rzeszów to participate in social consultations regarding climate policy and environmental protection, as well as to collect residents' opinions on spatial development plans and ecological investments.

Through those actions, both the understanding of local climate challenges and the engagement of Rzeszów residents in active environmental protection activities can be increased. Thanks to joint effort, it is possible to build a more conscious and responsible society.

9. Gaps in knowledge, lack of data and tools, high costs of acquiring them, lack of standardized methods of data acquisition, aggregation, utilization, and their verification, monitoring, and evaluation. Data digitization.

Barriers related to data digitization in Rzeszów can be characterized on several levels, which largely concern general challenges in acquiring, managing, and utilizing data. Here are the key points that make up this barrier:

- knowledge gaps: many institutions in Rzeszów (both public and private) lack the necessary knowledge and expertise in data digitization. This includes technical skills, understanding of legal regulations related to personal data and data protection, as well as knowledge of best practices in data analysis.
- lack of data and tools: sometimes institutions do not have access to appropriate data (for example, due to data fragmentation in different systems or its complete absence) and technological tools enabling efficient data collection, analysis, and visualization.
- high costs of data acquisition: purchasing data analysis tools, software, or employee training are associated with significant expenses. In the case of limited budgets of public institutions or small companies, this constitutes a significant obstacle in the process of digitalization.
- verification, monitoring, and evaluation: without clear methods of verifying, monitoring, and evaluating data, there is a risk that decisions will be based on incorrect or erroneous information. This limits the effectiveness of actions and can lead to wasting resources.

Possible response to the barrier: introduction of standardized methods for data acquisition, aggregation, and verification. This can be achieved by creating guidelines and best practices, as well as training employees.

Developing data classification schemes, which will facilitate its organization and subsequent use. It is also important to establish cooperation with higher education institutions, research institutes, and technology companies that can help in the development and implementation of effective technological solutions.

It is important to organize workshops and seminars that will promote the exchange of knowledge and experience in the field of data digitization and the search for external funds, such as EU grants, which can help cover the costs of purchasing data management tools. Furthermore, it is particularly important to educate the residents of Rzeszów about the benefits of data digitization, which can increase interest and support for such initiatives. Development of monitoring systems that allow for real-time evaluation of the effectiveness of digitalization-related activities and the quality of collected data, as well as regular assessment of data acquisition and analysis processes, which will enable their continuous improvement.

By taking the above steps, Rzeszów can effectively minimize barriers related to data digitization and create a solid foundation for further development in this field.

10. Independent situations causing destabilization of availability and prices, inflation growth, etc., such as a pandemic, war in Ukraine.

Independent situations, such as the COVID-19 pandemic or the war in Ukraine, have a significant impact on the economy of the region, including Rzeszów, causing destabilization of availability and prices and contributing to inflationary pressures. Here are a few key barriers that may result from those situations:

- disruptions in supply chains - the pandemic and armed conflicts lead to disruptions in international supply chains,

In the case of Rzeszów, which is an important industrial and technological center in Poland, those problems result in a shortage of raw materials and components, which hampers production and increases costs,

- rising production and transportation costs - translate into higher prices of goods and services in Rzeszów,

- investment slowdown - uncertainty related to crisis situations discourages investors from investing capital in the region. In Rzeszów, where the development of technology and industry is crucial, a lack of new investments can lead to economic stagnation and an increase in unemployment,

- increased public spending - increasing spending on economic support leads to growing public debt. In the longer term, this may affect the stability of public finances and tax policy,

- changes in the labor market - crises lead to destabilization of the labor market. In Rzeszow, where many people work in sectors sensitive to economic changes, such as the aviation industry or IT, this situation can result in an increase in unemployment and a decrease in household incomes,

- problems with the availability of products and services - as a result of crises, the availability of certain goods and services becomes significantly limited, leading to increased competition for resources. In Rzeszow, this can apply to both everyday products and specialized services, which can raise prices and lead to consumer frustration.

In summary, independent situations such as a pandemic and war pose a serious challenge to the economic stability of Rzeszów, affecting prices, availability of goods and services, as well as the job market. The long-term effects of those crises can be exacerbated by the need for both companies and local and national decision-makers policies to adapt.

Possible solution to the barrier: To overcome the barriers related to independent situations that can destabilize availability and prices in Rzeszów, such as a pandemic, the war in Ukraine, or other economic crises, multi-faceted actions must be taken. Offering grants, tax incentives, or other forms of support to local businesses that may be affected by crises, as well as supporting local producers and companies, which can increase the availability of products in Rzeszów and reduce transportation costs, would be beneficial. This will contribute to the stabilization of the labor market and the local economy. Furthermore, regular analysis of market trends and predicting potential threats allows for faster implementation of preventive actions. Additionally, through transparent communication and educating society about market cycles and the external effects of events, we can build greater resilience and understanding among residents.

By implementing those strategies, Rzeszów can better cope with unpredictable situations that affect the availability of products and prices, thus contributing to the stabilization of the local economy.

11. Transport - Rzeszów, as a developing city, has its unique transportation barriers that affect the mobility of its residents.

Despite the continuous development of transportation infrastructure, there are still areas where there is a lack of proper roads, intersections, or parking lots. Increased traffic during peak hours in many places leads to difficulties and frustration for drivers. Despite a good public transportation system, residents encounter difficulties such as infrequent services in some parts of the city, lack of direct connections between certain districts, and limited availability during evening and Sunday hours. Despite the growing popularity of electric bicycles and scooters, there is a lack of appropriate bicycle paths and infrastructure conducive to their use. The intensification of car traffic contributes to air pollution and noise, which lowers the quality of life for residents.

Possible response to the barrier: encouraging residents to use various means of transportation, such as public transportation, bicycles, electric scooters, or walking, as well as organizing informational campaigns about the benefits of sustainable transportation.

Improving transportation infrastructure, including the construction of new bicycle paths, sidewalks, and the expansion of public transportation networks, plays a significant role. It should be noted that the city has been systematically investing in improving public transportation for many years by increasing accessibility for people with limited mobility, modernizing city bus stops, replacing the bus fleet with eco-friendly vehicles, and introducing a city card for residents, which makes travel cheaper than the cost of a single ticket. With each passing year, there is a noticeable increase in the number of people using public transportation. The above actions will significantly improve the transportation situation in Rzeszów and make it even more accessible and environmentally friendly for residents.

Given the above barriers and challenges, the following possibilities have been identified for urban systems:

1. Development of new technologies and utilization of the potential of renewable energy sources, systematic development of PV installations and wind farms in order to create a locally sustainable energy area, understood as a limited area that, as a result of investments made, can balance its energy demand through production from sources located within this area. The process of creating such an area includes 5 main sectors: energy generation, energy transmission and distribution, energy storage, energy consumption, energy management.
2. Investments in public transportation, but also in alternative means of transportation, such as bicycles, electric scooters. Promoting alternative solutions to car transportation.
3. Use of digital technologies for monitoring emissions and managing them, for example by implementing smart energy management systems in buildings or traffic monitoring systems to reduce exhaust emissions.
4. Use of public-private partnerships as a financing and implementation formula for projects aimed at achieving climate neutrality.
5. Conducting systematic and multi-directional social campaigns and broad education to raise public awareness of the problem of climate change and encourage a change in lifestyle towards a more sustainable one, with particular emphasis on the needs of marginalized groups.
6. Creating attractive investment financing programs aimed at reducing greenhouse gas emissions - grants, tax incentives for entrepreneurs and residents.

The use of the above possibilities will certainly contribute to overcoming barriers and thus accelerating actions towards achieving climate neutrality.

To accelerate actions for a just energy transition, it is also necessary to make rational use of assets, resources, and processes owned or being implemented by the city. The key skills will be:

1. Transport infrastructure - investments in the development of transportation infrastructure, i.e. pedestrian paths, bicycle paths, public transportation with fleet powered by alternative energy sources, development of electric vehicle charging infrastructure.
2. Taking action to create a sustainable energy area and develop a city's energy security strategy.
3. Improving energy efficiency in public and residential buildings (deep thermal modernization, modernization of heating systems, renewable energy sources).
4. Sustainable spatial planning enables sustainable development, taking into account or even giving high priority to protection of nature and natural resources. Promoted must be ecological solutions, such as low- or zero-emission construction, clean transportation zones, creation of new and protection of existing green areas, etc.
5. Education, information, and social participation - combining educational and informational activities with social participation will raise residents' awareness of climate neutrality and engage them in the decision-making process regarding environmental protection. This will contribute to greater acceptance by residents of the actions that need to be taken to achieve climate neutrality.
6. Continuation and intensification of existing cooperation with business representatives and universities, achieving common ecological goals.

The involvement of all stakeholders is essential for conducting a fair climate transformation. However, in order to achieve mutual understanding and take into account different perspectives, the following are necessary:

1. Dialogue and open communication: It is important to openly communicate with other stakeholders and listen to their opinions and experiences. Dialogue can help in understanding different perspectives and finding common ground.
2. System analysis (mapping): Conducting a systemic analysis can help identify dependencies and interactions between different elements of the system, which can lead to a better understanding of the whole.
3. Collaboration and cooperation: working with various stakeholders and involving them in the decision-making process can help to consider different perspectives and achieve consensus.
4. Developing empathy and empathetic listening: It is important to be ready to understand and empathize with the point of view of others, even if it differs from our own. Empathic listening can help build trust and mutual understanding. This is particularly important in the case of marginalized groups or those affected by energy poverty.
5. Education and awareness building: well-executed education, tailored to different groups, can help in understanding different perspectives and views, as well as building awareness of the complexity of systems.

The city is aware that the above elements are necessary for a fair transformation, especially with regard to residents - that is why the first citizens' panel was held in 2023, in which a representative group of residents was asked “How can Rzeszów achieve climate neutrality by 2030?”. It was an excellent opportunity for educating residents, building awareness, dialogue, and open communication. The suggestions of the residents have influenced the document being developed and have been reflected in the planned actions to be implemented. Furthermore, MunicipalLab organizes many meetings, conferences, and debates in the urban space, also on the topics of ecology and climate transformation.
The city has established the Ecology and Social Affairs Team within the Economic Framework under the Mayor of the City of Rzeszów, in relation to the next very important group of stakeholders, namely entrepreneurs. The concept of the Contract and the significance of participation in the Mission have been repeatedly discussed in a broader forum of Rzeszów entrepreneurs, which also indirectly allowed for the development of this document thanks to cooperation and dialogue. A more detailed description and other examples of stakeholder engagement are described in the later in the document.

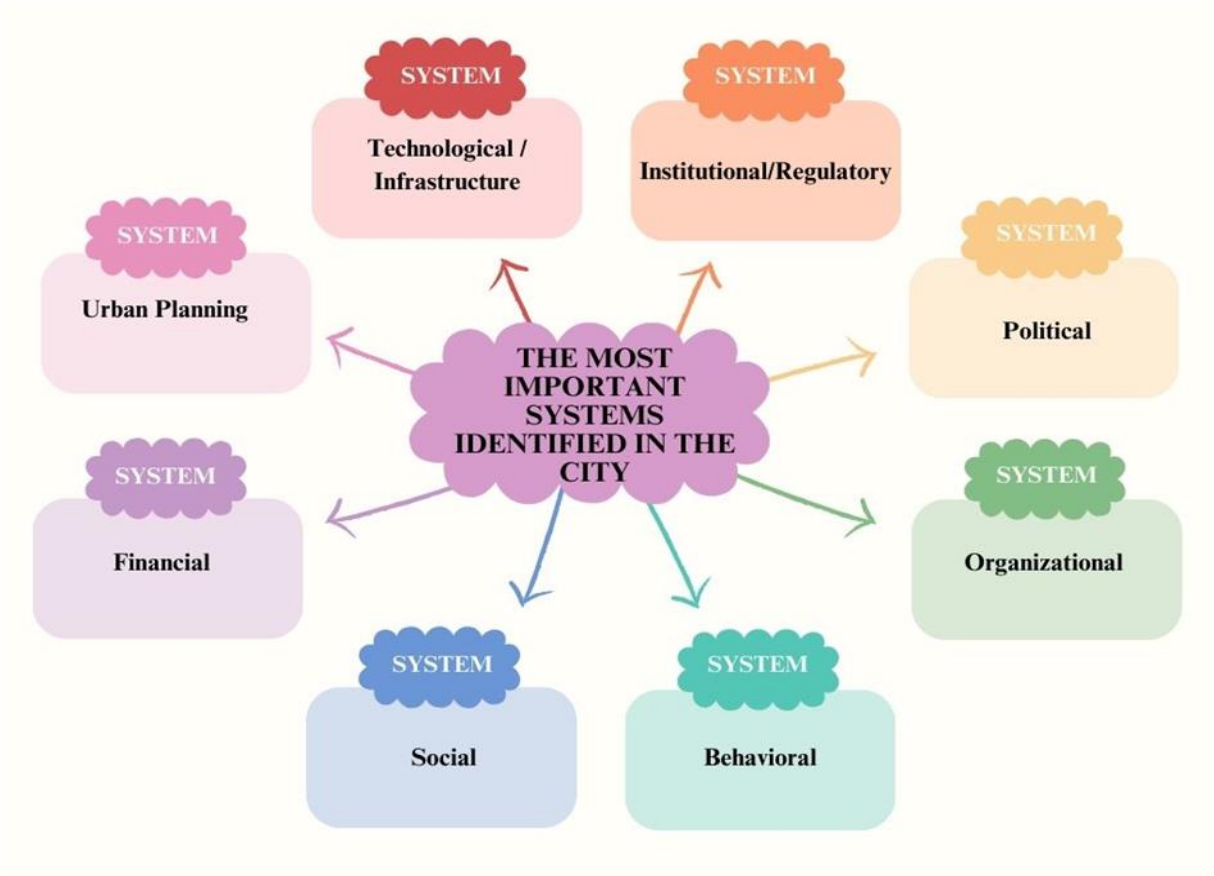


Diagram 3. The most important systems identified in the city

In Table A-3.2, the following scale was used to describe the impact of stakeholders in the city:
- high impact
- moderate impact
- low impact.

A-3.2: Systems & stakeholder mapping			
System	Stakeholders	Influence on the city´s climate neutrality ambition	Interest in the city´s climate neutrality ambition
Technological / infrastructural	PGE Energia Ciepła S.A., Rzeszów Combined Heat and Power Plant Branch	Impact: high It uses environmentally friendly technologies, promotes district heating, and raises environmental awareness, among other things, in terms of municipal waste management.	The stakeholder is interested in eco-social transformation. It takes actions aimed at reducing greenhouse gases and adapting to climate change.

		It implements programs that reduce the impact of combined heat and power plants on the natural environment. It has a Thermal Energy Recovery Installation (ITOPE), where municipal waste, mostly coming from the city, is thermally transformed.	
Technological / infrastructural	Edison Next Poland Sp. z o.o.	Impact: high It offers energy and environmental services aimed at reducing the operational costs of clients through the modernization of existing networks, strategic investments, centralization of engineering tasks, and administrative and legal support.	The stakeholder is interested in eco-social transformation. The mission of the Company is to support customers on the path of ecological transformation, offering itself as a long-term partner. The goals of the Company are decarbonization, zero emissions, and the development of renewable energy sources. Edison Next Poland Sp. z o.o. and Miejskie Przedsiębiorstwo Energetyki Cieplnej Rzeszów Sp. o.o. (City Heat Energy Company) have signed a new cooperation agreement for the supply of energy-efficient heat to the city's residents and the financing of the expansion of the municipal heating network. Thanks to the deepening of cooperation, Edison Next Poland will implement investment plans in ecological sources of energy,

			which will allow the city to take a significant step towards climate neutrality.
Technological / infrastructural	Polskie Sieci Elektroenegretyczne S.A.	Impact: high The Company's activity is to provide electricity transmission services, while maintaining the required safety criteria of the National Power System (KSE).	The stakeholder is interested in eco-social transformation. The PSE Strategy for 2020-2030 is a vision of a modern market that addresses the key challenges: - cost of transformation, - climate neutrality - import/export; - social acceptance, - excess complexity, - generational change. Additionally, the Development Plan for the Transmission System (PRSP) focuses on investments supporting Poland's energy transformation, including the integration of large amounts of renewable energy sources (RES) with the National Power System (KSE) and the safety of KSE operation.
Technological / infrastructural	PGE Dystrybucja S.A.	Impact: high Electricity distributor, performing tasks imposed by the Energy Law, including: conducting network operations in the distribution network; conducting operation, maintenance and repairs of the distribution network; planning the development of the distribution network; ensuring the expansion	The stakeholder is interested in eco-social transformation. The development plan for the years 2023-2028 regarding meeting the current and future demand for electricity is a response to the challenges arising from changes in legal regulations and decisions regarding the regulation of the sector, but also to the

		of the distribution network; balancing the system and managing system constraints; maintaining an appropriate level of safety in the operation of the distribution network.	changing behavior of electricity market participants. The investments being carried out should ensure that the grid is adapted to the scale of connected micro-installations and RES. They should also enable monitoring of the electrical parameters available from the prosumer's bidirectional meter, allowing for analysis of power flows in the network and the identification of methods to eliminate potential overloads and maintain the required voltage levels in the network.
Technological / infrastructural	GAZ – SYSTEM S.A.	Impact: high It is responsible for the transmission of natural gas, manages the most important gas pipelines in Poland and the Baltic Pipe offshore gas pipeline, and is the owner of the President Lech Kaczyński LNG Terminal in Świnoujście.	The stakeholder is interested in eco-social transformation. The mission of the Company is to ensure Poland's energy security and increase the competitiveness of the Polish economy by: creating and managing a gas fuel transmission network and connections within the European transmission network; reliable operation of terminals and other key infrastructure elements for gas fuels; conducting projects that contribute to the efficient and cost-effective energy transformation of Poland.

Technological / infrastructural	Polska Spółka Gazownictwa Sp. z o.o.	Impact: high Polska Spółka Gazownictwa is the Gas Distribution System Operator. in Poland. The key task of the Company is the reliable and safe transportation of gas fuels through the distribution network throughout the country directly to end users and other local operators' networks.	The stakeholder is interested in eco-social transformation. The PSG development plan for 2024-2028 includes a series of investments to meet current and future demand for gas fuels. Taking into account the EU's long-term climate policy, which aims to achieve climate neutrality and prioritize the production of energy from renewable sources, the Company is analyzing issues related to expanding the functionality of gas infrastructure to transportation natural gas with a mixture of other gases, especially zero- and low-emission gases such as biomethane, hydrogen, and synthetic natural gas. Furthermore, the Company conducts research and development work, for example, in the area of enabling the expansion of the functionality of the gas network and preparing it for the distribution of “decarbonized” gases.
Technological / infrastructural	Miejskie Przedsiębiorstwo Energetyki Cieplnej Rzeszów Sp. o.o. (City Heat Energy Company)	Impact: high Municipal Company - a provider of district heating in Rzeszów, whose task is to create a modern, efficient and environmentally friendly	The stakeholder is interested in eco-social transformation. All investment and renovation activities undertaken by MPEC-Rzeszów Sp. z o.o. are aimed primarily at

		system of supplying the city with heat, by providing services at the highest level, maintaining a stable price for heat, ensuring thermal comfort for Customers.	the development of the district heating system and gradually increasing its energy efficiency by reducing heat losses. This directly affects the improvement of heat energy utilization efficiency, allows to reduce the emission of CO_2 and other harmful compounds into the atmosphere. Furthermore, the implementation of those tasks directly contributes to the maintenance and improvement of the reliability of heat transmission, thus ensuring energy security in terms of System Heat supplying to Consumers. The representatives of the Company provide support to the Climate Neutrality Team.
Institutional / regulatory and organizational	Rzeszów Functional Area Association (ROF)	Impact: moderate The ROF Association manages Integrated Territorial Investments and acts as an Intermediate Body.	The stakeholder is interested in eco-social transformation. Implementing the overarching goal of the ZIT ROF Strategy – i.e., the socio-economic development of the ROF as a factor integrating and improving the quality of life for residents, achieved through developmental goals: - increasing the competitiveness of the economy by creating conditions for the development of innovative companies

			(development of Economic Activity Zones ROF). - improving the quality of life in the ROF by increasing access to modern public services and revitalizing public spaces (such as the development of the public transportation system). protection and promotion of cultural heritage of ROF; comprehensive revitalization of degraded areas within ROF) - improving the state of the natural environment and supporting the energy efficiency of the region (development of water and wastewater management in the ROF area; use of renewable energy sources in the ROF area; improving the energy efficiency of buildings and district heating infrastructure in the ROF area).
Institutional / regulatory and organizational	Local government administration - Podkarpackie Voivodeship Marshal's Office	Impact: high Development of the "Regional Program to prevent climate change and its effects, taking into account renewable energy sources and a closed-loop economy.	The stakeholder is interested in eco-social transformation. It takes more and more initiatives and programs aimed at protecting the environment and combating climate change. It cooperates and takes action at various levels of administration to effectively prevent climate change. It implements numerous pro-ecological initiatives. The main goal of the LIFE

			PODKARPACKIE project is the effective implementation of an air protection program by eliminating existing barriers at the local level. The project also involves developing and implementing good practices and mobilizing public and private resources to improve air quality and energy efficiency. The initiative will cover the areas of municipalities and cities in the Podkarpackie Voivodeship, reaching every resident of the region.
Institutional / regulatory and political	Government administration: - Ministry of Climate and Environment (Departments of: District Heating Transformation and Energy Efficiency; Electromobility and Hydrogen Economy; European Funds; Air Protection and Climate Negotiations; Renewable Energy Sources; Strategies and Analysis), - Ministry of Funds and Regional Policy, - Ministry of Economic Development and Technology, - Ministry of Education.	Impact: high Cooperation within the CapaCities project and other initiatives.	The stakeholder is interested in eco-social transformation. Taking effective actions, legislation, implementing financing programs, exchanging knowledge between entities responsible for environmental protection management in Poland and institutions involved in implementing European funds at the regional, national, and European levels. in particular in the areas of: air protection, improving energy efficiency, adaptation to climate change, nature conservation, and preserving biodiversity, digitalization, education.

Institutional / regulatory and organizational, social, behavioral	Institute of Environmental Protection - State Research Institute	Impact: moderate The departmental institute, supervised by the Ministry of Climate and Environment, whose main goal is to create scientific foundations for environmental protection, provide knowledge to government and local government administration as well as economic entities, and raise the level of ecological awareness and shape ecological attitudes in society.	The stakeholder is interested in eco-social transformation. As part of the "City with Climate" project, Rzeszów closely collaborated with the National Centre for Nuclear Research (NCBJ) to develop a Roadmap for the City's Transformation towards climate neutrality and resilience, particularly in the area of air quality. Close cooperation within the CapaCities project.
Institutional / regulatory and organizational, social, behavioral	National Center for Research and Development	Impact: moderate Government executive agency, a key center for supporting and creating innovative technological and social solutions, creates a knowledge and information ecosystem about them. It initiates and implements initiatives contributing to the civilizational development of the country.	The stakeholder is interested in eco-social transformation. Rzeszów closely collaborates with NCBR within the NEEST Pilot Program.
Institutional / regulatory and organizational, social, behavioral	National Centre for Nuclear Research	Impact: moderate Research institute, conducting fundamental research in the field of subatomic physics and applying nuclear physics methods and developing nuclear technologies.	The stakeholder is interested in eco-social transformation. As part of the "City with Climate" project, Rzeszów closely collaborated with the National Centre for Nuclear Research (NCBJ) to develop a Roadmap for the City's Transformation towards climate neutrality and resilience, focusing on

			energy transformation and zero-emission transportation.
Institutional / regulatory and organizational, social, behavioral	Institute of Ecology of Industrial Areas	Impact: moderate Research institute supervised by the minister responsible for climate affairs. Research and services offered by IETU are focused on environmental challenges related to industrialized and urbanized areas in the context of a circular economy, efficient resource management, and adaptation to climate change and mitigation of its effects.	The stakeholder is interested in eco-social transformation. As part of the "City with Climate" project, Rzeszów closely collaborated with the National Centre for Nuclear Research (NCBJ) to develop a Roadmap for the City's Transformation towards climate neutrality and resilience, focusing on urban greenery and water retention areas.
Institutional / regulatory and organizational, social, behavioral	Forest Research Institute	Impact: moderate The Institute's activities involve conducting research and development work in the field of forestry sciences.	The stakeholder is interested in eco-social transformation. As part of the "City with Climate" project, Rzeszów closely collaborated with the National Centre for Nuclear Research (NCBJ) to develop a Roadmap for the City's Transformation towards climate neutrality and resilience, focusing on urban greenery and water retention areas.
Institutional / regulatory and financial	National Fund for Environmental Protection and Water Management	Impact: high Main pillar of the Polish system for financing environmental	The stakeholder is interested in eco-social transformation.

		protection and water management, with the largest financial potential. The National Fund is an important tool for implementing environmental protection policy in Poland. This is achieved through stable income, experienced staff, and established forms of cooperation with beneficiaries.	Loan, grant, and other forms of financing offers for projects implemented by local governments, companies, public entities, social organizations, as well as individuals for activities in the field of environmental protection, including tasks related to air pollution reduction and GHG reduction.
	Voivodeship Fund for Environmental Protection and Water Management in Rzeszów.	Impact: high	Implementation of Programs, within which it is possible to obtain financing for: improving air quality; energy transformation of the economy; adaptation to climate change; rational waste management, including closed-loop economy and land surface protection; protection of biodiversity and ecosystem functions; protection and sustainable management of water resources.
Financial	Bank Gospodarstwa Krajowego	Impact: high Polish Development Bank, whose mission is to support sustainable socio-economic development of Poland.	The stakeholder is interested in eco-social transformation. The key role in building a strong and stable economy lies in developing cooperation and activating the private and public sectors in order to increase the potential for socio-economic

			development. The sustainable socio-economic development of Poland is supported through business model programmes in the following sectors: - industrial development, - entrepreneurship development, - healthcare, - social and territorial cohesion - infrastructure, transportation, logistics, - strategic safety, - public finances, - housing.
Financial	World Bank Group	Impact: high One of the largest sources of financing and knowledge for developing countries. Its five institutions are united by a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development.	The stakeholder is interested in eco-social transformation. The mission of the Group is to end extreme poverty and increase shared prosperity on a livable planet by: - including everyone, including: women and young people, - shock resistance, including: climate crises, biodiversity crises, pandemics. - sustainable development through economic growth and job creation, social development, budget and debt management, food security, and access to clean air, water, and affordable energy.

Financial	European Investment Bank	Impact: high The European Investment Bank provides financial resources for projects that contribute to achieving EU goals both within the EU and beyond its borders.	The stakeholder is interested in eco-social transformation. EBI aims to increase European potential. in terms of employment and economic growth; support actions in the field of climate; support EU policy beyond the EU borders.
Organizational, social, behavioral	City Council	Impact: high The City Council deliberates at sessions and resolves all matters within the scope of the City's activities by way of resolutions, unless otherwise provided by law. City Council it can adopt the following in the form of resolutions: - statements containing a position on a specific matter, - declarations in which one commits to specific actions, - appeals or requests calling for specific activitis, initiatives, or actions.	The stakeholder is interested in eco-social transformation. On 25 October 2022, the Rzeszów City Council adopted a resolution regarding the achievement of climate neutrality by the city of Rzeszów by 2050. It was emphasized that the City Municipality of Rzeszów will strive to achieve climate neutrality by 2050 through a just, effective, and socially acceptable transformation. It also recognizes the necessity of accelerating efforts to achieve climate neutrality and making it a priority in the city's policy in the City Municipality of Rzeszów.
	Neighborhood Councils	Impact: low The activities of the Neighborhood Councils include in particular: - organizing, initiating, and coordinating initiatives aimed at	The Neighborhood Councils engage in various initiatives, including pro-ecological ones, and collaborate with the City to improve the quality of residents' lives.

		improving the living conditions of the residents of the neighborhood. - supporting initiatives and actions aimed at integrating the local community, - cooperation with organizations and institutions operating in the neighborhood, - taking care of meeting the needs of the residents of the Housing Estate.	
Technological / infrastructural and organizational	Municipal companies: - Miejski Zarząd Budynków Mieszkalnych Sp. z o. o. (City Residential Buildings Management Authority), - Miejskie Przedsiębiorstwo Gospodarki Komunalnej-Rzeszów Sp. z o. o. (City Public Utility Company), - Miejskie Przedsiębiorstwo Wodociągów (City Waterworks Company) i Kanalizacji Sp. z o. o., - Miejskie Przedsiębiorstwo Komunikacyjne (City Transport Company) Sp. z o.o.	Impact: moderate The main function of Companies is to carry out the municipality's own tasks, which consist in meeting the needs of the community. They include, among others, supply of water, gas, electricity, waste disposal, maintenance of order in the municipality, and transportation. The development strategies of the Companies correspond to the climate policy implemented in the City.	Stakeholders are interested in the eco-social transformation. Representatives of the Companies provide substantive support to the Climate Neutrality and Smart City Team.
Organizational	Municipality budget units, including: City Transport Management Authority, City Greenery Management Authority, City Market and Parking Management Authority	Impact: moderate The City Transport Management Authority organizes public transportation within the municipality, while the City Greenery Management Authority maintains parks and both landscaped and non-landscaped urban greenery, greenery in road strips, establishes new urban green areas,	Stakeholders are interested in the eco-social transformation. Representatives of budgetary units are members of the Climate Neutrality and Smart City Team.

		and is responsible for city cleaning and the elimination of illegal dumping sites. The City Market and Parking Management Authority carries out tasks of the Rzeszów Municipality, including matters such as: markets and market fees; organization and operation of paid parking lots located on the grounds managed by MATiP (Urban Spatial Information System), organization and operation of the Paid Parking Zone, organization and operation of the Pedestrian Traffic Zone and Restricted Traffic Zone. Given the fact that transportation accounts for 24% of total CO_{2e} emissions, proper and sustainable planning of public transportation development and meeting the needs of residents in this area is crucial. In turn, taking care of existing green areas and creating new ones has undeniable value in the context of climate change adaptation.	
Organizational, social/ behavioral	Urban Lab Rzeszów	Impact: moderate Instrument (organization and physical space - office and/or a selected part of the city for experimenting with selected solutions for cooperation between city authorities, residents, companies,	The stakeholder is interested in eco-social transformation. Involving various stakeholders, primarily residents, in the process of designing and managing the city.

		and scientific entities, aimed at improving the quality of life for residents through innovative solutions to identified problems (initiating, testing, implementing, and evaluating projects) and generating additional value using urban resources.	
Social/behavioral	Non-governmental organizations, associations promoting knowledge in the field of environmental protection, such as the EKOSKOP Association or the Będzie Dziko Foundation, Youth Climate Strike.	Impact: moderate The EKOSKOP Association is an organization of natural persons established to promote environmental protection, operate in accordance with the principles of sustainable development, and advocate for a healthy lifestyle. The activities of the Association aim to educate (especially the younger generation) for harmonious coexistence with nature, responsibility for decisions and actions that affect the environment.	Stakeholders are interested in the eco-social transformation. Associations actively support actions aimed at protecting the environment. They promote and disseminate knowledge about climate change mitigation and adaptation actions.
Social/behavioral	Rzeszow Universities: - Ignacy Łukasiewicz Rzeszow University of Technology, - University of Rzeszów, - Higher School of Computer Science and Management with its registered office in Rzeszow	Impact: moderate	Stakeholders are interested in the eco-social transformation. The universities in Rzeszów support the city's efforts to achieve climate neutrality through education and teaching, ongoing investments, and participation in thematic teams within the Economic Council under the Mayor of Rzeszów. Those teams include: the

		Higher education institutions, as research and educational centers, play a crucial role in disseminating knowledge and technology. They contribute greatly to popularizing knowledge about environmental protection, including climate change, the ongoing changes, and the actions that need to be taken in terms of mitigation and adaptation. As a result, they shape pro-environmental attitudes and contribute to education and research in the field of climate protection.	Education and Health Team, the Ecology and Social Affairs Team, the Energy and Renewable Energy Sources Team, the Infrastructure, Communication, Urbanization, and Monuments Team, the Innovation and New Technologies Team, and the International Affairs Team.
Financial	Podkarpacie Innovation Center (PCI)	Impact: moderate An organization promoting the use of scientific achievements in the economy. It builds key skills for scientists and students. Strengthening the region's potential by financing research and development work of scientists and the resulting new technologies and solutions.	The stakeholder is interested in eco-social transformation. By supporting innovative ideas of young people, we broaden their knowledge about startups and prototyping by providing makerspace workshops, as well as organizing educational programs and hackathons, including in the field of environmental protection, such as CE.
Organizational	Podkarpacie Hydrogen Valley	Impact: moderate To support the development of the hydrogen economy and strive to build a branch of the Podkarpacie region hydrogen industry, including the production of hydrogen	The stakeholder is interested in eco-social transformation. Rzeszów - represented by the acting Mayor of the City of Rzeszów, is a signatory of the letter of intent for the

		in the electrolysis process using energy produced from renewable energy installations and its use in energy sector, including heat energy sector, transportation, infrastructure and industry.	establishment of the Association, which allows it to benefit from its scientific and research potential in the field of low-emission economy.
Financial	Rzeszow Regional Development Agency	Impact: moderate The aim of the Company is to conduct activities aimed at the comprehensive development of the Podkarpacie region through the concentration and mobilization of the potential of local communities, as well as advisory and service activities in the processes of restructuring, opening and supporting economic ventures, promoting the region and obtaining foreign aid funds.	The stakeholder is interested in eco-social transformation. RARR (Rzeszów Regional Development Agency) acquires foreign aid for tasks related to broadly defined environmental protection, including climate issues. It implements various international projects. for example, CIREVALC, whose aim is to introduce and scale up models of a circular economy in regional value chains in the food, gastronomy, and packaging sectors.
Organizational, social, behavioral	Polish Architects Association (Branch in Rzeszów)	Impact: moderate The nationwide professional association of architects, which aims to promote architecture, is interested in the highest professional standards of architects and working for the benefit of the surrounding space. The SARP (Association of Polish Architects) Branch in Rzeszów is a place that has long integrated the architectural community and individuals interested in	The stakeholder is interested in eco-social transformation. Conscious approach to designing buildings and spaces, taking into account issues related to energy efficiency and energy management, use of renewable energy sources, sustainable building materials, etc., as well as educating potential recipients of those projects, seems to be crucial for achieving climate neutrality.

		architecture and urban planning.	
Organizational, social, behavioral	Podkarpackie District Chamber of Civil Engineers	Impact: moderate An organization that brings together engineers and technicians across the following ten industries: construction and building, sanitary installations, electrical installations, water and land reclamation, road construction, bridge construction, railway construction, telecommunications, demolition, hydrotechnical.	The stakeholder is interested in eco-social transformation. A sustainable approach to designing and constructing buildings, spaces, infrastructure, and educating users of those products seems to be crucial for achieving climate neutrality.
Organizational, social, behavioral	Rzeszów Housing Cooperatives Agreement	Impact: low Organization bringing together housing cooperatives in Rzeszów, whose activities in the field of housing construction, both new and existing, will have an impact on achieving climate neutrality.	The stakeholder is interested in eco-social transformation. Housing cooperatives will have to adjust their resources to the provisions of the law. e.g. EPBD Directive.
Financial, social, behavioral	Business represented by the Rzeszów Economic Council	Impact: high The Economic Council is tasked with promoting the city and the companies operating within it. Collaboration among Council members contributes to strengthening the cooperation between local government and the business community. The Council consists of entrepreneurs from the City of Rzeszów and	The stakeholder is interested in eco-social transformation. The Rzeszow Economic Council supports the City's efforts to achieve climate neutrality through both investments and participation in thematic teams. within the Economic Council under the Mayor of Rzeszów. Those teams include: the Education and Health Team, the

		the Rzeszów Subregion.	Ecology and Social Affairs Team, the Energy and Renewable Energy Sources Team, the Infrastructure, Communication, Urbanization, and Monuments Team, the Innovation and New Technologies Team, and the International Affairs Team.
Spatial planning	Office for the Development of the City of Rzeszów	Impact: moderate The main task of the Office is to prepare local spatial development plans and Study of Conditions and Directions for Spatial Development, as well as other planning documents.	The stakeholder is interested in eco-social transformation. Representatives of the Office provide substantive support to the Climate Neutrality and Smart City Team. Consistently implemented sustainable spatial policy of the city is crucial for achieving climate neutrality.

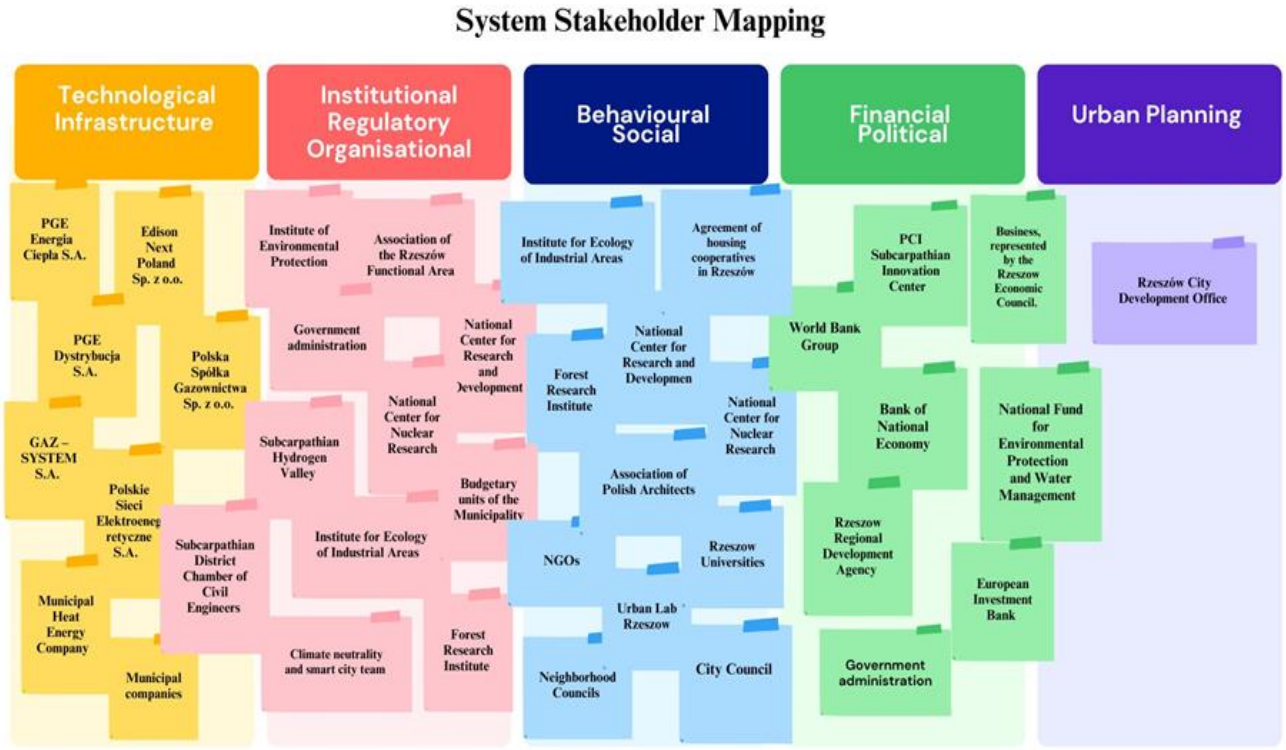


Diagram 4. System Stakeholders Mapping

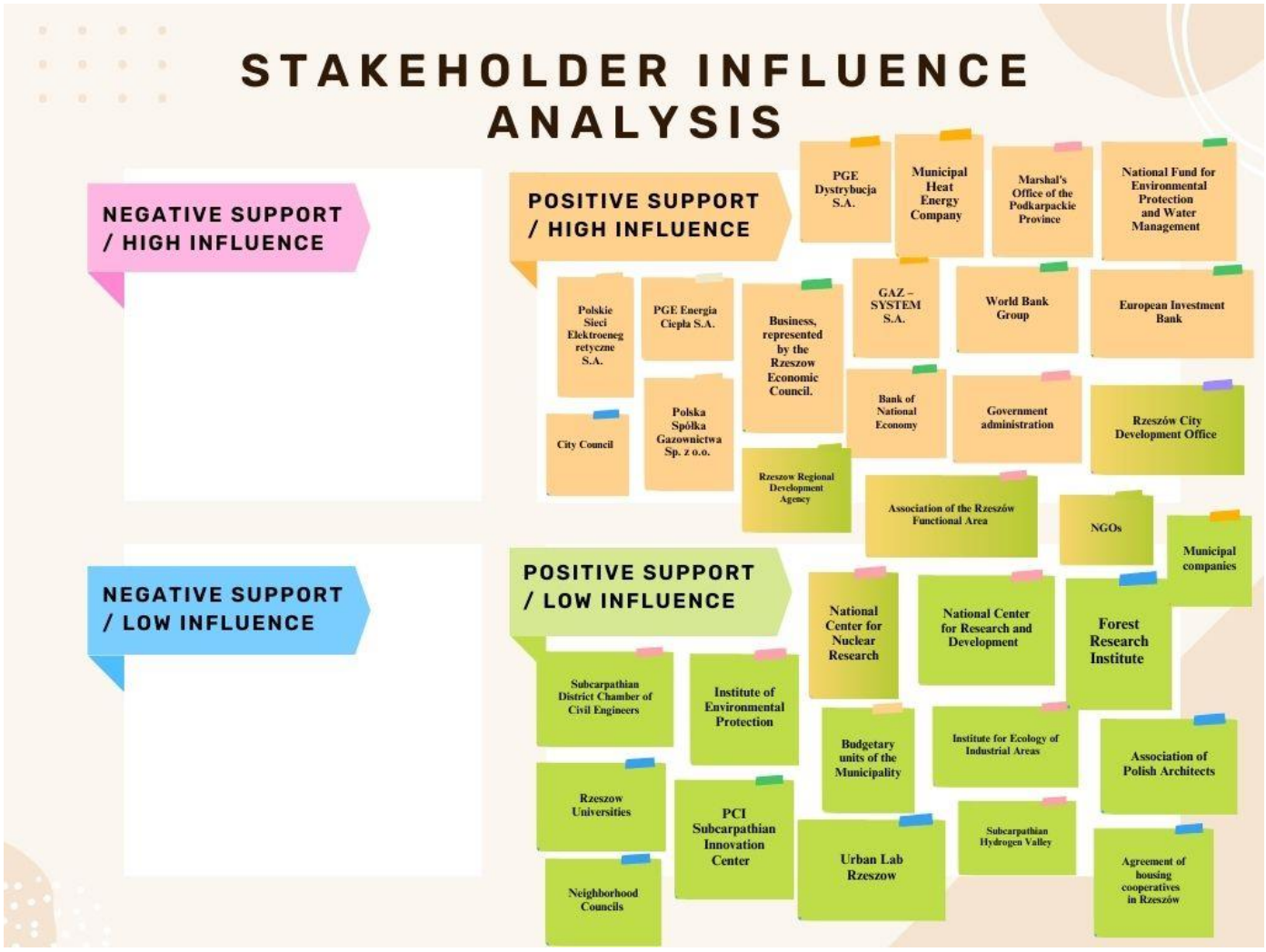


Diagram 5. Stakeholder influence analysis

3 Part B – Pathways towards Climate Neutrality by 2030

3.1 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	The development of technology and infrastructure (including its modernization) and the implementation of new solutions will enable a faster transition towards climate neutrality (high energy efficiency, innovative renewable energy solutions and their combination).	Gradual transition towards energy sustainable areas.	Total reduction of GHG emissions: 368,989 tCO_{2e}	1. Improvement in quality of life (reducing air pollution). 2. Lower energy costs for households, companies, and public administration. 3. Potential revenues from renewable energy generation. 4. Creating new job opportunities. 5. Increasing the security of public spaces.
		Decarbonization of the urban district heating network.	Complete departure from fossil fuels in favor of renewable energy sources.		
		100% of street lighting (lamp posts) equipped with LED fixtures.	The most modern and energy-efficient street lighting system.		
	Governance /policy/ organizational	New approach in public procurement (strong priority for ecological investments, use of “green energy”).	Increasing demand for sustainable products and services. Promoting energy efficiency. Reducing emissions throughout the life cycle of products.		1. Increasing the energy security of the city. 2. Reducing dependence on external sources of fuel, including those from outside the EU.

			Encouraging to buy local products. Raising awareness through education - especially among administrative staff.		3. Acquiring private investors.
		Developing new business models and financing investments in the field of energy systems.	Implementing and gathering experience from the implementation of new business models and investment financing in the analyzed area.		
	Finance	Financial support for activities in the field of the energy system at the regional, national, and international level. (dedicated programs).	Further financial support in the analyzed area. Close cooperation between local governments and financing bodies / institutions.		1. Financial benefits from long-term and future-oriented decisions and investments (e.g. through selling and/or reducing purchased energy). 2. Acquiring private capital.
	Social/ behavior/ education	Engaging a wide range of stakeholders in the process of planning the city as an energy sustainable area.	New technologies, implemented actions, and models are accepted by society.		1. High quality of life in a clean environment. 2. Stability of energy prices, resulting in savings in households.

		Transition Team's empowerment with external competencies.	Acquiring specialized knowledge inside and outside the Transition Team. Leaving specialized competencies within the Office.		3. Educated staff with desired competencies in the Office.
Mobility & transportation	Technology/ infrastructure	Expansion of public transportation infrastructure.	Planning the city's development towards its reurbanization, while simultaneously continuously raising the attractiveness of public transportation. Building interchange hubs that connect various means of transportation at multiple points in the city and synchronize connections to shorten travel time between distant parts of the city.	Total reduction of GHG emissions: 275,694 tCO_{2e}	1. Improvement in environmental quality: - reduction of air pollution, - improvement of acoustic climate – reduced noise levels. 2. Improving the condition, health, and well-being of residents. 3. Increasing road safety. 4. Shorter travel time - traffic fluidity.
		Expansion and modernization of the urban public transportation fleet towards zero-emission.	100% of the urban public transportation fleet is low- and zero-emission. Reduction of emissions from the public transportation sector.		

		Development of electric charging network for cars.	Growing popularity of electric vehicles.		
		Expansion of pedestrian and bicycle infrastructure.	Increase in the share of walking and bicycle trips.		
	Governance /policy/ organizational	Creation of Clean Transport Zone.	Replacement of old and high-emission means of transportation and optimization of freight transportation logistics.		1. Improvement in environmental quality: - reduction of air pollution, - improvement of acoustic climate – reduced noise levels. 2. Improving the condition, health, and well-being of residents. 3. Increasing road safety. 4. Shorter travel time - traffic fluidity. 5. Optimization of space utilization. 6. New business models enabling the acquisition of investors with private capital. 7. Creating new job opportunities.
		Development of the functioning of the public transportation system.	The city's development towards its reurbanization, while simultaneously continuously icreasing the attractiveness of public transportation. Significant increase in the number of people using public transportation.		
		Changing the way public spaces are used, including fewer parking spaces, more pedestrian streets, and the use of woonerf-type solutions.	Reducing car transportation in the city center.		
		Developing business models for the development of EV charging stations.	Intensive expansion of the public electric vehicle charging station system.		

	Finance	Identification of barriers to financing and financing infrastructure.	Increased financing for the analyzed area. Close cooperation of the local government with the financing bodies/institutions in this area.		Strong financial support at the beginning provides opportunities for long-term cost reduction (economies of scale).
	Social/ behavior/ education	Promoting alternative means of transportation (e.g. scooters), carpooling, etc.	Reducing the demand for private cars for city center residents. Developing new commuting models for work from outside the city.		1. Improvement in environmental quality: - reduction of air pollution, - improvement of acoustic climate – reduced noise levels. 2. Improving the condition, health, and well-being of residents. 3. Increasing road safety. 4. Shorter travel time - improved traffic flow. 5. Social integration, sense of community - meeting the expectations of residents. 6. Strong mandate to implement plans. 7. Social equality, by ensuring mobility accessibility for all social groups.
		Promoting hybrid and remote work reduces the demand for commuting to workplaces.	Reducing the demand for transportation, optimizing energy consumption in buildings, promoting a more sustainable lifestyle and corporate practices.		
		Promotion of "smart" solutions	Increased utilization of dedicated applications.		
		Development of new mobility models focusing on inclusion of all social groups.	Constant involvement of society in decision-making. Significant development of participation. Strong sense of responsibility for the solutions developed.		
	Spatial planning	Development of Sustainable Urban Mobility Plan	Successful implementation of the Sustainable Urban		

			Mobility Plan and close cooperation with the Municipalities forming the ROF, in order to fully implement the objectives of the Plan.		8. Urban benefits: reduction of traffic jams, congestion, better and more efficient spatial planning. 9.Promotion of the inverted pyramid of mobility idea.
Waste & circular economy	Technology/ infrastructure	Development of infrastructure (construction, expansion, modernization of facilities) necessary for proper waste management.	Increase in the number of exchange points and reuse points. Increase in the amount of selectively collected waste. Significant increase in the level of waste recycling, including bio-waste.	Total reduction of GHG emissions: 2,114 tCO_{2e}	1. Reduction of waste. 2. Resource conservation through the reuse of secondary raw materials. 3. Improvement in quality of life. 4. Aesthetics and cleanliness of the city. 5. Increased knowledge among residents. 6. Reduction of waste storage costs.
	Governance /policy/ organizational	Regulations regarding incentives for residents implementing environmentally friendly solutions, such as independently disposing of organic waste.	Increase in the amount of composted waste by residents.		
	Finance	Incentives for residents (tax incentives).	Increase in the amount of selectively collected waste.		
	Social/ behavior/ education	Development of reuse centers. Educational campaigns.	Raising awareness and knowledge of the society about waste prevention. Promoting the production and use of products with extended lifespan.		

Green infrastructure & nature-based solutions	Technology/ infrastructure	Development of blue-green infrastructure.	100% of residents with access to green areas within a walking distance of no longer than 10 minutes. Increase in the number of installations for rainwater retention.	CO_2 absorption 9,385 tCO_2	1. Reduction of the risk of residents of the city experiencing negative effects of high temperatures, water shortages during dry periods (thanks to the possibilities of small retention), and the negative impact of air pollution on the city's population. 2. Improvement in environmental quality: - reduction of air pollution - beneficial ventilation of the city, - improvement of acoustic climate – reduced noise levels, - improvement of microclimate. 3. Increased water retention capabilities, 4. Improvement of the condition, health (including mental health), and well-being of residents.
	Governance /policy/ organizational	Development of guidelines for proper maintenance of existing greenery and implementation of greenery management standards during investments.	Progressive implementation of solutions and involving an increasing number of stakeholders.		
		Implementing smart solutions in green management.	Comprehensive inventory of natural resources, including more and more elements such as: canopy maps, tree species and condition, orthophotomaps, 3D mesh models, land cover models, and heat islands.		
	Finance	Implementation of the Green Fund	Increasing participation of residents and businesses in the development of green areas in the city through co-financing “green” projects.		

	Social/ behavior/ education	Rzeszów Citizens' Budget	Increase in the number of "green" projects submitted and selected by residents for implementation within the budget.		5. Significant reduction of the Municipal Heat Island effect. 6. Increase in biodiversity. 7. Aesthetics and raising of the attractiveness of the city (also for pedestrian and bicycle traffic), 8. Increase of community engagement. 9. Developing new business models - acquiring private capital.
		Environmental education	Increasing social support for actions related to maintaining urban areas. Full transparency of actions.		
	Spatial planning	Designing and implementing the provisions of the Study of Conditions and Directions for Spatial Development. Design a general plan according to this idea.	Planning documents that take into account the need to protect areas for the development of green spaces. Taking special care of particularly valuable areas.		
Built environment	Technology/ infrastructure	Development of new sustainable technologies in the construction sector (new residential buildings and modernization of existing buildings).	Universal access to technology. Elimination of all sources of fossil fuels in the residential building sector. Significant increase in deep thermal modernization and significant reduction in primary energy demand, both in residential and industrial-service and public utility buildings.	Total reduction of GHG emissions: 470,728 tCO_{2e}	1. Significantly reduced energy demand (higher energy efficiency ratio). 2. Cost reduction of energy. 3. Financial savings resulting from the production of energy from RES, 4. Potential benefits resulting from the sale of energy surpluses.

		Development of renewable energy infrastructure.	Significant increase in the installation of renewable energy sources, both in public utility facilities and private ones.		5. Reducing dependence on fossil fuels. 6. Improvement in quality of life. 7. Increase in property value. 8. Creating new job opportunities.
	Governance /policy/ organizational	Development of standards for construction - primarily for buildings managed by the city.	Extension of construction standards to private properties (multi-family residential buildings), e.g. developers.		1. Reduction of operating costs. 2. High standard of residential areas, and later on, high standard of workplaces.
	Finance	Financial support enabling transition to ecology and sustainable development (including development of renewable energy sources and deep thermal modernization).	Increase in the utilization of available support funds for investment in the analyzed area (increase in the number of residents benefiting from subsidies). Programs dedicated to vulnerable groups.		1. High standards of investment implementation thanks to external support.
	Social/ behavior/ education	Promotion of a just energy transition by including vulnerable groups, especially those at risk of energy poverty, in support programs.	Increase in the number of residents served at the Municipal Promotional and Consultation Point of the "Clean Air" Program. Increase in the number of consultations provided by energy advisors.		1. Access to financing and tax incentives. 2. Reducing the number of people affected by energy poverty. 3. Caring for people with special needs

					(reducing the distance between the resident and the official, increasing trust in the Office).
		Development of participatory processes	Engaging a wider group of stakeholders, including residents in the city development planning process in the analyzed area. Understanding the needs of society, including marginalized groups, and particularly for the vulnerable - implementing pilot solutions in this area (implementation NEEST).		1. Residents' participation in decision-making processes. 2. Strong social mandate to implement actions. 2. Pilot and demonstration projects—scalable and replicable.

B-1.2: Description of impact pathways

The pathways to achieving climate neutrality in Rzeszów are based on previously identified systemic barriers. It should be remembered that the results of the GHG inventory for the area of the City of Rzeszów clearly indicate that the main sources of emissions in our city are stationary energy and transportation, which is why the main tasks are focused on the aforementioned areas.

Key tasks faced by Rzeszow

The key actions and activities in Rzeszów will focus on eliminating all sources of solid fuels, significantly increasing the use of renewable energy sources, and implementing deep thermal modernization in residential (single and multi-family), commercial, industrial, and public utility buildings. It should be noted that energy efficiency is also an important element of sustainable resource utilization. The decarbonization of the district heating network in Rzeszów (which has a length of 241 km, of which 93 km are pipes in modern pre-insulated pipe technology) has a significant impact on reducing GHG emissions. Similarly - all tasks in the field of transportation, both investment and organizational measures have a high potential for GHG reduction. Scientific studies, including IPCC reports, clearly indicate that achieving climate neutrality requires taking intensified dual-track actions. On the one hand, actions towards decarbonization should be taken, on the other hand, actions towards preserving biodiversity should be taken. In Rzeszów, efforts are being made to intensify and continuously plan new investments aimed at increasing green spaces, which are crucial for achieving climate neutrality. The adaptive value of actions aimed at increasing green areas and developing blue-green infrastructure cannot be underestimated. Defined impact pathways for Rzeszów enable a systematic approach to planning, implementation, and evaluation of strategies, helping to identify key actions, potential barriers, and opportunities. Thanks to this, the goals related to climate protection and sustainable development of the city will be achieved more effectively.

Significant system levers

To achieve climate neutrality by 2030, a wide range of systemic levers must be utilized. All levers will have significance for the respective areas of operation. However, the impact of each lever can vary significantly depending on the area of operation and will change with the changing conditions in the future. Identification and implementation of the appropriate intervention can cause significant and lasting changes in the system. These will be political, technological, social, economic actions, as well as partnerships and cooperation at various levels. The key element is a holistic approach that integrates various aspects and engages a wide range of stakeholders. This allows for effectively pursuing ambitious climate goals. The predicted direct effect of various levers is the reduction of greenhouse gas emissions, which will lead to achieving climate neutrality. The indirect effects, on the other hand, mainly concern the improvement of quality of life, greater societal engagement and the undertaking of innovative initiatives, creation of new jobs, and many others.

Paths of action for Rzeszów as key tasks on the road to transformation.

In relation to the identified systemic barriers, Rzeszów as a local government makes attempts to establish cooperation with higher-level authorities by participating in ministerial meetings. These discussions have the potential to develop national support for cities and adapt legal regulations to current needs. The same systemic barriers described in table B 1.2 will no longer be a blocking issue in the path towards decarbonizing the city, and they will become an area for work on their elimination. The authorities of the city of Rzeszów, by joining the Mission “100 Climate-Neutral and Smart Cities by 2030” have attempted to stand out among other Polish and foreign cities and position themselves as the initiators and organizers of the decarbonization process. In the process of developing the action plan, both internal and external stakeholders in the city are involved. The efforts made during its development, as well as those undertaken after its creation, are intended to lead to a better understanding of the significance of the climate crisis, the positive impact of the decarbonization process, and to raise awareness among decision-makers about the avoided costs and both direct and indirect benefits. Identifying barriers such as a lack of integrated approach between different sectors and institutions, silo mentality in management, a project-oriented approach rather than a process-oriented one, slowly to take deliberate steps to turn the situation in favor of the decarbonization process. Identified lack of appropriate structures for monitoring and evaluating actions, as well as staffing shortages and competency gaps can potentially be filled,

and the lack of current strategies that would result in greenhouse gas emission reduction goals will be replaced by a well-prepared plan.
Rzeszów organized its first citizens' panel, which revolved around the issues of decarbonization process in Our City in order to facilitate understanding of social climate and environmental challenges among its residents. This was one of the first meetings with the residents of Rzeszów addressing the issue of climate change. Meetings in this or any other format will also be planned in the future. Rzeszów, participating in the Mission of Cities, tries to talk about growing social and environmental problems, about the increasing pressure of climate challenges, in order to initiate a dialogue and invite residents to co-create solutions. By doing so, it replaces the lack of dialogue and inclusion of residents in decision-making processes with a stable agreement that combats resistance to change and fills gaps in knowledge.
The problem that Rzeszów must face is also the lack of data and tools necessary to undertake climate transformation on an urban scale - achieving energy efficiency, such as in the process of decarbonizing the district heating network. Rzeszów must address the high costs of acquiring them and develop and standardize methods for their acquisition, aggregation, utilization, verification, monitoring, and evaluation.
Rzeszów must also be prepared for independent situations that cause destabilization of availability, and prices, inflation growth, and similar events, such as a pandemic or the war in Ukraine. Such situations cannot lead to a lack of fluidity in operation and deviating from the set goals.

3.2 Module B-2 Climate Neutrality Portfolio Design

B-2.1: Description of action portfolios - textual or visual		
Energy systems	1. Purchase of green energy by the City Municipality of Rzeszów.	1. The City Municipality of Rzeszów, including urban units, currently purchases certified electricity (100% of the electricity introduced into the distribution or transmission network comes from renewable sources). The agreement for the supply of electricity from renewable energy sources is valid between 01.04.2024 and 31.03.2026. After this term, electricity purchased will also come from renewable energy sources.
	2. Generating electricity from renewable sources by the city. within its borders and beyond.	2. Development of investments in renewable energy sources in Rzeszów through investments in large-scale photovoltaics, wind energy, biogas utilization, hydrogen production, waste heat/sewage energy. The areas of the city, municipal companies, as well as areas belonging to neighboring municipalities together forming the Rzeszów Functional Area with the City Municipality of Rzeszów (as the leader) will be used for this purpose.
	3. Construction of a geothermal power plant and combined heat and power plant in Rzeszów.	3. Development of investments in renewable energy sources in Rzeszów through the implementation of a geothermal power plant and combined heat and power plant.
	4. Building an energy system and economy based on low-emission energy sources.	4. Rzeszow's participation in initiatives aimed at supporting a low-emission economy and utilizing scientific research potential. The Podkarpacie Hydrogen Valley Association (Rzeszów – represented by the Acting Mayor of Rzeszów as a signatory to the letter of intent for the establishment of the Association) aims to support the development of the hydrogen economy and strive to build a branch of the Podkarpacie hydrogen industry, including the production of hydrogen in the electrolysis process using energy produced from renewable energy installations and its use in energy sector, including heat energy sector, transportation, infrastructure and industry.
	5. Decarbonization of the heating system.	5. Cooperation with PGE Energia Ciepła S.A. and Edison Next Poland Sp. z o.o. in the decarbonization of the district heating sector and transition to renewable energy sources at the source, as well as the development of local low-temperature district heating systems (cooperation and support of Miejskie Przedsiębiorstwo Energetyki Cieplnej Rzeszów Sp. o.o. (City Heat Energy Company)).

	6. Development and modernization of the power infrastructure.	6. Systematic development and modernization of infrastructure. Energy management system and its further development.
	7. Decarbonization and development of local heating networks. Smart network solutions.	7. Expansion of the district heating network, replacing heat sources from solid fuels, oil, and gas with heat pumps or connection to an efficient district heating system; replacing heat sources in local heating networks. Ban on using solid fuels and its enforcement, changing the heat source, subsidies for heat pumps. Development of smart district heating networks integrating advanced monitoring, control, and communication technologies with heating systems, enabling real-time optimization of energy production, distribution, and consumption, improving overall system efficiency. Smart networks allow for better response to demand, integration, and thus better utilization of renewable energy potential and greater reliability of district heating networks.
	8. Replacement of street lighting with energy-efficient alternatives.	8. Successive modernization and replacement of lighting fixtures with energy-efficient LED fixtures.
Mobility & transportation	1. Increasing accessibility for public mass transportation.	1. Promotion of public transportation, making it more attractive to use (e.g. free tickets for residents or groups of residents, such as students; diverse and attractive pricing of city tickets, e.g. 3-hour, annual, semi-annual tickets; discounts on long-term tickets). Attractiveness of the fleet, electrification/alternative fuels (the city aims to systematically increase the share of zero-emission buses in the fleet until reaching 100% share), improvement of travel comfort and safety, optimization of timetables. Public transportation accessibility for people facing exclusion, additional transportation for elderly people, people in need, or with disabilities. The city is taking steps to expand the affordable, integrated ticketing options for buses and trains. When planning the public transportation system, the City applies a comprehensive, door-to-door approach. Current and clear information about changes in public transportation system, giving residents the opportunity to consult planned changes.
	2. Expansion of the public transportation network.	2. Investments in the development of urban transportation network, building interchange hubs that connect various means of transportation at multiple points in the city and synchronize connections to shorten travel time between distant parts of the city. Actions to prevent the exclusion of people from small settlements and places far from the transportation line (including suburban areas),

		increasing the frequency of bus line services. Planning the city's development towards its reurbanization, while simultaneously continuously raising the attractiveness of public transportation.
	3. Development of charging infrastructure throughout the city (with the goal of providing access to charging stations at every parking lot).	3. Making urban electric vehicle charging networks more attractive and ensuring their high availability (e.g. access to chargers for 30% of parking spaces). Subsidies/exemptions for electric charger energy.
	4. Changing regulations regarding the use of parking spaces and encouraging the use of alternative modes of transportation, as well as providing parking spaces for those traveling with passengers.	4. Car sharing and additional benefits for drivers with multiple passengers in the vehicle. Parking spaces only as a last resort (increasing fees), construction of well-connected P+R parking lots (combined with more frequent bus services) and offering attractive deals to drivers using this solution. Construction of parking lots preceded by public consultations regarding their location and connectivity to the city center.
	5. Promotion of bicycle transportation.	5. Expansion of safe bicycle infrastructure to create a cohesive and continuous network of bicycle routes, along with regulations and privileges for cyclists and cargo bicycle users (including transportation companies), setting a “good example from the City Office”. For instance, promoting such solutions by using delivery bicycles like Urvis, which are being tested by City Office couriers. Development of a standard for bicycle storage facilities at workplaces (bicycle parking, secure bicycle racks, bicycle shelters, etc.) and sanitary facilities for government offices and private companies. Increasing the number of bicycle racks/bicycle shelters in the city center. Development of the urban bicycle system (including scooters).
	6. Promotion of pedestrian traffic and ensuring its safety.	6. Developing and enforcing rules regarding permissible parking of scooters, bicycles ensuring safety for all road users, including designated parking areas for electric scooters. Creating pedestrian route maps (including at bus stops) along with providing approximate travel times between marked points (e.g. consecutive stops). Development of safe pedestrian infrastructure, ensuring safe and convenient access to bus stops, including in peripheral areas.

	7. Using "smart" solutions.	7. Optimization of traffic, for example through an electronic traffic management system, collision-free intersections, safe pedestrian crossings. Implementation of mobile applications containing information and functionalities: ticket purchase, tracking bus positions on the map, travel planner, real-time timetable taking delays into account, discount systems based on the number of tickets purchased. The application should be integrated with other municipal services.
	8. Education in the field of transportation and mobility, shaping pro-environmental attitudes, promoting the principles of the inverted mobility pyramid.	8. Encouraging residents to carpool, showing them the benefits of commuting to work together, taking children to school, etc. Promotion of a healthy lifestyle and active transportation, including walking and bicycle, as well as electric scooters and bicycles – campaigns conducted in public spaces and schools in various formats tailored to the audience.
	9. Development of a Sustainable Urban Mobility Plan.	9. Developing and effectively implementing a long-term strategy focused on ensuring good access to travel destinations and services, aimed at meeting the mobility needs of individuals and companies in urban areas and their surroundings, in order to improve quality of life. The development of the Sustainable Urban Mobility Plan (SUMP) was preceded by the largest, most comprehensive traffic studies in Rzeszów and the Rzeszów Functional Area, conducted by the Rzeszów University of Technology (using various methods, including big data).
Waste & circular economy	1. Waste Prevention actions (WP), in accordance with the concept of a circular economy (CE).	1. Creating exchange points (e.g. sharing, co-sharing, exchange markets); libraries of things; book exchange cabinets in public places, such as restaurants, cafes; additional urban glass containers in recreational and entertainment areas, such as by the river, in parks, squares, etc. Establishing reuse points at waste collection centers (PSZOKs) or other publicly accessible locations for the local community, allowing residents to leave functional but no longer needed items, such as household appliances, and to take other useful products. Establishing repair points for products that owners wish to continue using or pass on to others who are interested.

	2. Improving the quality of selective waste collection at the source and increasing the quantity of waste collected selectively and sent for recycling. Investments in solutions that enable achieving higher levels of recovery and recycling.	2. Construction, expansion, reconstruction, modernization of Selective Collection Points for Municipal Waste; reconstruction of the installation for mechanical processing of municipal waste in order to adapt it for sorting (purification) of selectively collected waste.
	3. Investments in solutions aimed at waste disposal and management.	3. Recycling of organic waste - construction of a green waste composting facility; implementation of a waste processing site with waste bins.
	4. Environmental education.	4. Raising public awareness and knowledge about waste prevention (WP), including food waste prevention WP, proper waste management (such as selective waste collection), and the risks associated with illegal waste handling. Promoting the production and use of products with an extended lifespan.
Green infrastructure & nature-based solutions	1. Development of green areas within the city.	1. Steady and systematic development of green areas, introduction of green infrastructure elements (including solutions of urban green acupuncture), implementation of rain gardens, retention basins and rainwater storage tanks, also in multi-family housing estates and in greenery around public facilities. Reducing surface runoff, extending soil moisture retention, and replenishing local greenery. Limiting the load on the wastewater system and providing a cheap source of water for watering greenery. Indirectly increasing air humidity and lowering its temperature.
	2. De-paving of concrete surfaces, including parking lots.	2.Retention actions dependent on surface area: for small surfaces, retaining rainwater in the ground and thus supplying greenery; for large surfaces with intensive use by vehicles of varying load capacity and technical condition - retaining rainwater.
	3. Application of solutions for retaining a portion of stormwater on new development sites.	3. Reducing surface runoff from heavy rainfall, extending soil moisture retention, and replenishing local greenery. Limiting the load on the wastewater system and mitigating the risk of flooding for lower-lying areas.

	4. Planting trees and trellises with climbers on heavily sealed streets.	4. Lowering air and street surface temperatures, increasing the ability to neutralize exhaust fumes and capture dust, protecting against street mud, and increasing noise reduction capabilities. Using climbers in areas with a large amount of underground infrastructure and places with road lane restrictions.
	5. Developing or modifying spatial development plans and other planning documents to increase public spaces with new green areas, blue-green infrastructure solutions, and the de-paving of high-density urban areas.	5. Building a system of purposeful, coherent actions to raise the quality of space and its ability to mitigate the effects of climate change, as well as optimizing local law in terms of provisions that increase resilience to the effects of climate change - increasing land retention, reducing surface runoff, lowering air temperature, shading areas where people stay, providing air purification from exhaust fumes and dust. Planning documents should also comprehensively address the issues of energy transformation towards climate neutrality.
	6. Broad education in the field of protection of nature and the natural environment; promotion/information about the undertaken and planned actions in the city regarding urban greenery.	6. Shaping pro-ecological and civic attitudes among city residents. Shaping knowledge about natural plant communities and respect for nature. Social support for activities related to maintaining urban areas, transparency of actions, shaping pro-ecological and civic attitudes.
Built environment	1. Replacement of heating systems and comprehensive thermal modernization of single-family residential buildings.	1. Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through thermal modernization and optimization of energy consumption. Unlocking the potential of national programs that provide financing for eco-friendly investments, such as replacing solid fuel heating systems, thermal modernization, and renewable energy investments, by increasing the engagement of the City Office in program implementation (e.g., the Clean Air Program Information and Advisory Point, STOP SMOG Program, Warm Apartment Program; energy advisors, etc.).Identifying individuals/households affected by energy poverty or other forms of exclusion and assisting them in obtaining financing for eco-friendly initiatives.

		Effective implementation of dedicated operational programs, such as air protection (OP for the Rzeszów city area).
	2. Conducting a deep thermal modernization and elimination of individual heating methods in order to connect to the district heating network in buildings belonging to housing cooperatives and housing communities.	2. Deep, comprehensive thermal modernization of multi-family residential buildings. Development of renewable energy installations. Replacement of lighting with energy-efficient alternatives. Implementing smart energy management systems.
	3. Implementing eco-friendly solutions in Municipal Units and Companies.	3. Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems.
	4. Improvement of energy efficiency in public buildings and educational facilities.	4. Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems.
	5. Improving energy efficiency of commercial and service facilities	5. Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems.

B-2.2: Individual action outlines		
Action outline	Action name	Purchase of Green Energy by the City Municipality of Rzeszów
	Action type	Procurement actions
	Action description	Ultimately, all electrical energy consumed by units and urban infrastructure should be produced from renewable energy sources. The purchase of energy with a guarantee of origin from RES is a transitional measure - until Rzeszów balances its own RES energy production with the needs of urban units and infrastructure. The purchase of "green" energy is intended to stimulate the energy market in Poland to invest in renewable energy sources (RES), and cause an increase in the share of renewable energy use in the country's energy balance. When purchasing electricity, Rzeszów chooses Polish green energy with a guarantee of origin.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/ infrastructure Governance /policy/organizational
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Climate and Environment of the Rzeszów City Office/Division of Energy.
	Action scale & addressed entities	Actions to increase the use of green energy are necessary.
	Involved stakeholders	City Municipality of Rzeszów - all departments of the Rzeszów City Office. and other organizational units.
	Comments on implementation – consider mentioning resources, timelines, milestones	The current agreement for the purchase of certified green electricity for the City of Rzeszów and its units is valid from April 2024 to March 2026. Subsequent agreements will also be concluded with certified suppliers, taking into account the need to secure the demand of additional connected points.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	27,866 tCO_{2e}

	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 24,738,109, EUR 5,497,358 Costs by CO_{2e} unit: PLN 887.75, EUR 197.28

B-2.2: Individual action outlines		
Action outline	Action name	Generating electricity from renewable sources by the city. within its borders and beyond.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations Procurement actions Business models
	Action description	Development of the city towards an energy-sustainable area, i.e. one that is able to balance its energy demand through production from sources located within this area. An ambitious plan is being developed for the Rzeszów area to balance the demand for electrical and thermal energy used by buildings and structures, as well as to replace fossil fuel consumption in the transportation sector with energy sourced entirely from renewable sources. The project prepared for Rzeszów assumes two phases at the beginning. Phase 1: - implementation of photovoltaic farms with a capacity of at least 50 MW. - implementation of wind turbines (preliminary identification of 18 locations) with a minimum capacity of 30 MW. - implementation of energy storage systems to stabilize the level of electricity generated from renewable energy sources, with power and capacity tailored to the applied renewable energy solutions. Warehouses are supposed to provide access to green energy 24 hours a day, especially considering their integration with sources before the point of connection to the power grid. - implementation of a biogas installation for purposes of production of energy of approximately 24,000 MWh/year, enabling achievement of a

		power utilization factor above 90%. Such an installation allows for controlling the power fed into the electrical network over a wide range. Additionally, the installation of a biogas plant allows for the continuous and environmentally friendly disposal of waste, contributing to emission reductions in the waste sector as well. The appropriate selection of power from several renewable energy sources allows for achieving a production profile similar to the energy demand profile. Furthermore, integrating various renewable energy sources enables response to variable environmental factors. As part of the project, the locations of 10 Main Power Supply Points within Rzeszów were also presented. <u>Phase 2:</u> implementation of a hydrogen hub, consisting of: a hydrogen production device - an electrolyzer; hydrogen storage tanks and feeding devices, including pipelines; dispensers - used for hydrogen refueling.
Reference to impact pathway	Field of action	Energy systems Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office, entrepreneurs, companies and urban units.
	Action scale & addressed entities	Balanced energy sustainable areas are a guarantee of achieving the goal of climate neutrality. The task also has the potential to be a replicable project.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office (departments, units responsible for planning and implementing projects), Rzeszów City Council, neighboring municipalities of the Rzeszów Functional Area - future locations of wind turbines; municipal companies, energy and heat consumers; companies (developers) from the clean energy sector, MPEC, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions.

	Comments on implementation – consider mentioning resources, timelines, milestones	The project is characterized by a very high level of ambition, making it highly complex.. Given the numerous factors that need to be considered throughout the long-term process of creating and building an energy self-sufficient area, from 2024 to 2030 (and beyond), the following steps have been proposed: identifying needs and development plans, preparing a detailed consumption profile, developing investment options to meet current and future demand, formulating a development plan with a detailed schedule, commencing work and obtaining the necessary implementation permits, carrying out construction according to the approved schedule, and integrating the components of the sustainable development area with system management.
Impact & cost	Generated renewable energy (if applicable)	Minimum 182,720 MWh/year
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	125,163 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	They will be known at the stage of developing the development plan along with a detailed schedule.

B-2.2: Individual action outlines		
Action outline	Action name	Construction of a geothermal power plant and combined heat and power plant in Rzeszów.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations Procurement actions Business models

	Action description	The implementation of the task involving the construction of a geothermal power plant and combined heat and power plant, preceded by necessary analyses and studies. A properly planned and managed investment has the potential to lead the city to climate neutrality.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office, entrepreneurs, companies and urban units
	Action scale & addressed entities	Geothermal power plants have the potential to meet local, regional, and national energy needs. However, their implementation must involve various entities, including governments, local authorities, the private sector, financial institutions, and the scientific research sector.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office (departments, units responsible for planning and implementing projects), Rzeszów City Council, neighboring municipalities of the Rzeszów Functional Area, municipal companies, energy and heat consumers, and developers. from the clean energy sector, MPEC, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions.
	Comments on implementation – consider mentioning resources, timelines, milestones	The project phase 1 will include scientific and research elements, as well as the necessary analysis for proper investment planning. The implementation of such investments is a challenge that requires the involvement of many stakeholders and the implementation of new business models and formulas that have not been used before.
Impact & cost	Generated renewable energy (if applicable)	163,800 MWh/year
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	112,203 tCO_{2e}

	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 180,000,000, EUR 40,000,000 Costs by CO_{2e} unit: 1604.24 EUR 356.50

B-2.2: Individual action outlines		
Action outline	Action name	Building an energy system and economy based on low-emission energy sources.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations Procurement actions Business models
	Action description	Rzeszow's participation in initiatives aimed at supporting a low-emission economy and utilizing scientific research potential. The Podkarpacie Hydrogen Valley Association (Rzeszów – represented by the Acting Mayor of Rzeszów as a signatory to the letter of intent for the establishment of the Association) aims to support the development of the hydrogen economy and strive to build a branch of the Podkarpacie region hydrogen industry, including the production of hydrogen in the electrolysis process using energy produced from renewable energy installations and its use in energy sector , including heat energy sector, transportation, infrastructure and industry.
Reference to impact pathway	Field of action	Energy systems Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area.
Implementation	Responsible bodies/person for implementation	Urban Innovation Center – Urban Lab, Department of Climate and Environment of the Rzeszów City Office, Division of Energy

	Action scale & addressed entities	Transitioning to a low-emission economy is essential in the context of energy transformation, and cooperation in this process between local government, regional level, business, and universities is key to success.
	Involved stakeholders	Podkarpacie Hydrogen Valley which includes: Rzeszow University of Technology, University of Rzeszow, Institute of Power Engineering - Research Institute, Ceramics Department CEREL in Boguchwała, Institute of Power Engineering - Research Institute, Polenergia S.A., Polenergia Elektrociepłownia Nowa Sarzyna Sp. z o. o., ML System S.A., Agencja Rozwoju Przemysłu S.A., Fibrain Sp. z o. o., Association of Entrepreneurs of the Aviation Industry "Dolina Lotnicza", Autosan sp. z o. o. The signatories of the letter of intent for the Podkarpacie Hydrogen Valley are also: Podkarpackie Voivode, Marshal of the Podkarpackie Voivodeship, Mayor of the City of Rzeszów, Mayor of the City of Sanok, and all beneficiaries of the developed solutions, e.g. in the field of transportation.
	Comments on implementation – consider mentioning resources, timelines, milestones	Research and projects are carried out on an ongoing basis. Currently, the UNLOCK project - Unlocking the green hydrogen economy for SMEs in European regions is being carried out. The aim of the project is to reduce disparities between European regions and improve policy tools to improve sustainable growth, competitiveness of SMEs, and job creation. The task corresponds with the action titled: Generating electricity from renewable sources by the city. within its borders and beyond.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	Emission reduction included in specific projects resulting from the activities of the Podkarpacie Hydrogen Valley.
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Costs included in specific projects resulting from the activities of the Podkarpacie Hydrogen Valley.

B-2.2: Individual action outlines		
Action outline	Action name	Decarbonization of the heating system
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations Business models
	Action description	Conclusion of a long-term contract for the supply of energy-efficient heat for city residents and financing the expansion of the municipal heating network.
Reference to impact pathway	Field of action	Energy systems (district heating)
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area. Complete departure from fossil fuels in favor of renewable energy sources.
Implementation	Responsible bodies/person for implementation	Miejskie Przedsiębiorstwo Energetyki Cieplnej Rzeszów Sp. o.o. (City Heat Energy Company), Edison Next Poland Sp. z o.o., PGE Energia Ciepła S.A.
	Action scale & addressed entities	Continuous development of energy-efficient district heating networks, moving away from fossil fuels in heat generation.
	Involved stakeholders	Edison Next Poland Sp. z o.o., MPEC Rzeszów Sp. z o.o., PGE Energia Ciepła S.A., heat recipients, residents
	Comments on implementation – consider mentioning resources, timelines, milestones	Edison Next Poland Sp. z o.o. has committed to modernizing its heat source to meet increasingly eco-friendly challenges in the operation of its cogeneration plant. Advanced technological production units will enable a complete departure from coal and reduce greenhouse gas emissions by almost 70% by 2030.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels

	GHG emissions reduction estimate (total) per emission source sector	45,560 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Company trade secret

B-2.2: Individual action outlines		
Action outline	Action name	Development and modernization of the power infrastructure.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations
	Action description	The development plans of companies responsible for electricity and gas networks, are very ambitious and include actions corresponding to the goal of climate neutrality, such as integration with renewable energy sources, modernizations (towards smart grids, automation, monitoring), or actions for energy efficiency (reducing transmission losses, demand management).
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	Increasing energy efficiency, stabilizing energy carriers. Unlocking the potential of RES.
Implementation	Responsible bodies/person for implementation	Polskie Sieci Elektroenergetyczne S.A. PGE Dystrybucja S.A. PGE Energia Ciepła S.A. EDISON NEXT POLAND Sp. z o.o. PSG Dystrybucja S.A.
	Action scale & addressed entities	Continuous and consistent efforts are necessary to modernize and increase the efficiency of the network, also to unlock the potential of RES. Development and modernization activities, on the one hand, aim to

		comply with ambitious EU regulations, while on the other hand, they have a strong economic dimension.
	Involved stakeholders	Polskie Sieci Elektroenegretyczne S.A. PGE Dystrybucja S.A. The relevant Ministries Funding institutions
	Comments on implementation – consider mentioning resources, timelines, milestones	In accordance with the approved development plans of the relevant Companies.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	-

B-2.2: Individual action outlines		
Action outline	Action name	Decarbonization and development of local heating networks. Smart network solutions.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations.
	Action description	7. Construction of a district heating network along with connections to new and existing buildings. 8. Increasing energy efficiency and reliability of heat distribution to Customers by eliminating group heat exchangers in the city of Rzeszów. 9. Increasing energy efficiency and reliability of heat transmission through the modernization of overhead district heating networks, above-ground district heating networks, and duct networks, along with connections.

		10. Increasing the reliability and energy efficiency of heat supply to Customers by expanding the district heating network in a ring system. 11. Optimization of the use of system heat through the construction of an smart district heating system within the Smart City concept. 12. Dismantling of a gas-oil boiler room and construction of a photovoltaic farm with a local heat source. 13. Construction of garage roofs with photovoltaic cells or carports, as well as photovoltaic panels on a supporting structure above ground networks.
Reference to impact pathway	Field of action	Energy systems (district heating)
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	Gradual transition towards a sustainable energy area. Complete departure from fossil fuels in favor of renewable energy sources.
Implementation	Responsible bodies/person for implementation	Miejskie Przedsiębiorstwo Energetyki Cieplnej Rzeszów Sp. o.o. (City Heat Energy Company)
	Action scale & addressed entities	Systematic investments in the district heating network, optimization of heat utilization, increasing the safety and reliability of transmission, as well as energy efficiency, are necessary to achieve the goal of climate neutrality.
	Involved stakeholders	MPEC Rzeszów Sp. z o.o., System heat recipients, Financial institutions
	Comments on implementation – consider mentioning resources, timelines, milestones	The Company's development plans are very ambitious, but they require a huge commitment of financial resources that exceed the Company's capabilities, even assuming external financing. The Company's activities are planned until 2029 and include, among others: - construction of new sections of district heating network using modern pre-insulated technology. - construction of new heat connections, - construction of modern individual heating nodes, both single-function and dual-function - liquidation of group heat exchangers,

		- removal of external receiving installations (low-parameter networks) for heating and hot water made using the traditional duct method, - installation of telemetry stations in individual heat nodes based on the use of freely programmable controllers and various communication systems (remote monitoring and control of node operations), - construction and expansion of telemetry system in heating chambers and construction of telemechanics system enabling remote management of network traffic. - construction of a remote monitoring system for pre-insulated pipeline alarm installations, including the construction of remote monitoring points. - modernization and expansion of the remote reading system for heat measurement circuits. - integration of data from the above systems to support remote management of the heating system. - dismantling of a gas-oil boiler room and construction of a photovoltaic farm with a local heat source, - construction of garage roofs with photovoltaic cells or carports, as well as photovoltaic panels on a supporting structure above ground networks. Ultimately, all actions will be intensified to decarbonize the city's district heating network.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	53,676 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 258,826,786, EUR 57,517,064 (excluding the cost of the task of liquidating the gas-oil boiler room) Costs by CO_{2e} unit: PLN 6,026.38 EUR 1,339.20

B-2.2: Individual action outlines		
Action outline	Action name	Replacement of street lighting with energy-efficient alternatives.
	Action type	Technical interventions Procurement actions
	Action description	Successive modernization and replacement of lighting fixtures with energy-efficient LED fixtures.
Reference to impact pathway	Field of action	Energy systems (lighting)
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance
	Outcome (according to module B-1.1)	The most modern and energy-efficient system of road lighting and pedestrian and bicycle paths.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Climate and Environment/Division of Energy, City Road Management Authority in Rzeszów, City Greenery Management Authority in Rzeszów, PGE Distribution S.A.
	Action scale & addressed entities	Systematic replacement of lighting fixtures with energy-efficient by 100% ones in 2030.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/Department of Climate and Environment/Division of Energy, MZD, ZZM, PGE Dystrybucja S.A., residents.
	Comments on implementation – consider mentioning resources, timelines, milestones	In the city of Rzeszów, there are a total of 20,147 lighting fixtures, including over 6,800 energy-efficient LED fixtures. 10,973 units are owned by the City Municipality of Rzeszów. 9,174 units are owned by PGE Dystrybucja S.A. Lighting fixtures are being gradually modernized and replaced with LED ones. The use of such solutions will allow for a saving of approximately 60% of electrical energy. When implementing new road investments, the MZD equips them with energy-efficient lamps. Such lighting is also used in urban investments. However, cooperation and investment by all lighting owners in the city or the acquisition of all public lighting points by the City Municipality of Rzeszów are necessary.
Impact & cost	Generated renewable energy (if applicable)	-

	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	4,521 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 34,000,000, EUR 7,555,556 Costs by CO_{2e} unit: PLN 7,520.46 EUR 1,671.21

B-2.2: Individual action outlines		
Action outline	Action name	Increasing accessibility for public mass transportation.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations Procurement actions
	Action description	1. Purchase of zero-emission buses along with the construction of charging infrastructure (20 units of 12-meter buses powered by electricity from a hydrogen fuel cell). Buses will be adapted to the needs of people with limited mobility and parents/guardians with children, ensuring a comfortable and safe trip. 2. Delivery of 282 bus shelters and 48 pylons with timetables - selected objects will be green and equipped with energy-efficient LED lighting powered by PV energy. The integral elements of the garden will be planters that allow for planting various types of climbers and grasses. 3. By 2027, at least 25% of the fleet will be replaced with low- and zero-emission vehicles. 4. By 2030, 100% of the fleet will be low- and zero-emission. 5. Conducting driver training in the field of “ecodriving” - an economical driving method that reduces fuel consumption and thus reduces pollutant emissions.
Reference to impact pathway	Field of action	Transport

	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance Social/ behavior/ education
	Outcome (according to module B-1.1)	Low- and zero-emission fleet of public collective transportation. Increasing the number of residents using public transportation.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Transport Management Authority in Rzeszów
	Action scale & addressed entities	The tasks planned by ZTM are a continuation of actions that have been taken for many years. ZTM undertakes systematic activities to improve the quality of public transportation (through both the gradual replacement of vehicles and organizational changes, such as adjusting the number of routes based on residents' needs, etc.) to encourage as many residents as possible to switch from private transportation to public transportation. By 2027, it is planned to replace at least 25% of the fleet with zero-emission vehicles. In the perspective of a year, the plan is for the entire fleet to be emission-free. Actions in this area contribute not only to the reduction of GHG, but also to air pollution and noise.
	Involved stakeholders	City Municipality of Rzeszów, City Transport Management Authority in Rzeszów, Miejskie Przedsiębiorstwo Komunikacyjne Rzeszów Sp. z o.o. (City Transport Company), road users, neighboring municipalities within the ROF framework.
	Comments on implementation – consider mentioning resources, timelines, milestones	ZTM will gradually strive to reduce the emissions of the transportation area. The provisions of the currently developed SUMP will have a very significant impact on the planning of public transportation development. The recommendations resulting from the citizens' panel conducted in Rzeszów under the name “How to achieve climate neutrality in Rzeszów by 2030?” will also be taken into account. Regardless of the above, ZTM will strive to replace the entire bus fleet with low- and zero-emission vehicles by 2030.
Impact & cost	Generated renewable energy (if applicable)	-

	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	7,522 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 576,529,697, EUR 128,117,710 Costs by CO_{2e} unit: PLN 76,645.80 EUR 17,032.40

B-2.2: Individual action outlines		
Action outline	Action name	Expansion of the public transportation network.
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations
	Action description	1. Creation of 6 Bike&Ride facilities as part of planned interchange nodes integrating public urban and suburban transportation with individual transportation. 2. Implementation of new connections in accordance with the concept of a compact city, along with promotion and priority for public transportation.
Reference to impact pathway	Field of action	Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Finance Behavior/ social/ education
	Outcome (according to module B-1.1)	Urban regeneration and the promotion of public transportation. Increasing the number of residents using public transportation.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Transport Management Authority in Rzeszów
	Action scale & addressed entities	The expansion of the public transportation network, combined with prioritizing this type of transportation, will significantly contribute to reducing GHG emissions from the transportation sector.

	Involved stakeholders	City Municipality of Rzeszów - City Transport Management Authority in Rzeszów, BRMR, Miejskie Przedsiębiorstwo Komunikacyjne Rzeszów Sp. z o.o. (City Transport Company), traffic participants, neighboring municipalities within the framework of ROF.
	Comments on implementation – consider mentioning resources, timelines, milestones	ZTM will gradually strive to reduce the emissions of the transportation area. The provisions of the currently developed SUMP will have a very significant impact on the planning of public transportation development. The recommendations resulting from the citizens' panel conducted in Rzeszów under the name “How to achieve climate neutrality in Rzeszów by 2030?” will also be taken into account. Regardless of the above, the ZTM will strive to replace the entire bus fleet with low- and zero-emission vehicles.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	38,605 tCO_{2e}/year
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs PLN 1,200,000, EUR 266,667 Costs by CO_{2e} unit PLN 31.08 EUR 6.91

B-2.2: Individual action outlines		
Action outline	Action name	Development of charging infrastructure throughout the city (with the goal of providing access to charging stations at every parking lot).
	Action type	Technical interventions Implementation and development of national and/or EU laws and regulations
	Action description	The electrification of road transportation requires a significant improvement in charging infrastructure. For the implementation of the operation, the location of at least 100 publicly accessible electric vehicle charging stations, as well as the replacement of vehicles serving municipal services with electric ones, has been planned.

Reference to impact pathway	Field of action	Energy systems Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Expansion of charging station network. Increase in the share of electric cars.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Transport Management Authority in Rzeszów, Rzeszów City Office - Department of Climate and Environment / Division of Energy, Department of Investments
	Action scale & addressed entities	Decisive actions are necessary to develop charging infrastructure. High level of electrification of transportation will enable significant reduction of its emissions. The City Municipality of Rzeszów will provide land for entities delivering and servicing chargers.
	Involved stakeholders	Owners of power networks, fleet owners, real estate owners, charging infrastructure providers, traffic participants, ROF neighboring municipalities, City Municipality of Rzeszów - ZTM, MZD, MATiP (Urban Spatial Information System), BGM (Office of Property Management), BRMR.
	Comments on implementation – consider mentioning resources, timelines, milestones	New locations for publicly accessible charging stations and the gradual replacement of the municipal fleet until 2027 have been planned. However, the key to the success of electrifying road transportation is close cooperation and engagement of various stakeholders, including residents. In the perspective of 2030, there will also be a significant increase in electric vehicles.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	199,869 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-

	Total costs and costs by CO_{2e} unit	-

B-2.2: Individual action outlines		
Action outline	Action name	Changing regulations regarding the use of parking spaces and encouraging the use of alternative modes of transportation, as well as providing parking spaces for those traveling with passengers.
	Action type	Regulations/organizational
	Action description	Expansion of the Paid Parking System in Rzeszów with a parking space counting system. Promotion of car-sharing, by providing parking spaces for people traveling with co-passengers/preferential parking rates.
Reference to impact pathway	Field of action	Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Reducing the number of people traveling to the city center by their own cars. Increasing the number of people using public transportation and alternative forms of transportation (walking, bicycle, scooters).
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Market and Parking Management Authority
	Action scale & addressed entities	The paid parking zone was introduced by the resolution of the Rzeszów City Council. The same resolution also established the amounts of fees for this zone. The last expansion of the zone was a response to the requests of residents and neighborhood councils signaling a shortage of parking spaces in the area, while the increase in fees is intended to contribute to greater vehicle rotation, but ultimately may lead residents to choose public transportation.
	Involved stakeholders	City Municipality of Rzeszów - MATiP (Urban Spatial Information System), ZTM; BRMR, traffic participants, residents
	Comments on implementation – consider mentioning resources, timelines, milestones	Implementing solutions that involve costs for residents must always be preceded by an educational and informational campaign in order to obtain

		a mandate to act. In the coming years (by 2027 at the latest), at least 7 Park&Ride parking lots at hubes and stops, as well as at least 30 Bike&Ride parking lots at stops will be built.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	Reduction included in the task - the use of smart solutions.
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 15,041,400, EUR 3,342,533

B-2.2: Individual action outlines		
Action outline	Action name	Promotion of bicycle transportation
	Action type	Technology/Infrastructure Regulations/organizational
	Action description	1. Systematic construction of new bicycle paths (ultimately by 2030 - 340 km of paths - recommendation of the citizens' panel). 2. Installation of 5 bicycle shelters with monitoring, equipped with two-level racks for 40 parking spaces each.
Reference to impact pathway	Field of action	Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increasing the number of bicycle lanes. Reducing the number of people traveling to the city center by their own cars. Increasing the number of people using alternative forms of transportation (bicycle).
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Road Management Authority in Rzeszów, City Transport Management Authority in Rzeszów, City

		Greenery Management Authority in Rzeszow.
	Action scale & addressed entities	A systematically developed safe infrastructure for cyclists is essential to promote this form of transportation as an alternative to car travel. Bicycle paths have been built for many years, often serving as a part of road infrastructure. Bicycle shelters have been implemented since 2021. The implementation of such actions will be significantly intensified.
	Involved stakeholders	City Municipality of Rzeszów - MZD, ZTM, ZZM; BRMR, participants of the bicycle traffic, neighboring municipalities forming ROF
	Comments on implementation – consider mentioning resources, timelines, milestones	Bicycle paths and infrastructure encouraging the use of bicycle will be systematically developed. Bicycle transportation (Urvis delivery bicycles) is currently being tested by couriers at the Rzeszów City Office. Systematic development of the city bicycle system - by 2027 the number of bicycles and other two-wheelers available within the system - at least 300.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	2,367 tCO_2
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs - Stage 1 - bicycle shelters: PLN 1,140,395, EUR 253,421; bicycle paths: PLN 1,877,073, EUR 417,127 Stage II - expansion of the length of bicycle paths and development of the city bicycle system PLN 22,500,000, EUR 5,000,000. Costs by CO_{2e} unit (both stages): PLN 10,780.51 EUR 2,395.67
B-2.2: Individual action outlines		
Action outline	Action name	Promotion of pedestrian traffic and ensuring its safety.
	Action type	Regulations/Organizational
	Action description	Development of safe pedestrian infrastructure, ensuring safe and convenient access to bus stops, including in peripheral areas.
	Field of action	Transport

Reference to impact pathway	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Reducing the number of people traveling to the city center by their own cars.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - MZD, ZTM, ZZM
	Action scale & addressed entities	Safe pedestrian infrastructure should remain at the center of attention for authorities, as the basis of society's mobility should be active mobility, i.e. individual mobility, carried out, for example, on foot. This is the basic principle of the inverted pyramid of mobility, which should be particularly promoted in society.
	Involved stakeholders	City Municipality of Rzeszów - MZD, ZTM, ZZM, BRMR, traffic participants, ROF neighboring municipalities.
	Comments on implementation – consider mentioning resources, timelines, milestones	Piloting the closure of streets in the city center for traffic. Increasing the number of city streets covered by woonerf zones to at least 10 by 2027.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	-

B-2.2: Individual action outlines		
Action outline	Action name	Using "smart" solutions
	Action type	Regulations/organizational Education Smart solutions
	Action description	Optimization of traffic, for example through an electronic traffic management system, collision-free intersections, safe pedestrian crossings. Implementation of mobile applications containing information and functionalities: ticket purchase, tracking bus positions on the map,

		travel planner, real-time timetable taking delays into account, discount systems based on the number of tickets purchased.
Reference to impact pathway	Field of action	Transport
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Increasing the number of people using available applications. Optimization of urban traffic.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - MZD, ZTM, ZZM
	Action scale & addressed entities	Full implementation and functionality of the mobile application E-Parking Rzeszów - navigating to the nearest available parking space, saving the driver's time and at the same time reducing the negative impact on the environment that occurs during prolonged search for an available parking space. Promoting the solution among traffic users. This is a smart solution with potential for replication.
	Involved stakeholders	City Municipality of Rzeszów - MZD, ZTM, ZZM, BRMR, CIM - Urban Lab, traffic participants, ROF neighboring municipalities.
	Comments on implementation – consider mentioning resources, timelines, milestones	Rzeszów systematically implements smart solutions that are designed to facilitate the use of public transportation, thereby improving the quality of life for residents. Such actions have already been taken as part of previous large projects, such as: "Integration of different forms of public collective transportation in Rzeszów" and "Expansion of the public transportation system in Rzeszów" (including ITS - Smart Transport System). Smart actions will be continued.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	27,331 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Costs included in the educational tasks.

B-2.2: Individual action outlines		
Action outline	Action name	Education in the field of transportation and mobility, shaping pro-environmental attitudes, promoting the principles of the inverted mobility pyramid.
	Action type	Regulations/organization Education
	Action description	Broadly understood education aimed at encouraging residents to carpool, showing them the benefits of commuting to work together, taking children to school, etc. Promotion of a healthy lifestyle and active transportation, including walking and bicycle, as well as electric scooters and bicycles – campaigns conducted in public spaces and schools in various formats tailored to the audience. Introducing the topic of sustainable, zero-emission, and safe urban transportation to educational institutions. Permanent promotion of "smart" solutions, such as the E-parking application and others.
Reference to impact pathway	Field of action	Transport
	Systemic lever	Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Reducing the number of people traveling to the city center by their own cars. Increasing the number of people using public transportation and alternative forms of transportation (walking, bicycle, scooters).
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Transport Management Authority in Rzeszów, City Greenery Management Authority in Rzeszów Rzeszów City Office - Department of Climate and Environment, educational units Miejskie Przedsiębiorstwo Komunikacyjne Rzeszów Sp. z o.o. (City Transport Company)
	Action scale & addressed entities	Education in the field of transportation and mobility must be conducted in a continuous and systematic manner and be tailored to target groups. A

		well-conducted one can result in changes in the behavior of residents, who will be more willing to use alternative forms of transportation other than individual car travel.
	Involved stakeholders	City Municipality of Rzeszów - ZTM, ZZM, BRMR; Rzeszów City Office - KŚ, CIM - Urban Lab, educational institutions, MPK, traffic participants, neighboring municipalities ROF
	Comments on implementation – consider mentioning resources, timelines, milestones	Rzeszów carries out systematic educational and informational activities aimed at promoting public transportation. Cyclic meetings between city authorities and residents and stakeholders are organized, including regular neighborhood meetings with residents and in the Urban Lab, where the involvement of the local academic community is evident and the opinions of experts, local government representatives, and interested residents are presented. By 2027, the introduction of sustainable, zero-emission, and safe urban transportation topics is planned in at least 50 educational institutions. Furthermore, the promotion of the inverted mobility pyramid is carried out each time during the cyclical European Mobility Week campaign. Educational and informational activities will be continued and intensified.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	Reduction included in tasks in the field of transportation, particularly related to changing traffic user behavior.
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 300,000, EUR 66,667

B-2.2: Individual action outlines		
Action outline	Action name	Development of the Sustainable Urban Mobility Plan for the Rzeszów Functional Area (SUMP)
	Action type	Regulations/organizational

	Action description	Developing and effectively implementing a long-term strategy focused on ensuring good access to travel destinations and services, aimed at meeting the mobility needs of individuals and companies in urban areas and their surroundings, in order to improve quality of life. The development of the Sustainable Urban Mobility Plan (SUMP) was preceded by the largest, most comprehensive traffic studies in Rzeszów and the Rzeszów Functional Area, conducted by the Rzeszów University of Technology (using various methods, including big data).
Reference to impact pathway	Field of action	Transport
	Systemic lever	Governance /policy/ organizational Spatial planning
	Outcome (according to module B-1.1)	Adapting urban planning and regulatory tools related to reducing the demand for motorized passenger transportation.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Office for the Development of the City of Rzeszów
	Action scale & addressed entities	The development of the document is necessary in order to plan the directions of transportation development in the city and in the municipalities forming the ROF. The document will indicate justified reasons for implementing the task, for example, the need to introduce Clean Transport Zones.
	Involved stakeholders	City Municipality of Rzeszów - MZD, ZTM, ZZM, BRMR, Rzeszów City Office, MPK, ROF neighboring municipalities, carriers, traffic participants, ROF residents.
	Comments on implementation – consider mentioning resources, timelines, milestones	The necessary research for the development of the SUMP has already been conducted, and currently BRMR is preparing the Diagnostic-Strategic Report for the SUMP (planned completion - end of September 2024). Next, the SUMP will be developed. The document will contain detailed recommendations regarding solutions such as: Park & Ride, Kiss & Ride, Park & Go, Clean Transport Zones. Vision, objectives, and actions in SUMP, integration and compliance with higher-level documents, including the strategic objectives of European documents, which aim to

		significantly reduce the negative impact of transportation on the environment, will be ensured.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	As part of the costs of operating of the BRMR and neighboring municipalities ROF.

B-2.2: Individual action outlines		
Action outline	Action name	Waste Prevention actions (WP), in accordance with the concept of a circular economy (CE).
	Action type	Infrastructure Regulations/organizations Education
	Action description	Creating exchange points (e.g. sharing, co-sharing, exchange markets); libraries of things; book exchange cabinets in public places, such as restaurants, cafes; additional urban glass containers in recreational and entertainment areas, such as by the river, in parks, squares, etc. BAZZAR - flea market at Fosa (a recurring event as part of the Zero Waste x Fosa project). Establishing reuse points at waste collection centers (PSZOKs) or other publicly accessible locations for the local community, allowing residents to leave functional but no longer needed items, such as household appliances, and to take other useful products. Creating repair points for products that owners would like to continue to use or transfer to other interested parties (the repair point, along with the Ecological Education Center, is planned to be implemented as part of the construction of the Selective Municipal Waste Collection Point - PSZOK). It is also planned to create an online exchange service—providing this service to residents aims to foster pro-environmental attitudes by

		preventing excessive consumerism and promoting actions in line with the waste management hierarchy by preventing waste generation. Unused and unnecessary items that are still functional and useful can get a "second life" instead of becoming waste, thanks to the service. Through the online service, residents will be able to post advertisements about items they are looking for and would be happy to receive. Furthermore, the service plans to include information about repair points located in the city (e.g. tailor, cobbler, household appliances repair workshop, etc.). The operators of those points will be able to post their advertisements for free.
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Increase in the number of exchange points and reuse points. Increase in the amount of selectively collected waste. Significant increase in the level of waste recycling, including bio-waste.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Municipal Services Miejskie Przedsiębiorstwo Gospodarki Komunalnej-Rzeszów Sp. z o. o. (City Public Utility Company)
	Action scale & addressed entities	Education of society in the field of CE is crucial in the context of reducing GHG emissions from waste. Therefore, the actions taken must be continued and intensified, and the activities must be tailored to the target group in order to achieve the greatest possible effect.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/Department of Municipal Services, Department of Investments, MPGK, MATiP (Urban Spatial Information System), residents, entrepreneurs
	Comments on implementation – consider mentioning resources, timelines, milestones	Promoting WP is crucial in the context of proper waste management and will be carried out systematically.
Impact & cost	Generated renewable energy (if applicable)	-

	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs - Internet of Things. PLN 5,000, EUR 1,111

B-2.2: Individual action outlines		
Action outline	Action name	Increasing the quality of selective waste collection at the source and increasing the quantity of waste collected selectively and sent for recycling. Investments in solutions that enable achieving higher levels of recovery and recycling.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Education
	Action description	1. Construction of a modern PSZOK along with a repair point and the reuse of products and the Environmental Education Center. As part of the task, an office building with social and sanitary facilities, as well as a storage building for the temporary accumulation of waste received at the PSZOK (Waste Collection Point), will be constructed. At the point, a facility will be built with a repair and reuse point for products, or the storage building will be expanded to include the necessary space for creating a repair and reuse point. A construction of an Ecological Education Center with social and sanitary facilities has also been planned, where ecological education - multimedia exhibitions, interactive games and animations, infographics, information and interesting facts about waste management, recycling, CE, installations, processing processes, and many more, will be carried out.

		The Ecological Education Path (educational) will also be implemented, mainly intended for children and youth, including small architectural objects, ecological games, informational boards, and other elements. The necessary infrastructure is also planned to be implemented on the site of the new investment project: a ramp for access, unloading, covered, equipped with containers for selective waste collection; container storage areas for various types of waste, maneuvering areas, internal roads, and parking lots. 2. Reconstruction of the installation for mechanical processing of municipal waste in order to adapt it for sorting (purifying) selectively collected waste.
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increase in the amount of selectively collected waste. Significant increase in the level of waste recycling, including bio-waste.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Municipal Services, Department of Investments. Miejskie Przedsiębiorstwo Gospodarki Komunalnej-Rzeszów Sp. z o. o. (City Public Utility Company)
	Action scale & addressed entities	Continuous and systematic actions in the area of waste management are extremely important. They are crucial in striving for more sustainable and responsible resource management and environmental protection. Furthermore, the actions should be continued and intensified to meet ambitious legal regulations in this area.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/Department of Municipal Services, Department of Investments. MPGK, residents, entrepreneurs
	Comments on implementation – consider mentioning resources, timelines, milestones	Adapting waste management infrastructure to current and future legal regulations is also crucial in the context of achieving climate neutrality.

		The City Municipality of Rzeszów will systematically plan and implement necessary activities. Furthermore, as part of the planning of the municipal waste collection and management system in the City Municipality of Rzeszów, the Specification of Order Conditions for the above-mentioned service includes a provision in the criteria for evaluating submitted offers that promotes companies using low-emission transportation. In the following years, the permissible number of vehicles serving the above-mentioned task with EURO V and lower emission standards will be gradually reduced. By 2030, the plan is to use only companies with low- and zero-emission transportation for the task. Such an approach will cause potential Contractors to invest in tractors in order to be competitive in the future on the market, and as a result, GHG emissions in the transportation sector will decrease.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	533 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 30,000,000, EURO 6,666,667 Costs by CO2e unit: 56,285.18 EUR 12,507.82

B-2.2: Individual action outlines		
Action outline	Action name	Investments in solutions aimed at waste disposal and management.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Education

	Action description	1. Construction of a green waste biocomposting facility; implementation of a waste processing site with waste bins until 2027. 2. Systematic modernization of the vehicle fleet.
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Significant increase in the level of waste recycling, including bio-waste.
Implementation	Responsible bodies/person for implementation	Miejskie Przedsiębiorstwo Gospodarki Komunalnej-Rzeszów Sp. z o. o. (City Public Utility Company)
	Action scale & addressed entities	Continuous and systematic actions in the area of waste management are extremely important. They are crucial in striving for more sustainable and responsible resource management and environmental protection. Furthermore, the actions should be continued and intensified to meet ambitious legal regulations in this area.
	Involved stakeholders	MPGK, City Municipality of Rzeszów - Rzeszów City Office, residents
	Comments on implementation – consider mentioning resources, timelines, milestones	Adapting waste management infrastructure to current and future legal regulations is also crucial in the context of achieving climate neutrality. MPGK will systematically plan and implement necessary activities. The company also plans systematic modernization of its vehicle fleet - those actions will result in a reduction of GHG emissions, but will also ensure the company's competitiveness in the market. In addition, numerous and systematic educational campaigns are being carried out to encourage residents to compost waste by highlighting the numerous benefits of such a solution.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	1581 tCO_{2e}

	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs PLN 45,000,000, EURO 10,000,000. Costs by CO_{2e} unit: PLN 36,976.17 EURO 8,216.93

B-2.2: Individual action outlines		
Action outline	Action name	Environmental education
	Action type	Education
	Action description	Systematic education of residents through billboard campaigns, workshops for residents (e.g., cooking with food scraps in a zero-waste spirit, reusing waste, how to avoid generating waste, etc.), lectures for students, educational games, ecological contests, happenings, promotion of circular economy (CE) and zero waste (ZW) initiatives, as part of city events such as Neighborhood Days, and recurring events like Reggae on the Wisłok River. We play for the Climate, etc. Implementation of the Ecological Education Center (described earlier).
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Increase in the amount of selectively collected waste. Significant increase in the level of waste recycling, including bio-waste.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Municipal Services
	Action scale & addressed entities	Education as a process aimed at imparting knowledge, shaping specific traits and skills is extremely important in the context of achieving climate neutrality, especially in the area of waste. In practice, education for sustainable development means much more than traditionally perceived environmental education, as it involves acquiring knowledge and skills to deal with the dilemmas and challenges of sustainable development. One of the ideas of sustainable development is the preservation of the environment (resources) for the needs of the existence and development of future generations and the elimination of waste.

		The aim is to minimize the production of waste generated on a daily basis in households. This is a great challenge and requires undertaking many diverse educational projects dedicated to different target groups.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/GK, KŚ, Department of Education, CIM-Urban Lab; MPGK, educational institutions, NGOs, environmental associations, residents, businesses, universities
	Comments on implementation – consider mentioning resources, timelines, milestones	Education and shaping of ecological awareness and pro-environmental attitudes of residents will be carried out systematically. There are also plans for stronger involvement of the private sector and universities in the process.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	Indirect reduction - included in tasks in the waste management sector.
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs PLN 1,750,000, EUR 388,889

B-2.2: Individual action outlines		
Action outline	Action name	Development of green areas within the city.
	Action type	Technical interventions/infrastructure Procurement actions Education
	Action description	1. Construction of pocket gardens in Rzeszów. 2. ARKADIA - a green relaxation zone for juniors and seniors. 3. Wisłok - a green relaxation zone. 4. Revitalization of the park in the Słocina housing estate. 5. Renovation of the natural area in Rzeszów - protective actions in the Lisia Góra nature reserve and its buffer zone. 6. Ecological green mobility corridor. 7. Development of the area of the Konfederatów Barskich Mound.

		8. Green and recreational areas in the Pogwizdów Nowy housing estate (near a special area of protected habitats of importance for the Mrowle Łąki residential community). 9. Introducing green roofs and facades on public and private buildings. 10. Ultimately, by 2045, 894 ha of green areas are planned (with around 204 ha more green areas by 2030).
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increasing the area of green spaces. Green roofs and facades on public and private buildings. Green areas accessible to 100% of residents within a walking distance of no more than 10 minutes.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Greenery Management Authority
	Action scale & addressed entities	Shaping greenery should be an integral part of city development policy. Greenery plays a crucial role in reducing the inconveniences of life in crowded, noisy, and polluted cities. The most important functions include: air, water, and soil purification; creation of a microclimate that reduces temperature fluctuations and increases air humidity; wind protection/barrier; water retention and flood prevention; biodiversity protection; support for urban wildlife survival; stress reduction and stimulation of physical activity, including associated detailed health benefits (improved mental health, reduction in hypertension, reduction in obesity, etc.); noise protection; recreational function; aesthetic, image, and symbolic functions; and social functions as spaces for meetings and collaboration. The importance of green areas as natural CO2 absorbers cannot be overstated.
	Involved stakeholders	City Municipality of Rzeszów - ZZM, Rzeszów City Office/WI, MZBM, housing cooperatives, entrepreneurs, developers, residents

	Comments on implementation – consider mentioning resources, timelines, milestones	In 2022, there were 234 hectares of green areas available within the city, accessible within a walking distance of no longer than 10 minutes for 89% of the city's residents. In 2045, 894 hectares of such areas are planned to be available for 100% of residents. New green areas will be gradually developed, while existing ones will be taken care of.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	9,180 tCO_2
	Total costs and costs by CO_{2e} unit	Tasks 1-8 Total costs PLN 14,854,000, EUR 3,300,889 Tasks 9 and 10 No information is available at the moment.

B-2.2: Individual action outlines		
Action outline	Action name	De-paving of concrete surfaces, including parking lots.
	Action type	Technical interventions/infrastructure Education
	Action description	Development of green infrastructure and deconcreting of sealed surfaces in Rzeszów - removal of concrete and other hardened surfaces in the city area of over 1 hectare. In the places where the concrete has been removed, biologically active surfaces will be created, such as sports fields with grass surface, rain gardens in road strips, pocket parks, and new green arrangements in the spaces between the buildings.
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increasing green areas.

		Reducing the urban heat island effect. Increasing retention of rainfall.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Greenery Management Authority
	Action scale & addressed entities	Surface de-paving primarily enables retention, dependent on the surface: for small surfaces, retaining rainwater in the ground and thus supplying greenery; for large surfaces with intensive use by vehicles of varying load capacity and technical condition - retaining rainwater.
	Involved stakeholders	City Municipality of Rzeszów - ZZM, Rzeszów City Office/WI, MZBM, housing cooperatives, developers, entrepreneurs
	Comments on implementation – consider mentioning resources, timelines, milestones	Actions related to deconcreting will be systematic and intensified. Heavy rains causing floods, as a result of climate change, require a quick response. Retention of water and its utilization “at the source” is one of the responses to this challenge.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	135 tCO_2
	Total costs and costs by CO_{2e} unit	Total costs: PLN 5,338,580, EUR 1,186,351 Costs by CO_{2e} unit: PLN 39,545, EUR 8,787.8

B-2.2: Individual action outlines		
Action outline	Action name	Application of solutions for retaining a portion of stormwater on new development sites.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Education
	Action description	Implementing and planning new tasks to reduce surface runoff from heavy rains, prolong soil moisture retention, and support local greenery. Limiting

		the load on the wastewater system and mitigating the risk of flooding for lower-lying areas.
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increasing retention of rainfall.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/Department of Investments
	Action scale & addressed entities	Planning new investments with a priority on water retention and its utilization at the “point of origin”.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/WI, KŚ, Department of Architecture; BRMR, residents, entrepreneurs, developers, housing cooperatives
	Comments on implementation – consider mentioning resources, timelines, milestones	Implementation of new “urban" investments with a priority of collecting and the use of rainwater “at its source” is crucial in the context of climate change adaptation, particularly as a response to increasingly frequent heavy rainfall causing flooding and inundation. Therefore, solutions in this scope are reflected in the prepared documentation, based on which investments are carried out. This approach must also be respected by Investors carrying out their investments in the city, therefore, already at the stage of obtaining so-called environmental decisions by Investors (or at the stage of development conditions decision, if an environmental decision is not required), issues related to water management are thoroughly analyzed and conditions regarding water retention are imposed.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	-

	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 78,248,974, EUR 17,388,661

B-2.2: Individual action outlines		
Action outline	Action name	Planting trees and trellises with climbers on heavily sealed streets.
	Action type	Technical interventions/infrastructure Education
	Action description	Revitalization of road lanes and urban green areas, as well as the implementation of replacement plantings.
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology/ infrastructure Governance /policy/ organizational Social/ behavior/ education
	Outcome (according to module B-1.1)	Reducing air pollution. Reducing the Urban heat island effect.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Greenery Management Authority in Rzeszów
	Action scale & addressed entities	The described actions primarily aim to lower the air and road surface temperature, increase the ability to neutralize exhaust fumes and trap dust, protect against street pollution, and increase noise reduction capabilities. Newly planted trees and shrubs absorb CO_2.
	Involved stakeholders	City Municipality of Rzeszów - ZZM, MZD, BRMR, BGM, Rzeszów City Office/KŚ.
	Comments on implementation – consider mentioning resources, timelines, milestones	Often, the implementation of investments, whether linear, such as roads or utilities, or volumetric, requires the removal of trees or shrubs. The adopted city policy, in which greenery has gained special importance, will be consistently implemented - if the investment requires the removal of trees - first and foremost, it will have to be particularly analyzed in terms of minimizing cutting down, in the next step, the priority will be tree

		transplantation, and in the final stage, planting (native species). Green revitalization and replacement plantings are key elements of the climate neutrality strategy. By sequestering CO_2, improving air quality, regulating temperature, managing water, supporting biodiversity, and providing social and health benefits, they contribute to the creation of more sustainable and climate-resilient urban and rural ecosystems. These actions are not only beneficial for the environment, but also for local communities, raising their quality of life and health.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	70 tCO_2
	Total costs and costs by CO_{2e} unit	Total costs: PLN 1,800,000, EUR 400,000 Costs by CO_{2e} unit: PLN 25,714, EUR 5,714

B-2.2: Individual action outlines		
Action outline	Action name	Developing or modifying spatial development plans and other planning documents to increase public spaces with new green areas, blue-green infrastructure solutions, and de-paving of high-density urban areas.
	Action type	Implementation and development of national and/or EU laws and regulations Regulations/organizational
	Action description	Including in the developed planning documents and diagnoses of the aspect of environmental protection, including climate protection. Introducing provisions concerning: permissible heating sources for buildings (with priority given to municipal district heating networks and renewable energy sources); designating green areas with various functions; establishing minimum biologically active areas for plots or land; solutions for managing stormwater and meltwater.

		Identifying areas that can be acquired and protected as an action to protect the city's territory from improper spatial development, ensuring future residents' access to green spaces, reducing the phenomenon of heat islands, lowering air temperature.
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Governance /policy/ organizational Spatial planning
	Outcome (according to module B-1.1)	Adaptation of urban planning and regulatory tools related to increasing the area of green spaces.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Office for the Development of the City of Rzeszów
	Action scale & addressed entities	Building a system of purposeful, coherent actions to raise the quality of space and its ability to mitigate the effects of climate change, as well as optimizing local law in terms of provisions that increase resilience to the effects of climate change - increasing land retention, reducing surface runoff, lowering air temperature, shading areas where people stay, providing air purification from exhaust fumes and dust.
	Involved stakeholders	City Municipality of Rzeszów - BRMR, BGM, ZZM, Rzeszów City Office/WI, KŚ, residents, entrepreneurs, developers, housing cooperatives
	Comments on implementation – consider mentioning resources, timelines, milestones	From January 2022 to June 2024, 15 spatial development plans were adopted, covering approximately 310 ha of the city's area. Each study included provisions regarding climate protection. At present, there are 58 spatial development plans being prepared, in each of which issues concerning environmental protection, including climate protection, are treated as a priority. In addition, on 26 September 2023, the Rzeszów City Council adopted the Study of Conditions and Directions for Spatial Development, which paid special attention to the chapter on the environment and resilience to climate change. Work is currently underway to develop the Diagnosis for the Rzeszów City Strategy (expected to be completed in the second half of 2024) and the Diagnostic-Strategic Report for the SUMP (Sustainable Urban Mobility Plan). Work is also underway to prepare a general plan by

		the end of 2025. All those documents will specifically address issues related to climate change mitigation and adaptation.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	As part of the operating costs of BRMR

B-2.2: Individual action outlines		
Action outline	Action name	Broad education in the field of protection of nature and the natural environment; promotion/information about the undertaken and planned actions in the city regarding urban greenery, informing residents about air quality in the city.
	Action type	Education
	Action description	1. Construction of a playground in the Staromieście housing estate with elements of information, education, and sensory infrastructure about biodiversity (birdhouses, insect houses, information boards, educational blocks). 2. Small Retention Program - a subsidy for the costs of investment related to the implementation of one of the systems for collecting and using rainwater: purchase and installation of sealed above-ground tanks with a total capacity of at least 500 liters. purchase and installation of underground sealed tanks with a minimum capacity of 2000 liters; purchase and installation of a septic tank or overflow-dispersal system; creation of a rain garden; creation of a water pond with a minimum capacity of 500 liters. 3. Educational activities along with the delivery of air quality measurement service through educational air quality sensors installed on the buildings of educational institutions or standalone devices attached to the foundation in the city of Rzeszów.

Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Governance /policy/ organizational Social/ behavior/ education Finance
	Outcome (according to module B-1.1)	Increasing the area of green spaces. Increasing retention of rainfall. Reducing the urban heat island effect. Reduction of air pollution.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - City Greenery Management Authority Rzeszów City Office - Department of Climate and Environment
	Action scale & addressed entities	Shaping pro-ecological and civic attitudes among city residents. Shaping knowledge about natural plant communities and respect for nature. Social support for activities related to maintaining urban areas, transparency of actions, shaping pro-ecological and civic attitudes.
	Involved stakeholders	City Municipality of Rzeszów - ZZM, Rzeszów City Office/KŚ, CIM-Urban Lab; MZBM, housing cooperatives, entrepreneurs, universities, NGOs, environmental associations, educational institutions, developers, residents
	Comments on implementation – consider mentioning resources, timelines, milestones	ZZM and Departments of the Rzeszów City Office: Education and Climate and Environment conduct systematic ecological education, including in the field of green infrastructure and nature-based solutions. ZZM systematically implements and plans to implement further investments taking into account the educational aspect, especially in the context of biodiversity and the importance of greenery in the city. The City Municipality of Rzeszów also invests in air quality sensors, which indicate the air quality in the area of their location (the service is always provided as part of an educational and informational campaign for schools). The Small Retention program providing financing to residents, businesses, housing cooperatives and communities, and schools for investments aimed at rainwater retention, is very popular. The programs are implemented cyclically, every year.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-

	GHG emissions reduction estimate (total) per emission source sector	Indirect reduction included in investment tasks and related to the attitudes of residents.
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs PLN 4,167,000, EUR 926,000

B-2.2: Individual action outlines		
Action outline	Action name	Replacement of heating systems and comprehensive thermal modernization of single-family residential buildings.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Business models Education
	Action description	Implementation of the provisions of the anti-smog resolution for the Podkarpackie Voivodeship and the Air Protection Program for the urban zone. Rzeszów - complete elimination of individual solid fuel heating sources along with thermal modernization of residential buildings.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/ infrastructure Governance & policy Organizational Social & Behavior Finance
	Outcome (according to module B-1.1)	Elimination of all sources of fossil fuels in the municipal sector. Increase in the number of buildings undergoing deep thermal modernization. Increase in the number of buildings using energy management systems. Increase in the number of RES.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/WI, KŚ, residents

	Action scale & addressed entities	Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through thermal modernization and optimization of energy consumption. Unlocking the potential of national programs that provide financing for eco-friendly investments, such as replacing solid fuel heating systems, thermal modernization, and renewable energy investments, by increasing the engagement of the City Office in program implementation (e.g., the Clean Air Program Information and Advisory Point, STOP SMOG Program, Warm Apartment Program; energy advisors, etc.).Identifying individuals/households affected by energy poverty or other forms of exclusion and assisting them in obtaining financing for eco-friendly initiatives. Effective implementation of dedicated operational programs, such as air protection (OP for the Rzeszów city area).
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/KŚ, WI, residents, MPEC, entrepreneurs, housing cooperatives, housing communities, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions
	Comments on implementation – consider mentioning resources, timelines, milestones	The anti-smog resolution adopted by the Voivodeship Assembly constitutes a local legal act and establishes the following obligations for the city of Rzeszów (and also for the entire Podkarpackie Voivodeship): • From June 1, 2018, it is not allowed to burn in heating devices (boilers, fireplaces, etc.): brown coal and solid fuels produced using this coal; coal sludge and coal flotation concentrates and mixtures produced using them; fuels with a grain size below 5 mm and ash content above 12%; solid biomass with a moisture content exceeding 20% in the working state. • Deadlines for replacing heating devices purchased before June 1, 2018:

		- until December 31, 2021, installations operated for over 10 years from the date of production or without a nameplate (not meeting any of the classes of the PN-EN 303-5:2012 standard). - until December 31, 2023, installations operated for 5 to 10 years from the date of production (not meeting the emission standards of any of the classes of the PN-EN 303-5:2012 standard). - until December 31, 2025, installations operated for up to 5 years from the date of production (not meeting the emission standards of any of the classes of the PN-EN 303-5:2012 standard). - from January 1, 2028, installations meeting the emission requirements of classes 3 and 4 of PN-EN 303- 5:2012 standard. The devices running on gas fuel will also be gradually replaced, due to their age and degree of wear and tear.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	117,938 tCO_2
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 459,975,201, EUR 102,216,711 Costs by CO_{2e} unit: PLN 3,900.14 EUR 866.70

B-2.2: Individual action outlines		
Action outline	Action name	Conducting a deep thermal modernization and elimination of individual heating methods in order to connect to the district heating network in buildings belonging to housing cooperatives and housing communities.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Business models Education

	Action description	1. Deep, comprehensive thermal modernization of multi-family residential buildings. 2. Development of renewable energy installations. 3. Replacement of lighting with energy-efficient alternatives. 4. Implementing smart energy management systems.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/ infrastructure Governance & policy Organizational Social & Behavior Finance
	Outcome (according to module B-1.1)	Elimination of all sources of fossil fuels in multi-family residential buildings. Increase in the number of multi-family residential buildings undergoing deep thermal modernization. Increase in the number of multi-family residential buildings using energy management systems. Increase in the number of RES.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/WI, housing cooperatives and housing communities, MPEC
	Action scale & addressed entities	Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems. Comprehensive thermal modernization of multi-family residential buildings.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/WI, MZBM, MPEC, Housing Cooperatives: “Projektant”, “ZODIAK”, “Geodeci”, „Metalowiec, “Nowe Miasto”, Rzeszowska Spółdzielnia Mieszkaniowa, housing communities, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions

	Comments on implementation – consider mentioning resources, timelines, milestones	Housing cooperatives and housing communities have been taking pro-ecological actions for many years, aiming at deep thermal modernization and elimination of individual heating sources in favor of district heating. Projects incorporating renewable energy sources are also becoming increasingly popular.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	29,438 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 257,343,959, EUR 57,187,546 Costs by CO_{2e} unit: PLN 8,741.90 EURO 1,942.64

B-2.2: Individual action outlines		
Action outline	Action name	Implementing eco-friendly solutions in Municipal Units and Companies.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Business models
	Action description	1. Development of photovoltaic installations. 2. Replacement of lighting with energy-efficient alternatives. 3. Implementing smart energy management systems.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/ infrastructure Governance & policy Organizational Social & Behavior Finance

	Outcome (according to module B-1.1)	All buildings of Municipal Units and Companies with energy-efficient management systems. Increase in the number of RES.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/WI, Municipal Companies, municipal units
	Action scale & addressed entities	Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/WI, municipal units and companies, MPEC, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions.
	Comments on implementation – consider mentioning resources, timelines, milestones	Companies and municipal units have been taking various actions for many years to achieve climate neutrality. In the near future, PV installations with a total capacity of approximately 550 kWp will be installed by ROSiR, MZMB, and MPGK. Companies and units will gradually strive to increase the capacity of renewable energy sources.
Impact & cost	Generated renewable energy (if applicable)	513.94 MWh
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	352 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Total costs: PLN 1,630,000, EUR 362,222 Costs by CO_{2e} unit: PLN 4,630.68 EUR 1,029.04

B-2.2: Individual action outlines		
Action outline	Action name	Improvement of energy efficiency in public buildings and educational facilities.
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Business models Education
	Action description	Implementation of thermal modernization of public utility buildings in the building resources: cultural institutions, educational facilities, healthcare services, and other public utilities.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/ infrastructure Governance & policy Organizational Social & Behavior Finance
	Outcome (according to module B-1.1)	80 public utility buildings and educational facilities undergoing deep thermal modernization.
Implementation	Responsible bodies/person for implementation	City Municipality of Rzeszów - Rzeszów City Office/WI, Department of Education, public entities, educational institutions.
	Action scale & addressed entities	Public buildings - in the first place, 80 buildings.
	Involved stakeholders	City Municipality of Rzeszów - Rzeszów City Office/WI, Department of Education MPEC, public entities with headquarters in the implemented facilities, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financial institutions.
	Comments on implementation – consider mentioning resources, timelines, milestones	Public utility buildings in Rzeszów have been undergoing thermal modernization for many years - the key is to carry out the process comprehensively.

Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	29,005 tCO_{2e}
	Total costs and costs by CO_{2e} unit	Total costs: PLN 136,582,164, EUR 30,351,592 Costs by CO_{2e} unit: PLN 4,708.92 EUR 1,046.43

B-2.2: Individual action outlines		
Action outline	Action name	Improving energy efficiency of commercial and service facilities
	Action type	Technical interventions/infrastructure Implementation and development of national and/or EU laws and regulations Procurement actions Business models Education
	Action description	Reducing the demand for non-renewable energy by: installing photovoltaic installations, heat pumps, and other renewable energy sources on existing buildings or in their surroundings, increasing the energy efficiency of existing buildings through deep thermal modernization and optimization of energy consumption, and implementing smart energy management systems. Adaptation to ambitious legal regulations promoting energy efficiency in industry and companies (in particular the Directives: EED, EPBD).
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/ infrastructure Governance & policy Organizational Social & Behavior Finance

	Outcome (according to module B-1.1)	Increase in the number of commercial and service buildings with increased energy efficiency. Increase in RES.
Implementation	Responsible bodies/person for implementation	Entrepreneurs from Rzeszów
	Action scale & addressed entities	The scale of needs is enormous, however, due to the fact that business is a significant source of emissions - in various areas, entrepreneurs must take action to reduce GHG emissions.
	Involved stakeholders	Entrepreneurs, industrial plants, City Municipality of Rzeszów - Rzeszów City Office, MPEC, NFOŚiGW, WFOŚiGW, Marshal of the Podkarpackie Voivodeship, financing institutions
	Comments on implementation – consider mentioning resources, timelines, milestones	Companies are required to implement a range of initiatives to reduce greenhouse gas emissions. CSR or ESG issues are not without significance.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Fossil fuels
	GHG emissions reduction estimate (total) per emission source sector	293,995 tCO_{2e}
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO_{2e} unit	Within the entrepreneurs' budget

Note: the exchange rate used to convert the value of tasks is EUR 1 = PLN 4.5

B-2.3: Summary strategy for residual emissions

Residual emission strategy refers to compensating for approximately 20% of the city's baseline greenhouse gas emissions. Residual emissions are those greenhouse gas emissions that cannot be reduced through existing plans, strategies, policies, and planned tasks. These emissions come from various sources such as buildings, district heating, electricity, industry, transportation, waste management, and other areas of urban life.

To develop an effective residual emissions strategy, it is necessary to identify the sources of these unavoidable emissions and assess the feasibility of implementing emission reduction compensation measures.

In the planned strategy, key solutions are those that enable the capture and storage of carbon dioxide from the atmosphere while ensuring long-term benefits from emissions reduction. Those solutions primarily involve significantly increasing natural absorbers, such as forests and wetlands, and in the future implementing permanent absorption methods, such as carbon capture and storage (CCS) technologies. Broad stakeholder partnership, particularly with the private sector, will be essential in this regard.

The main goal of the city of Rzeszów is to continuously increase green areas. In 2022, there were 234 hectares of green areas available to the residents in the city. By 2030, this area is expected to increase by approximately 204 hectares, so that according to the plans, by 2045, there will be approximately 894 hectares of green areas available to residents. The need for a significant increase in green areas is already addressed in the developed and being developed planning documents, such as the Study of Conditions and Directions for Spatial Development of the city of Rzeszów adopted on 26 September 2023 by the resolution of the Rzeszów City Council and the General Plan of the city of Rzeszów being developed. In those documents, green areas and their sustainable development are of paramount importance.

Investments in green infrastructure & nature-based solutions, which, in addition to absorbing CO_2, have enormous adaptive significance, so crucial in a changing climate, will also be developed intensively and systematically. At the same time, existing greenery is continuously maintained due to its value.

In summary, the plan for dealing with residual emissions aims to achieve further reductions in emissions from the city area, while also considering the crucial importance of long-term carbon storage and the need for sustainable solutions to prevent climate change.

3.3 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
(List early changes/ late outcomes and impacts to be evaluated by indicator)	(List action/ pilot project if applicable)	(Indicate unique identifier)	(Insert indicator name)		(List one value per indicator)	(List one value per indicator)	(List one value per indicator)
Reduction of CO_{2e} emissions compared to 2022.	The entirety of tasks included in the Action Plan.	RZE-AP-1	Reduction of CO_{2e} emissions				80.06%
Surface area of new green spaces.	All tasks in the field of green infrastructure & nature-based solutions	RZE-AP-2	Green areas.		29	117	204 ha
Number of passengers using public transportation	Task: Increasing accessibility for public mass transportation.	RZE-AP-3	Public transportation.				Growth compared to the base year*
Number of zero-emission buses in the urban public transportation fleet	Task: Increasing accessibility for public mass transportation.	RZE-AP-4	City buses.		20	60	95
Total insulation area in public utility buildings.	Task: Improvement of energy efficiency in public buildings and educational facilities.	RZE-AP-5	Public utility buildings.				Growth compared to the base year.

Elimination of coal boilers and furnaces in residential buildings.	Task: Replacement of heating systems and comprehensive thermal modernization of single-family residential buildings.	RZE-AP-6	Single-family residential buildings.		6,743	4,043	0
Increase in the level of recycling of municipal waste.	Overall tasks in the field of Waste and Circular Economy	RZE-AP-7	Waste management.		55%	57%	60%

**numerical value will be indicated based on the developed Sustainable Urban Mobility Plan.*
*** the numerical value will be specified soon.*

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Reduction of CO_{2e} emissions (RZE-AP-1)
Indicator Unit	tCO_{2e}
Definition	Reduction of CO_{2e} emissions compared to 2022.
Calculation	According to Table B-2.2.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	yes
If yes, which emission source sectors does it measure?	Stationary energy, transportation, waste, IPPU
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Energy systems, mobility & transportation, waste & circural economy, green infrastructure & nature based solutions, built environment

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	GHG inventory.
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data resulting from GHG inventory.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Green areas (RZE-AP-2)
Indicator Unit	ha
Definition	Increasing the area covered by green spaces.
Calculation	According to table B-2.2 in the area of green infrastructure & nature-based solutions; the Obliview application.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	green infrastructure & nature based solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-
Data requirements	
Expected data	ZZM Report.

source	
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data resulting from the ZZM report.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Public transportation (RZE-AP-3)
Indicator Unit	Number of people
Definition	Number of passengers using public transportation.
Calculation	According to Table B-2.2, task: Increasing accessibility for public mass transportation.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Mobility & transportation
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-
Data requirements	
Expected data source	ZTM report, GUS analyses

Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data from the ZTM report, data from statistical analyses.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	City buses (RZE-AP-4)
Indicator Unit	Number of buses
Definition	Number of zero-emission buses in the urban public transportation fleet
Calculation	According to Table B-2.2, task: Increasing accessibility for public mass transportation.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Mobility & transportation
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-
Data requirements	
Expected data	ZTM Report

source	
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data from the ZTM report.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Public utility buildings (RZE-AP-5)
Indicator Unit	m^2
Definition	Total insulation area in public utility buildings.
Calculation	According to Table B-2.2, task: Improvement of energy efficiency in public buildings and educational facilities.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Stationary energy
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-
Data requirements	

Expected data source	WI report, reports of municipal units,
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data resulting from the report of WI and municipal units.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Single-family residential buildings (RZE-AP-6)
Indicator Unit	number of boilers
Definition	Elimination of coal boilers and furnaces in residential buildings.
Calculation	According to Table B-2.2, task: Replacement of heating systems and comprehensive thermal modernization of single-family residential buildings.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	yes
If yes, which emission source sectors does it measure?	Stationary energy
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Stationary energy
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-

Data requirements	
Expected data source	Database - Central Emissions Inventory Database (CEEB) WFOŚiGW reports on the progress of implementing programs, such as “Clean Air”.
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data resulting from CEEB reports.
Other indicator systems using this indicator	-

B-3.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Waste management (RZE-AP-7)
Indicator Unit	%
Definition	Increase in the level of waste recycling.
Calculation	According to Table B-2.2, overall tasks in the area of Waste and Circular Economy.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	yes
If yes, which action and impact pathway is it relevant for?	Waste and Circural Economy

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	-
Data requirements	
Expected data source	Data from the “Analysis of the state of municipal waste management in the City of Rzeszów” report
Is the data source local or regional/national?	Local
Expected availability	Available
Suggested collection interval	Annual or biennial cycles.
References	
Deliverables describing the indicator	Data resulting from GK reports
Other indicator systems using this indicator	-

4 Part C – Enabling Climate Neutrality by 2030

4.1 Module C-1 Governance Innovation Interventions

C-1.1: Description or visualisation of the participatory governance model for climate neutrality

Effective management structures and processes are crucial for overcoming barriers and harnessing opportunities on the path to climate neutrality. An integrated approach including planning, collaboration, stakeholder engagement, financial instruments, innovation, and strong regulatory frameworks can significantly increase the chances of achieving this ambitious goal by 2030. The complexity of the challenge of achieving climate neutrality by 2030 requires the city authorities of Rzeszów to take a series of actions. The most important of them is a change in the way the internal organization of the Rzeszów public administration is structured, by abandoning the traditional division of responsibilities and silo mentality in favor of efficient flow of information and collaboration.

Internal organizational structure change

Taking the above into consideration, there has been a change in the internal organizational structure at the City Office of Rzeszów, and a unit has been separated within the structure of the Department of Climate and Environment (previously the Department of Environmental Protection and Agriculture), which prioritizes issues related to climate protection through, among other things, analyzing the city's state in terms of threats resulting from climate change and identifying the city's adaptive potential. As part of those activities, issues related to water management, biodiversity, environmental resource protection, air quality, etc. are being analyzed. The projects of local spatial development plans are also reviewed in the unit in terms of adaptation to climate change, and cooperation with the substantive unit is carried out in the preparation of projects financed from external sources on topics implemented by the newly created unit, thus implementing the idea of breaking down competency silos. One of the main goals of the newly established Department is to raise awareness among residents about climate change and, consequently, to plan and organize activities aimed at rationalizing energy consumption and promoting solutions that reduce its usage in the city. The competences of the Department also include collecting and gathering information on innovations, new technologies in the field of energy saving and environmental protection, as well as providing advice in this area, as well as creating energy-saving activities in municipal organizational units and promoting energy saving and renewable energy sources in the city, and implementing actions to reduce CO_2 emissions.

Innovations in organization and management

Innovations in organization and management are a key element that will enable the Rzeszów city council to adapt to changing market conditions and improve operational efficiency.

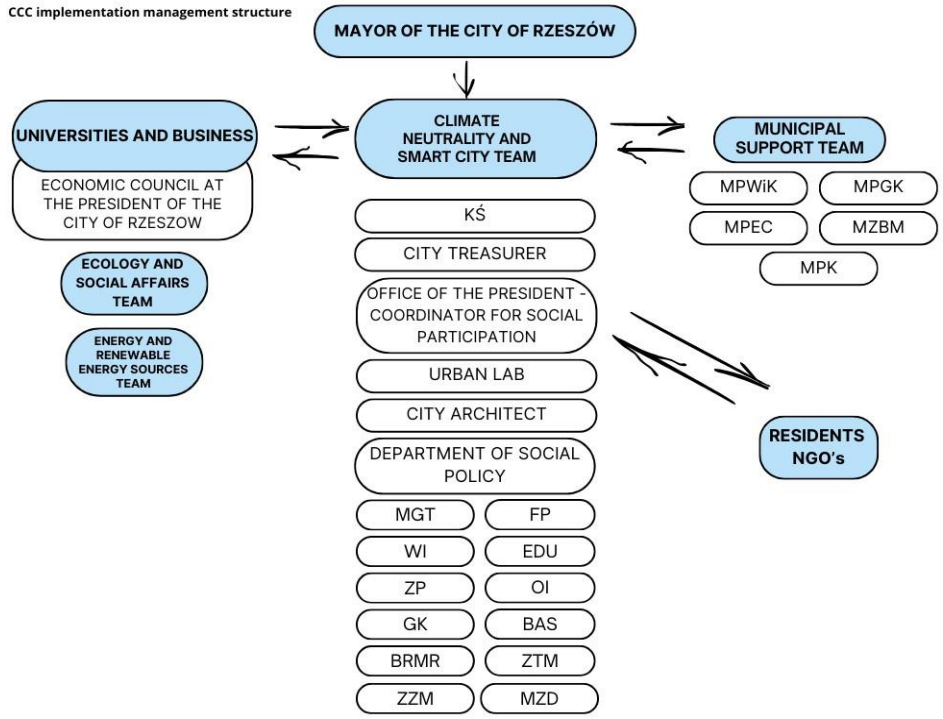
New management models are being created, both internal - such as the establishment of the Climate Neutrality and Smart City Team in the city - and external - inviting independent entities to cooperate with local government.

This is an innovative work organization. The key to success seems to be managing and organizing work according to the logic of multilateral cooperation, with distributed leadership and multi-level management - aimed at overcoming identified barriers to achieving climate neutrality by 2030. Integrating actions for social responsibility that support sustainable development and benefit both the city of Rzeszów and local communities.

It is extremely important for achieving effectiveness in action and increasing the likelihood of achieving set goals that Rzeszów cooperates with national and foreign organizations promoting rational energy use and management, as well as participating in programs funded by European and national funds related to the scope of the department's activities.

In view of the above, Rzeszów participates in numerous initiatives and programs that can bring many developmental benefits, supporting sustainable economic, social, cultural, and ecological development. The key element of success is effective cooperation, knowledge exchange, and a shared pursuit of ambitious goals. An example of Rzeszów's commitment to identifying, developing, and creating a multi-level approach to stakeholder collaboration is its participation in the Capacities Project.

The project aims to initiate and strengthen national change processes to establish national networks and management structures and provide dedicated support to public authorities (at national, regional, and local levels) in creating conditions and means enabling cities to implement Climate-Neutral and Smart City Missions.
The fact that Rzeszów's character and the strong commitment of the City Authorities (especially the Mayor) to actions towards achieving climate neutrality remain significant, makes the decision-making process in Rzeszów in this regard incomparably shorter than in other cities, allowing for a quick response to changes.



MGT - CITY BRANDS DEPARTMENT ECONOMIC COOPERATION AND TOURISM
WI - INVESTMENT DEPARTMENT
ZP - PUBLIC PROCUREMENT DEPARTMENT
GK - DEPARTMENT OF MUNICIPAL ECONOMY
BRMR - RZESZÓW CITY DEVELOPMENT OFFICE
ZZM - MUNICIPAL GREENERY BOARD
FP - FUND RAISING DEPARTMENT
EDU - DEPARTMENT OF EDUCATION
OI - IT SERVICE DEPARTMENT
BAS - OFFICE OF ANALYSIS AND STRATEGY
ZTM - PUBLIC TRANSPORT AUTHORITY
MZD - MUNICIPAL ROAD AUTHORITY
MPWiK - MUNICIPAL ENTERPRISE WATER AND SEWAGE
MPGK - MUNICIPAL ENTERPRISE OF MUNICIPAL ECONOMY
MPEC - MUNICIPAL HEAT ENERGY ENTERPRISE
MZBM - MUNICIPAL RESIDENTIAL BUILDING AUTHORITY
MPK - MUNICIPAL COMMUNICATION ENTERPRISE

Diagram 6 Implementation management structure

Rzeszów active at the local community level.
Appropriate management structures and processes are crucial for overcoming organizational, legislative, competency, social barriers, etc., and harnessing opportunities on the path to climate neutrality. An integrated approach including planning, collaboration, stakeholder engagement, financial instruments, innovation, and strong regulatory frameworks can significantly increase the chances of achieving this ambitious goal of climate neutrality by 2030, as all key issues are complex and have a high potential for impact. The integration of internal stakeholders at the local, regional, voivodheship, and national levels is extremely important in order to strengthen the network of mutual support and replicate good practices. It is also necessary to take action at the local community level.
It is worth noting that at the end of 2023, Rzeszów hosted its first Citizens' Panel. 60 randomly selected residents of Rzeszów, representing a "city in a nutshell" in terms of the diversity of its inhabitants, took part in it. For 5 days, participants collectively pondered the answer to the question: "How can Rzeszów achieve climate neutrality by 2030?"
The processes of cooperation with residents and the implementation of informational activities are carried out through the social media platform Facebook, where the page "Rzeszów-Klimat to My" has been created.
The website "ekoRzeszów" is also being prepared.
The Department of Climate and Environment, in cooperation with other stakeholders, engages in the organization of cultural events, such as "Reggae by the Wisłok River. Playing for the Climate."
Additionally, every year the Mayor of the City of Rzeszów organizes visits to residential areas in Rzeszów, which aim to be closer to the residents, conversations, negotiations, and making joint decisions. During the meetings, he talks about changes in the city, new investments, improvements, and plans for the near future. He talks about urban priorities, about so-called contracts with residents. The meetings are also attended by directors of all departments of the City Office, chairpersons of neighborhood councils, and city councilors. During the meetings, officials are also on duty, providing information and accepting written applications from residents. This is an innovative form of management that significantly shortens the distance between residents and officials and allows for an increase in residents' trust in the Office.
The instrument newly established under the City Mayor is the **Economic Council**. This is an advisory body that can significantly support the development of the local economy. Table C-1.2 contains a detailed description of the role, functions, potential benefits, and opportunities provided by collaboration with the Economic Council. By providing valuable analysis, recommendations, and supporting investment and innovation initiatives, the Council can contribute to the dynamic and sustainable economic development of Rzeszów, raise the quality of life for its residents, and increase the city's attractiveness on both national and international levels.

Rzeszów wants to be a Smart City.
Rzeszów, as one of the dynamically developing cities in Poland, has undertaken initiatives aimed at transforming it into a Smart City. This concept assumes the use of modern technologies to improve the quality of life for residents, increase the efficiency of city management, and promote sustainable development. The implementation of those solutions encounters certain systemic barriers, but at the same time opens up numerous opportunities for the city.
In Table C-1.2, some key aspects and initiatives that Rzeszów can implement or is already implementing as part of the transformation into a smart city are presented. The transformation of Rzeszów into a smart city is a complex process, but it brings numerous benefits for residents and the city administration. The key is to create a coherent strategy, efficient resource management, and educate and engage residents. Thanks to the appropriate approach and cooperation of various sectors, Rzeszów has a chance to become a modern, smart city of the future.
The "smart" energy management platform ROBOT (a solution based on direct observation and technology) is a solution that refers to advanced energy management systems that utilize modern technologies such as artificial intelligence (AI), machine learning, the Internet of Things (IoT), and automation to optimize energy consumption in various sectors. Implementation of such a system can bring many benefits for companies, public institutions, and entire communities. Energy management systems based on ROBOT technology offer a wide range of possibilities for optimizing energy consumption, reducing costs, and improving energy efficiency. The co-benefits of those systems include

financial, environmental, social, and technological benefits. Implementation of such systems can bring significant savings, improve the quality of life for users, and support sustainable development by reducing CO_2 emissions and promoting energy efficiency.
In terms of smart solutions, it is worth noting among urban innovations that Rzeszów has access to the Obliview application. This is a versatile analytical tool that supports the management and optimization of public space.
Partially, it can be used to manage the construction standards implemented in the city, described in more detail in table C-1.2, which are focused on energy efficiency, low emissions, and sustainable solutions crucial for creating more ecological and energy-efficient buildings. Implementing those standards and utilizing their capabilities contributes to the creation of more sustainable, energy-efficient, and healthy buildings, which benefits both users and the environment.
In order to coordinate all investments related to spatial development of the city and the implementation of energy-efficient solutions, cooperation with the City Municipal Planning and Architectural Commission may be crucial for the implementation of many investment projects, but it is associated with significant challenges. Systemic barriers such as complex administrative procedures, lack of transparency, conflicts of interest, complicated regulations, and lack of resources can hinder the process. Effective management of those challenges requires a strategic approach that includes early and regular consultations, thorough documentation preparation, proactive project management, relationship building, and the use of modern technologies.

Thinking outside the box
Citizen engagement in climate action requires a multidimensional approach that combines education, participation, collaboration with NGOs and businesses, and supportive policies and regulations. The key is to build awareness, understanding, and a sense of responsibility and community in climate action in order to achieve lasting and effective results.
The above indicates that a complete change in city management system, going beyond established operating patterns, and promoting a shared commitment to achieving goals by changing the way public administration works in a way that engages stakeholders at different levels of influence is the only way to achieve climate neutrality, as well as the realization of other ambitious objectives.

Responsibility for climate mitigation policy
The main responsibility for climate change mitigation policy and intersectoral coordination of the climate program and actions lies with the national government. In Poland, the key entity is the Ministry of Climate and Environment, which coordinates actions related to climate policy, collaborating with other ministries and local government units. Intersectoral coordination:
1. Climate Council - a ministerial working group on climate change adaptation - brings together representatives from various levels of government administration, as well as experts and representatives from the private sector. Their task is to coordinate climate policies and actions in various sectors of the economy.
2. Local and regional authorities - implementing climate policies also requires the involvement of local and regional authorities, which are often responsible for implementing specific projects within national climate strategies.
3. International cooperation - due to the global nature of climate change, national governments collaborate with international organizations such as the United Nations, the European Union, and the World Meteorological Organization (WMO) to coordinate actions at the international level.

Involvement of relevant stakeholders
Engaging the relevant stakeholders and integrating systems related to emission sources are crucial for the effective implementation of climate policy. Some of the mechanisms that can support those processes:
1. Consultations and public forums:
   - social consultations conducted to obtain the opinions of citizens, non-governmental organizations (NGOs), companies, and other stakeholders on climate policies.
   - discussion forums and workshops: organizing them enables stakeholders to exchange ideas, information, and best practices.

2. Public-private partnerships (PPP):
   - cooperation with the private sector: creating partnerships with companies that can offer the technologies, innovations, and investments necessary for emission reduction.
   - demonstration projects: supporting pilot and demonstration projects that can showcase the effectiveness of new technologies and approaches.
3. Intersectoral cooperation platforms:
   - Intersectoral councils and commissions: the establishment of advisory bodies involving representatives from various sectors of the economy, non-governmental organizations, scientists, and government agencies.
   - research and innovation consortia: creating consortia that bring together the knowledge and resources of various stakeholders to develop new technological and operational solutions.
4. Financial instruments and incentives:
   - grants and subsidies: providing financial resources for projects related to emission reduction, energy efficiency, and renewable energy sources.
   - tax incentives and financial incentives: the use of tax incentives, tax credits, and other financial incentives for companies and individuals investing in green technologies.
   - market mechanisms: emissions trading systems (e.g. EU ETS) and offset programs that incentivize companies to reduce emissions through market mechanisms.
5. Monitoring, reporting, and verification systems:
   - mandatory reporting: requirement for companies and other entities to regularly report greenhouse gas emissions
   - standardized methodologies: the use of standard methods and tools for measuring and reporting emissions, which facilitates data comparison and progress assessment.
   - audit and verification: conducting independent audits and verifications of reported data to ensure its accuracy and reliability.
6. Education and informational campaigns:
   - educational programs: initiating educational programs for various stakeholder groups to raise their awareness of climate change and methods of emission reduction.
   - social campaigns: conducting informational campaigns aimed at society to promote sustainable behaviors and practices.
7. International cooperation:
   - participation in international agreements: active participation in international climate agreements and cooperation with other countries.
   - transfer of technology and knowledge: supporting the transfer of technology and knowledge from developed countries to developing countries, which can help in global emission reduction.
8. Local and regional initiatives:
   - local climate plans: accurate diagnosis and development and implementation of local and regional climate action plans that take into account the specific needs and capabilities of a given region.
   - "green budgeting": introducing green budgeting at the local and regional level to ensure that public expenditures support climate goals.

The above-mentioned mechanisms were used during the development of the Climate City Contract, in particular the tasks contained in this document. The strategic goals and individual activities were therefore developed through various consultations with a wide range of stakeholders, both owners of the task and its actors.

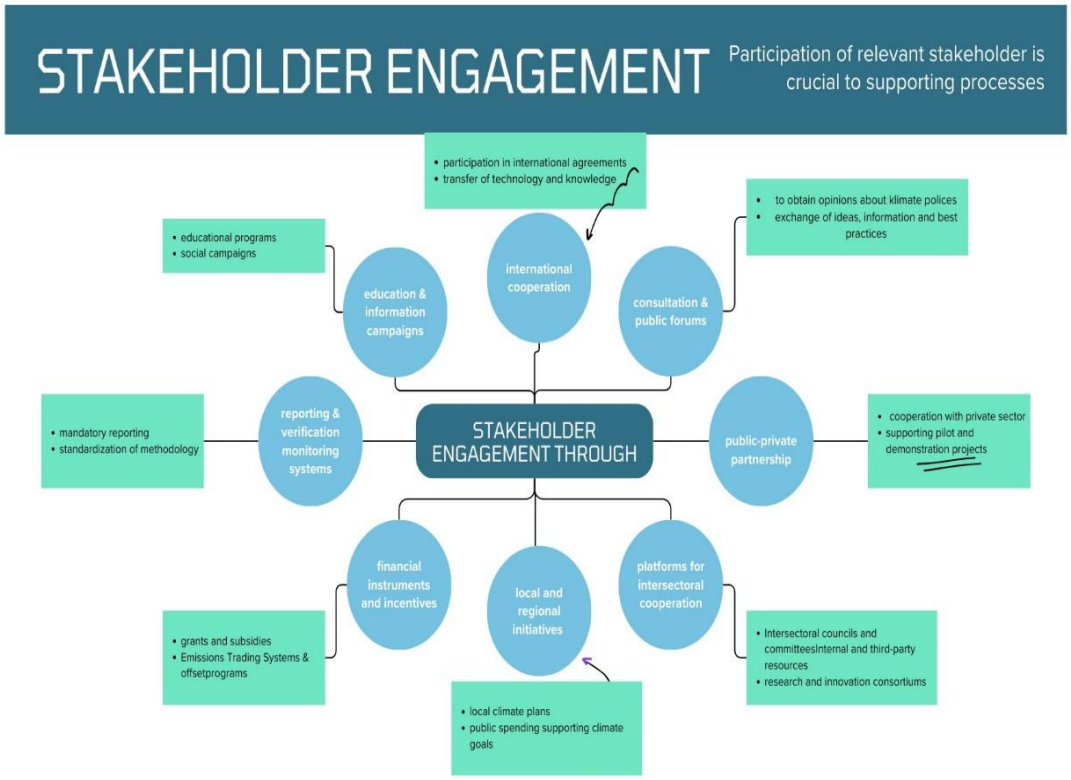


Diagram 7. Stakeholder engagement

Citizens' engagement

On the other hand, mechanisms for engaging citizens and building common understanding and support for the climate agenda and its additional benefits focus on:

1. Educational and informational campaigns: initiatives such as “Earth Day” and “Earth Hour” engage citizens and raise awareness about climate change and simple actions everyone can take; dedicated educational programs in schools (integrating climate and sustainability topics into curricula at all educational levels); online platforms and social media – using the internet and social media to disseminate information about climate change and promote positive actions.
2. Public consultations and social dialogue: open social consultations during which citizens can express their opinions on climate policies and proposed actions, e.g. consultations on local climate action plans; citizen dialogues - initiatives such as “Citizens' Climate Assemblies” engage randomly selected citizens in discussions on climate strategies, enabling them to co-create public policies.

In order to increase citizens' willingness to participate in decision-making processes and increase their involvement in the life of the city of Rzeszów, the position of *Coordinator for Social Participation* has been created, which can significantly increase the effectiveness of actions related to climate transformation, thanks to active involvement of residents, better communication, education and integration of local initiatives. The Coordinator for Social Participation will be responsible for monitoring the progress of climate actions and their impact on the local community. Regular assessment will allow for the modification of strategies and adjustment of actions to the real needs of residents, and systematic reporting of results and collecting feedback from residents will enable ongoing response to challenges and problems, which will increase the effectiveness of the conducted activities. The position is crucial and important in the situation of implementing recommendations in tasks after

a conducted citizens' panel, when it is necessary to coordinate and inform the panelists and the general public about the usefulness of the recommendations developed.
In November 2023, the first "Citizens' Panel" was conducted in Rzeszów, in which 60 randomly selected residents of Rzeszów, representing a "city in a nutshell" in terms of the diversity of its inhabitants, spent 5 days collectively pondering the answer to the question: "How can Rzeszów achieve climate neutrality by 2030?" The coordinating team of the Rzeszów Climate Panel summarized the course of the entire process and its most important effects in the report. Panelists selected from 10,000 households in Rzeszów listened to the positions of non-governmental organizations, expert presentations, and speeches from the City Office on the energy efficiency of buildings and the future of sustainable transportation. The recommendations that emerged during the initiative have been included in the Action Plan, hence the contribution of residents to the process of creating this document is significant, and selecting tasks with strong social support will guarantee their implementation.
3. Participation in local initiatives and projects: organizing volunteer programs related to environmental protection, such as tree planting, cleaning local green areas, or urban gardening projects; local social projects - initiatives such as urban community gardens, projects related to renewable energy sources in local communities, or shared solar installations can engage citizens in climate action.
4. Collaboration with non-governmental organizations (NGOs): partnerships with NGOs - non-governmental organizations often carry out campaigns, projects, and educational initiatives that support climate awareness building and mobilize society to take action; educational programs and workshops - NGOs organize workshops, trainings, and seminars for various social groups to increase knowledge about climate change and promote pro-environmental behaviors.
5. Participatory mechanisms and co-decision-making: participatory budget - citizens can directly decide on the allocation of part of the city budget to projects related to environmental protection and climate; platforms for submitting ideas and initiatives, where citizens can submit their ideas for pro-climate actions and vote on proposals from others.
6. Media campaigns and storytelling: success stories - presenting positive examples of climate actions and their benefits, both at an individual and community level, can inspire others to take similar actions; campaigns in traditional media - using television, radio, press, and advertisements to raise awareness about climate change and promote specific actions.
7. Business and corporate initiatives: sustainable development programs in companies - Companies can engage their employees and customers in pro-climate actions through internal sustainable development programs, green marketing, and CSR (Corporate Social Responsibility); green products and services - promoting products and services that are climate-friendly can raise consumer awareness and encourage them to make more sustainable choices.
8. Policies and regulations supporting citizen engagement: tax incentives, grants, and other financial incentives for citizens who invest in renewable technologies, energy-efficient solutions, or other environmentally friendly actions; municipal and regional programs - local authorities can create support programs for residents, such as subsidies for solar panel installations, support for sustainable transportation, or grants for green projects.

The city used the above-mentioned mechanisms to engage residents in the process of creating the Climate City Contract. The citizens' assembly was of particular value in developing the tasks presented in the Action Plan. It was an excellent opportunity for educating residents, building awareness, dialogue, and open communication. The suggestions of the residents have influenced the city's Climate Contract being developed and have been reflected in the planned actions to be implemented.
The citizens' panel clearly showed that the residents of Rzeszów are convinced about the need to take action for a just climate transformation is evident from the recommendation supported by 92% of the panel participants, which states: "the city recognizes the importance and urgency of energy transformation in budget planning, not avoiding large and challenging investments that bring savings in the longer term". Furthermore, residents want to actively co-create the development of the city in which they will live, because they feel responsible for it. The recommendations were officially accepted by the Mayor of the City of Rzeszów in the presence of the Minister for Civil Society Affairs and representatives of the residents, which further emphasized the role of the panel as an effective tool for influencing reality.

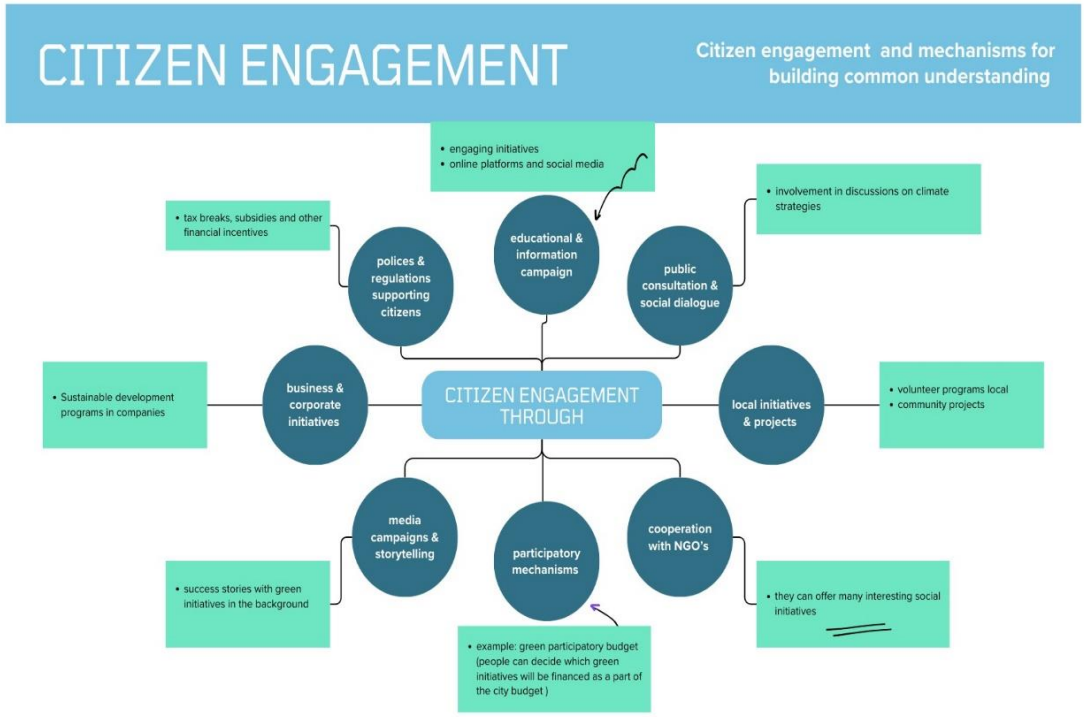


Diagram 8. Citizen engagement

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
(Indicate name of intervention)	(Describe the substance of the intervention)	(Refer to barriers and opportunities identified in Module A-3)	(List leaders and all stakeholder involved and affected, referring to the stakeholders mapped in Module A3)	(Describe how intervention enables climate neutrality)	(Indicate how intervention helps achieve the impact listed in Module B-1)
Creating management structures	The change of the long-established Department of Environmental Protection and Agriculture in the Rzeszów City Office to the Department of Climate and Environment, with the aim of prioritizing climate protection issues and energy management. Establishment of the Climate Neutrality and Smart City Team and systematic building of competences from the outside. Establishment of a Team for the implementation of the project entitled "NEEST - Neutral and Environmentally Sustainable Areas" under the NetZeroCities Pilot Cities Program. (NZC-H2020-202209)	• governance/ policy/ organizational, • finance, • behavior/ social/ education.	Rzeszów City Office, business, universities, residents, non-governmental organizations, associations	• effective implementation of complex tasks with a mitigating and adaptive nature through: - improving work efficiency, - better resource allocation, - simplification of processes, - increased flexibility and adaptability, - faster response to changes, - better adapted teams - the ability to create project teams that are more flexible and better adapted to specific tasks. - development of new skills through training and new challenges.	• increased innovation: the new structure promotes the culture of innovation, encouraging employees to propose and implement new ideas. • vertical and horizontal initiatives: better conditions for implementing innovative projects, both at the department level and between them. • effective stakeholder management, • financial savings, • increased transparency: clear procedures and transparent organizational structure • better flow of information: improvement of communication between departments, which contributes to a better flow of information, cooperation and coordination.

Coalition of Polish Mission Cities	The initiative of all Polish cities participating in the "100 Climate-Neutral and Smart Cities" Mission, namely Rzeszów, Kraków, Warsaw, Wrocław, and Łódź, aims to strengthen cooperation for the promotion and implementation of the Mission's objectives.	• technology/ infrastructure • governance/ policy/ organizational, • finance, • behavior/ social/ education,	Mission Cities: Rzeszów, Kraków, Warsaw, Wrocław, Łódź, UMP, ZMP, ultimately: Polish cities	• implementation of tasks of a mitigating and adaptive nature, • implementation of innovative pilots with scaling and replication potential • collaboration in creating the Climate City Contract.	• exchange of good practices/experiences and innovations • joint participation in initiatives such as the Union of Polish Metropolises, the Association of Polish Cities, • joint participation in workshops, conferences, events, • joint implementation of the NEEST Pilot Program.
Green Fund for Rzeszów	The program is a response to grassroots initiatives of residents, donors, experts, socially responsible companies, and individuals interested in improving the space of the City of Rzeszów. The reported initiatives are implemented in areas maintained by ZZM. Thanks to the support of donors, a number of	• governance/ policy/ organizational, • finance, • behavior/ social/ education,	ZZM, Urban Lab, Residents, Entrepreneurs	• implementation of mitigation and adaptation projects • development of areas naturally absorbing CO_2	• improvement in quality of life, • educational campaigns raising social awareness about climate change and ecology, • increased resilience to climate change, • strengthening cooperation with residents, • strong mandate to carry out actions.

	projects are being implemented, ranging from large investments such as planting in roadside strips or creating sensory gardens, to small projects such as flower meadows or planting in flower beds. Donation enables financing of a specific purpose.				
Doing Business with...	Cooperation and interactions between companies and various organizations, including local government units, government agencies, other companies, as well as international partners. Active involvement in the investor acquisition process and maintaining good relations with the Mayor of the City of Rzeszów.	• governance/ policy/ organizational, • finance, • behavior/ social/ education,	Rzeszów City Office, Economic Council under the Mayor, Companies, Financial institutions	• long-term projects - infrastructure, public services, • impact on local development - corporate social responsibility, • supporting local initiatives.	• advisory and consulting services, • promotion and cooperation, • strengthening the city's position and its investment attractiveness • improvement in quality of life, • transparency and principles of fair competition.
Rzeszów SMART CITY	Rzeszów strives to implement the concept of “smart city" - a smart city that utilizes modern technologies to improve the quality of life for its	• governance/ policy/ organizational, • technology/ infrastructure, • finance,	Rzeszów City Office, Urban Lab, Municipal units and municipal companies, Technology companies,	• implementing new technologies and systems, including energy management in public and residential buildings, for	• improvement in quality of life, • safety and monitoring: smart monitoring systems, crisis management systems,

	residents, increase the efficiency of city management, and promote sustainable development. Here are some key aspects and initiatives that Rzeszów can implement or is already implementing as part of the transformation into a smart city are presented. • Rzeszów Smart Transport System (RIST), • Urban Lab, • Digital education: educational programs promoting digital skills among residents, especially children and youth. • applications and platforms enabling residents to actively participate in city life, reporting issues and making suggestions.	• behavior/ social/ education, • spatial planning	Service providers, Entrepreneurs, START-UPs, Research institutions, Non-governmental organizations and associations, Residents	optimalization of energy consumption, • Smart Governance transparency and better communication with residents through digital tools, mobile applications, and participatory platforms.	• promotion and implementation of smart solutions, • promotion and development START-UP, • strengthening cooperation with residents, • strong mandate to carry out actions.
Economic Council under the	The council brings together companies operating in the city. In	• governance/ policy/ organizational, • finance	Rzeszów City Office, Entrepreneurs, Universities,	• optimization of investments - better planning and utilization of urban	• advisory and consulting services,

City Mayor's Office	2024, as part of the Council's activities, specialized Teams were established, including those related to environmental protection.	• behavior/ social/ education	Non-governmental organizations, Financial institutions	resources and funds, both domestic and European • private financing of ecological investments	• trend analysis: monitoring and analysis of local and global economic trends, • recommendations - developing recommendations for the Mayor in the field of economic policy, investments, infrastructure, and innovation, • support in strategic decision-making - planning development and co-creating city development strategies with a focus on long-term perspectives, promotion and cooperation, • strengthening the city's position and its investment attractiveness
RBO Rzeszów Citizens' Budget	Possibility of submitting and selecting projects financed from the city budget. Participation in the citizen's budget is a great opportunity to decide together with others how	• governance/ policy/ organizational, • behavior/ social/ education	Rzeszów City Office, Residents, Non-governmental organizations	• implementation of tasks of a mitigating and adaptive nature	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation

	Rzeszów is changing.				of ecological investments
Partnership: Environment for Development	The aim of the project is to create a platform for cooperation and knowledge exchange knowledge between entities responsible for environmental protection management in Poland and institutions involved in implementing European funds at the regional, national, and European levels. Its topics include in particular air protection, improving energy efficiency, adaptation to climate change, nature conservation, and preserving biodiversity. The result of the project will be the creation of a network of partnerships between stakeholders representing central, regional, and local administration, experts, non-governmental	• governance/ policy/ organizational, • finance, • behavior/ social/ education	Government administration Local administration Non-governmental organizations Government institutions Financial institutions	• access to EU and international funds, • policies and regulations supporting sustainable development,	• improvement in quality of life, • development of partnerships, new business models (e.g. PPP) and financing, • exchange of experiences and best practices, • acquiring private capital

	organizations, and the development of solutions conducive to improving the coordination of environmental and climate policy implementation.				
Rzeszów Building Standard	Rzeszów Building Standard is currently being developed, which will be gradually implemented - in the first stage for public utility buildings, and in the next stage for all newly constructed buildings. The standard will focus on energy efficiency, low emissions, and sustainable solutions, including educational aspects.	• governance/ policy/ organizational, • technology/ infrastructure, • finance, • behavior/ social/ education, • spatial planning,	Rzeszów City Office, BRMR, City Architect, Heritage Conservation Officer Design studios/planners Investors, developers Producers of materials and systems, residents.	• designing buildings with minimal impact on the natural environment (including design, construction, operation, and maintenance of buildings) • promotion of CE - use of recycled materials and local resources. • new approach to public procurement.	• reduction of operating costs of facilities, • energy cost reduction, • financial savings resulting from the production of energy from RES, • improvement in quality of life, • increase in real estate value, • creating new job opportunities, • high standard of living spaces, and in the later stage, high standard of workplaces.
Municipal Planning and Architectural Commission	The Urban Planning and Architectural Commission (UPAC) is an advisory body that aims to support city authorities in matters related to spatial planning, architecture, and urbanism.	• governance/ policy/ organizational, • spatial planning,	BRMR, Rzeszów City Office, Department of Architecture, City Architect, Heritage Conservation Officer Design studios, Investors	• consultations, preparation of opinions, recommendations regarding sustainable urban development, • promotion of quality standards in urban planning and architectural projects,	• sustainable urban development through more efficient spatial planning, taking into account priorities related to environmental protection in the broadest sense,

			Non-governmental organizations Residents	• prioritization of environmentally friendly actions.	• efficient use of space, city aesthetics, • protection and preservation of historical buildings and urban layouts, • improvement in quality of life, • increase of the investment attractiveness of the city.
OBLIVIEW mapping application	An analytical tool supporting spatial planning process management. The electronic database on the Obliview platform includes, among others: - urban trees, their parameters, condition, and species, - vegetation cover percentage, - tree canopy coverage, - vegetation structure, - invasive species participation, - participation of semi-natural vegetation, - thermal mosaic of the ground surface,	• governance/ policy/ organizational, • spatial planning, • behavior/ social/ education	BRMR, Department of Architecture, City Architect, Heritage Conservation Officer Design studios, Investors Non-governmental organizations Residents	• continuous monitoring of the current state and the "comparison" with previous years module, • urban space management • monitoring of performance indicators, i.e. space utilization, energy savings, etc. • setting optimization goals based on collected data, • analysis of optimal locations for RES,	• improvement in environmental quality, • significant reduction of the urban heat island effect, • increase in biodiversity • aesthetics and improving the attractiveness of the city, • increase of community engagement, • sustainable spatial planning.

	- impermeable surface area, - biologically active surface area, - urban heat island map and its changes over the years - light pollution map, - vertical infrastructure density (buildings) - solar potential of roofs.				
Energy Management Database - ROBOT "Robotic Automation of the process of acquiring, distributing, and archiving documents related to electricity from the supplier and distributor for the City."	Automation tool for managing energy sales documents.	• governance/ policy/ organizational, • finance	Rzeszów City Office, City units and municipal companies, Service providers,	• optimization of energy consumption - smart energy management (adjustment to current needs and conditions) • monitoring and control, data analysis and reporting • strong integration with RES	• reduction of operating costs, through savings on energy purchases, • stimulating innovation and technological development, • implementing "smart" solutions • improvement in quality of life, • knowledge and new skills of the employees of the Office

4.2 Module C-2 Social Innovation Interventions

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
(Indicate name of intervention)	(Describe the substance of the intervention)	(Refer to barriers and opportunities identified in Module A-3)	(List leaders and all stakeholder involved and affected, referring to the stakeholders mapped in Module A3)	(Describe how intervention enables climate neutrality)	(Indicate how intervention helps achieve the impact listed in Module B-1)
UrbanLab	Urban space open to everyone who wants to have an impact on changes in the city and setting the directions of its development.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Municipal Companies, NGO, Residents, Universities.	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Rzeszów Climate Panel	60 randomly selected residents were educated to develop recommendations on how the city can achieve climate neutrality by 2030. The residents presented recommendations in the area of energy efficiency and sustainable transportation.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Municipal Companies, NGO, Residents, Experts.	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments

Green Fund for Rzeszów	Possibility of selecting and financing green initiatives.	• governance/ policy/ organizational, • finance, • behavior/ social/ education	City Greenery Management Authority, Urban Lab, Business, Residents.	• implementation of mitigation and adaptation projects • development of areas naturally absorbing CO_2	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Citizens' budget	Possibility of submitting and selecting projects financed from the city budget.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Residents, NGO, Organizations	• implementation of mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
RzeszówToMy application	Application enabling residents to contact the City Office.	• governance/ policy/ organizational,	City Office, Residents.	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Social Dialogue Commission for Tree Protection	The Commission assesses the appropriateness of planned or proposed actions related to logging and issues opinions and recommendations in this regard.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Associations, Foundations, Municipal Companies, Investors	• care for green areas	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments

Meetings of the Mayor with residents	The Mayor regularly meets with residents of housing estates. Representatives from all departments, units, and municipal companies participate in the meetings.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Municipal Companies, Municipal units, Residents, Neighborhood councils.	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Consultation walks with the Mayor	The Mayor organizes walks, for example, to discuss issues such as planting, leveling architectural barriers, or light pollution.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Municipal Units, Residents.	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Rzeszów Social Councils	The Rzeszów Councils perform an advisory and consultative function for the city authorities on matters concerning the socio-economic life of Rzeszów.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, Public institutions, NGO, Universities, Economic entities	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments

Program of cooperation with non-governmental organizations	The aim is to build partnerships with non-governmental organizations in carrying out activities aimed at improving the quality of life of the residents of Rzeszów.	• governance/ policy/ organizational, • behavior/ social/ education	City Office, NGO	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments
Connected City	Information-intervention platform.	• governance/ policy/ organizational, • behavior/ social/ education •	City Office, residents	• strong mandate to implement mitigation and adaptation projects	• improvement in quality of life, • residents' participation in decision-making processes, • strong social mandate for the implementation of ecological investments

C-2.2: Description of social innovation interventions

In Rzeszów, a series of actions have been implemented to support and promote social initiatives, social entrepreneurship, and social awareness. Below are presented the key social innovations:

Urban Lab

Urban Lab is a space for experimenting with selected solutions for cooperation between city authorities, residents, companies, and scientific entities, aimed at improving the quality of life for residents through innovative solutions to identified problems (initiating, testing, implementing, and evaluating projects) and generating additional value using urban resources.

MunicipalLab conducts a wide range of activities as an "urban laboratory", which is a space for discussions among residents, social organizations, representatives of higher education institutions, and businesses about the city's development directions.

Urban Lab's mission is based on 4 pillars:

- collaboration with Partners to develop solutions for diagnosed urban problems,
- sharing urban data on the website www.otwartedane.erzeszow.pl useful for all urban stakeholder groups, which can also be used to create innovative solutions and projects implemented by Urban Lab and its Partners,
- running MunicipalCafe, which is a space for meetings and debates between city residents and their authorities, local government officials, scientists, and business representatives, where coffee is just a pretext for discussion,
- activity of the Innovation Incubator, supporting the process of developing innovative projects submitted by residents.

Rzeszów Climate Panel

The first Rzeszów Climate Panel took place in 2023 and was dedicated to climate change and the climate neutrality of the city. Sixty randomly selected residents of Rzeszów, representing a "city in a nutshell" in terms of the diversity of its inhabitants, spent 5 days collectively pondering the answer to the question: "How can Rzeszów achieve climate neutrality by 2030?"

Participants selected from 10,000 households in Rzeszów were educated by non-governmental organizations, experts, and City Office officials on the energy efficiency of buildings and the future of sustainable transportation. Empowered by scientific knowledge, they took a practical look at the city in three moments of the panel:

- about the values that the city should follow when making any decisions regarding climate neutrality,
- about the visions of city development in two areas of the panel in the long-term perspective,
- about detailed recommendations that they have developed or modified themselves.

The actions of city authorities aiming for climate neutrality should, according to the panel, be based on expert knowledge, long-term, systemic, and resistant to politics, and should take into account the diverse situation of residents.

In the field of energy efficiency, the panel composition has chosen a vision of development that involves reducing energy demand - both in urban buildings and private homes. The city should conduct an information campaign to raise awareness among residents about the need to save and respect electrical and thermal energy, and to supplement shortages primarily from a decentralized network of citizen and renewable energy sources. In the vote on specific recommendations, the following three received the highest support from the panel in the housing sector:

- the city is designing an energy storage system in Rzeszów (e.g. in distributed warehouses) – as part of the expansion of the urban infrastructure of Renewable Energy Sources - based on feasibility analysis and in cooperation with the world of science and business, and also planning a schedule for its implementation,
- the city takes into account the importance and urgency of energy transformation in budget planning, not avoiding large and challenging investments that bring savings in the longer term,
- the city establishes regular cooperation with technical universities in the field of innovative solutions that can be implemented in the city.

According to the panelists, in the area of sustainable transportation, the city should focus on a strong expansion of the zero-emission public transportation system. Ecological transportation, but also transportation accessible - through the synchronization of timetables and significant increase

in frequency of service, price reductions, passenger amenities and promotional campaigns, as well as restrictions on private car traffic in favor of promoting bicycle and walking. The most popular specific recommendations included the following three:

- the city is building well-connected Park&Ride parking lots on the outskirts and offering a favorable deal to drivers who use this solution, The construction of parking lots should be preceded by public consultations regarding their location and connectivity to the city center,
- the city is installing secure bicycle racks at public transportation stops, especially in areas far from the city center,
- the city supports the construction of bicycle parking lots at workplaces, schools, offices, housing communities, etc.,

Green Fund for Rzeszów

The City Greenery Management Authority in Rzeszów, in cooperation with Urban Lab, is running a program called "Green Fund for Rzeszów", which is a response to grassroots initiatives of residents, donors, experts, socially responsible companies, and individuals interested in improving the space of the City of Rzeszów. The reported initiatives are implemented in areas maintained by the City Greenery Management Authority in Rzeszów.

A number of projects are being implemented, ranging from large investments such as planting in roadside strips or creating sensory gardens, to small projects that can be equivalent to flower meadows, plantings in flower beds, or trees.

Adding a small contribution in the form of a "donation" allows for financing a specific goal, such as planting trees, ornamental plants, building small architecture, or supporting wildlife-friendly spaces.

An example of grassroots initiatives carried out in Rzeszów was the collection of ideas for "Rzeszów To MY" conducted as part of the Urban Lab Rzeszów project. As part of the project, ideas from residents were implemented, such as: nest boxes for swifts and hedgehog houses, Bee Meadow, and a solar bench. Actions have also been carried out to integrate the school community with its surroundings, such as a community fruit and vegetable garden and an ecological mural.

"The Green Fund for Rzeszów" engages stakeholders in decision-making processes and provides the opportunity for financial support for specific projects. Thanks to the implementation of various ecological initiatives, this program plays a role in striving to reduce greenhouse gases by, among other things, increasing green infrastructure and promoting biodiversity. Promoting this initiative can contribute to long-term impact and an increased number of green investments.

Citizens' budget

The participatory budget is a unique opportunity for real and direct co-decision-making on how a part of our city's budget will be spent. Since 2014, residents have continuously come up with and submitted projects every year, and then voted on which ones will be implemented. Many of the submitted and implemented projects concern green infrastructure. Through the implementation of the participatory budget, the City provides an opportunity for all residents to participate in decision-making.

RzeszówToMy application

The RzeszowToMY mobile application combines an informational function, allowing you to familiarize yourself with news about Rzeszow and the events calendar, facilitating access to information about municipal education, social consultations, taxes, warnings, and road disruptions, as well as an intervention function. The application is integrated with an online resident account, which allows for remote handling of selected official matters. The Internet resident account is a collection of various local government services gathered in one place.

Social Dialogue Commission for Tree Affairs

The Commission is an advisory body to the Mayor, it assesses the appropriateness of planned or proposed actions related to deforestation and issues opinions and recommendations in this regard. The commission consists of representatives of the City Office, municipal units, municipal companies,

associations, and foundations - enabling collaboration between investors and representatives from both the local government and the community.

Meetings of the Mayor with residents
The Mayor regularly meets with residents of housing estates in Rzeszów. Representatives from all departments, units, and companies of the Rzeszów City Office participate in the meetings. Each of them is connected with shifts, which are performed on site by representatives of individual departments of the Rzeszów City Office, municipal units and companies, as well as associations and organizations operating in the city and its surroundings. This allows for direct conversations with officials, handling many issues, and submitting documents on-site. Organizations collaborating with the city present their activities to the residents of Rzeszów and encourage cooperation.
Meetings are crucial for supporting participatory, transparent, and accountable local government. They help build trust, promote civic engagement, effectively solve local problems, and ensure inclusive and informed decision-making.

Consultation walks with the Mayor of the City of Rzeszów
City consultation walks are held with the Mayor and representatives from the Rzeszów City Office, focusing on the topics of the walks discussions. Sample walks discussions: development of green areas, reduction of light pollution, removal of barriers for people with disabilities.

Rzeszów Social Councils
The Rzeszów Councils perform an advisory and consultative function for the city authorities on matters concerning the socio-economic life of Rzeszów. Members of the Council represent public institutions, non-governmental organizations, universities, and business entities.
Rzeszów Social Councils:

- Economic Council,
- Women's Council,
- Culture Council,
- Senior Council,
- Sports Council,
- Strategic Group and Thematic Teams,
- Youth Council,
- Student Council,
- Council of Public Benefit Activities.

Program of cooperation of the city of Rzeszów with non-governmental organizations
The aim of the Cooperation Program is to build partnerships with non-governmental organizations in carrying out activities aimed at raising the quality of life of the residents of Rzeszów. Priority areas of cooperation in 2024 include: health care and promotion; activities for people with disabilities, activities for seniors, social assistance, including assistance to families and individuals in difficult life situations and equalizing opportunities for those families and individuals, supporting and promoting physical culture, culture, art, protection of cultural goods and national heritage; activities for the integration of foreigners.
Specific objectives of the Cooperation Program include:

- creating conditions for strengthening existing non-governmental organizations, establishing new entities and citizen initiatives,
- using the potential of non-governmental organizations as a complement to the City's activities in areas not covered by local government structures,
- taking innovative and more effective actions for the benefit of the residents of the City,
- strengthening the social awareness of responsibility for the local community and its tradition.

ConnectedCity
This is one urban ecosystem where the collaboration between residents and technology allows the city to become a safe and friendly place to live. It is a platform that, on one hand, has

an informative character - for example, it indicates the locations of educational institutions, the location of fire department units, air sensor measurements, and the history of readings from other sensors. On the other hand, it has an intervention character - residents can report inconveniences or threats, such as damaged infrastructure or flooding, through the platform, to which the relevant Departments and units of the Office respond promptly.

The interventions presented above show that the city is constantly implementing social innovations. Special emphasis is placed on engaging residents. The implementation of the climate panel not only engaged residents in the decision-making process (the Mayor committed to implementing the recommendations), but also allowed for education and raising awareness of climate naturalness. The example of including city decisions in the process is also the Civic Budget, recent years show that residents often choose green projects. The Social Dialogue Commission for Tree Protection also gives residents the opportunity to influence administrative decisions regarding tree felling.

The city wants to know the needs of its residents, which is why meetings are held in neighborhoods and consultation walks. This is an opportunity to talk to residents about issues that directly concern them.

It is important for society to have easy access to information, undoubtedly the RzeszowToMy and ConnectedCity applications serve this purpose. Interactive Tree Canopy Map is being refined, which will provide information on how urban greenery is developing in the city. Engagement and cooperation with businesses and organizations are very important. Therefore, the Economic Council was established under the Mayor and the Cooperation Program with non-governmental organizations is developed every year. The Green Fund for Rzeszów, on the other hand, provides an opportunity to finance green initiatives.

Future projects will be more clearly and in details focused on climate neutrality, while future initiatives will be built on the foundation already established in previously implemented projects and draw inspiration from other cities. A wide range of stakeholders will be more closely involved in the process of co-creating the city. This is one of the key factors that can contribute to achieving climate neutrality in the city.

Residents and other stakeholders will be involved in every future iteration of the Action Plan, in order to collectively shape the future of the city and have a real impact on the quality of life.

5 Outlook and next steps

Plans for next CCC and CCC Action Plan iteration

Achieving climate neutrality in Rzeszów by 2030 is an extremely ambitious and very difficult task. It means a completely different organization and approach to planning and implementing tasks, as well as managing the city, than the ones previously used in local governments. It requires a vision and bold decisions of the Rzeszów city leadership, including innovative management models, as well as the important aspect of pioneering evolutionary processes, tests, pilots, without which the implementation, and ultimately achieving climate neutrality of the city of Rzeszów, will not be possible. Joining the EU Mission "100 Climate-Neutral and Smart Cities", which requires the development and systematic - effective implementation of the Climate City Contract, is an expression of such a decision.

The Climate City Contract was developed primarily by the Climate Neutrality and Smart City Team established by the Mayor of Rzeszów by Order dated August 23, 2022. The team is interdisciplinary, consisting of individuals with various competencies from different departments, units, and municipal companies with different levels of responsibility. The intra-city team is also systematically enriched with external competencies (business, universities, NGOs). The main challenges for the Team in the near future will be: strengthening communication within and outside the Team, monitoring the implementation of actions indicated in the Climate City Contract and responding to ongoing changes, building the Team's competencies and collaborating with various stakeholders, including city residents, systematically strengthening the mandate for action and the role of the Team in the city.

Planned actions within the iterative process.

Achieving climate neutrality goals requires not only project management but also reflective learning. Therefore, the Climate City Contract will be a "living" document that will continuously adapt to ongoing changes as needed. It will take the form of a strategic umbrella document, overarching other future documents in the field of environmental protection. Acquiring reliable data will be extremely important, as its analysis will enable making the right decisions and implementing actions with the highest possible efficiency. Therefore, the implementation of a platform automating data management, aggregation, analysis, monitoring, and reporting is planned.

As part of the iterative process of continuous improvement, the Climate City Contract will be reviewed within 2 years of its approval. It should be kept in mind that as a result of this process, many changes and improvements will be introduced - some of the planned tasks will be significantly detailed. The second iteration is planned for 2028, while in 2030 an analysis is scheduled to determine whether the contract's goals and assumptions have been met.

Various data necessary for assessing the implementation of the Climate City Contract will be collected from different sources in one place to facilitate their analysis. The data will be checked for accuracy and consistency. Any errors or inaccuracies will be addressed or corrected. The analysis of the acquired data will be conducted from both a quantitative perspective—statistical analysis to understand trends and patterns—and a qualitative perspective—evaluation of qualitative data, such as stakeholders' opinions gathered through interviews and surveys.

Regular reports on the progress of environmental actions will be produced based on the collected data, highlighting the results achieved in comparison to the set goals. The data will be visualized for easier presentation of the results. All the above-mentioned elements will enable the assessment of the effectiveness of planned actions and provide the opportunity to make modifications to the plan based on the results of the analysis in order to increase its effectiveness.

Furthermore, progress in achieving the goals of the Climate Contract will be verified through greenhouse gas inventories, which will annually monitor emission levels in Rzeszów. Based on it, it will be possible to assess at what stage of transformation the city is currently at and how much remains to be done. Additionally, in the near future, there are plans to expand greenhouse gas inventory from the Basic level to the Basic+ level. Planned inventory expansion will

include the following sectors: Industrial Processes and Product Use (IPPU) and Agriculture, Forestry and Other Land Use (AFOLU) and additional greenhouse gases.
All stakeholders will be regularly informed about the progress and results of the environmental actions being carried out and will be invited to provide their feedback to ensure effective implementation of the actions.
Upon completion of the action cycle, a thorough analysis will be conducted to identify strengths and areas for improvement. In subsequent cycles, improvements derived from the analyses and monitoring conducted will be implemented.
Effective monitoring of progress will require a systematic approach and the involvement of all stakeholders, enabling the optimization of actions and the achievement of the intended environmental goals.
The decision regarding the acceptance of the document by a resolution of the Rzeszów City Council will be made at a later stage. If the decision is positive, the document will be widely consulted and undergo a formal procedure of social consultations. It will be presented to various stakeholder groups, and their comments will be collected in accordance with the requirements of the law. The conclusions drawn from this process will be reflected and mirrored in subsequent versions of the document.
In the next steps, social participation will also be developed - perceived as a process of building and strengthening the knowledge of society as a whole about actions planned and undertaken by local government. It gives local authorities a valuable opportunity to present and justify their actions and subject them to public discussion, in which all social groups can present their point of view. Thanks to this, it will be possible to introduce certain corrections, changes in proposed actions, which will make them better perceived by society and allow for a better way to achieve the set goals. The educational and informational aspect is also invaluable.
The goal for the near future is also to analyze the potential of obtaining energy from dry geothermal sources, in close cooperation with Municipal Companies, universities, and research institutes – the State Geological Institute as well as private investors.
The City authorities will also be looking for opportunities in the near future to implement installations that capture and permanently store carbon dioxide - in cooperation with companies that are the largest GHG emitters in the city.

6 Annexes

Annexes number 1 - Photo reports from selected meetings in Rzeszów during which the assumptions of the Cities Mission and the CCC being developed were presented and discussed.

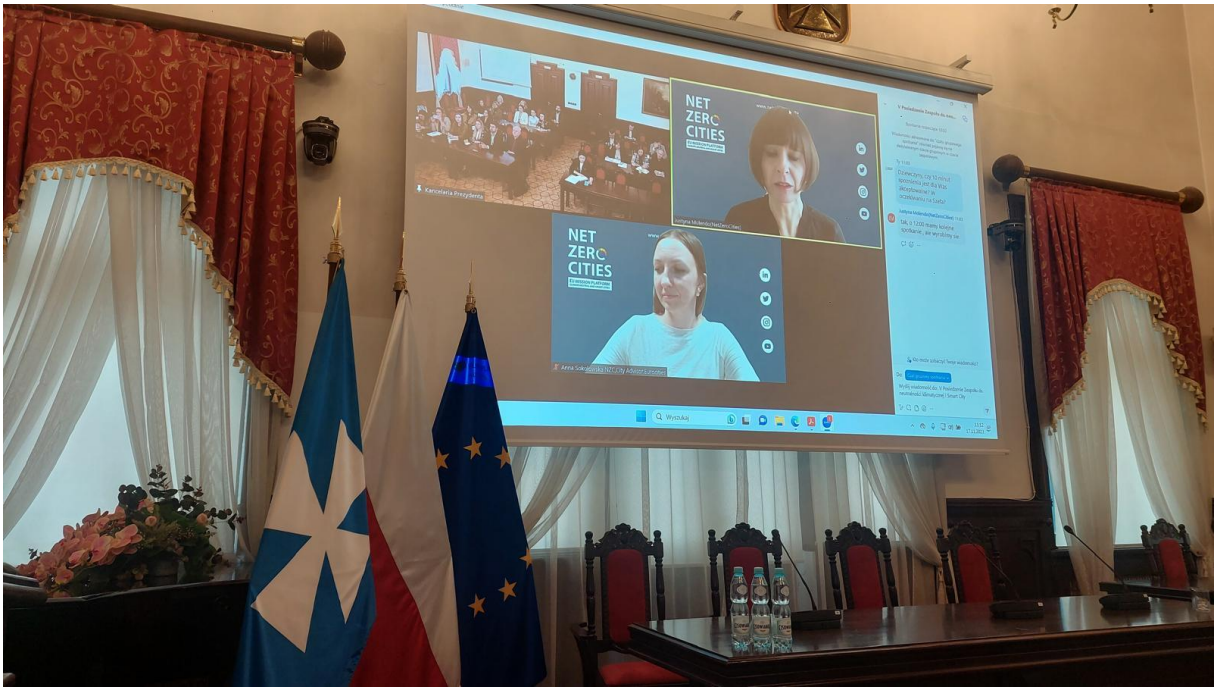
Annexes number 1 - Photo reports from selected meetings in Rzeszów during which the assumptions of the Cities Mission and the CCC being developed were presented and discussed.

1. CYCLICAL MEETINGS OF CLIMATE NEUTRALITY AND SMART CITY TEAM

The team is assembled from representatives of various Departments of the Office and is supported by representatives of municipal companies.

Internal team meeting

Internal team meeting



Team meeting with Netzero advisors Justyna Wieczorkiewicz-Molendo and Anna Sokołowska

Team meeting with Netzero advisor Jakob Stolt

2. MEETINGS WITH STAKEHOLDERS

Meeting with business representatives from Rzeszów regarding participation in the Mission

Meeting with representatives of universities, NGOs and business

3. MEETINGS WITH RESIDENTS - CITIZEN'S PANEL "HOW IS RZESZÓW TO ACHIEVE CLIMATE NEUTRALITY BY 2030?"

Residents while developing recommendations

Adoption of the recommendation by the mayor in the presence of residents and the Minister for Civil Society

4. MEETINGS WITH REPRESENTATIVES OF OTHER CITIES AND SPECIALISTS FROM NETZERO

"Polish Cities for Climate" Summit with representatives from Polish cities and online participation of Thomas Osdoba

Conference with Polish cities participating in the Mission and specialists from Netzero

Conference with Polish cities participating in the Mission

Meeting with the delegation from Kiev (Ukraine) regarding the participation of Rzeszów in the Mission

Meeting with the delegation from Rivne (Ukraine) regarding the participation of Rzeszów in the Mission

5. TWIN TRANSITION WORKSHOPS IN RZESZOW

The main goal of the workshop was to build awareness of the opportunities and potential for increasing energy efficiency through a comprehensive approach to revitalization. The workshop was aimed at representatives of local governments, housing cooperatives, municipal building management and entrepreneurs.

DEBATE: How to ensure holistic insights, synergy and value creation in revitalization? Holistic revitalizations - from green transformation to social transformation

The debate was attended by representatives of mission cities in Poland, the National Research and Development Centre and representatives of Danish companies

Energy efficiency workshop with mission cities, focus on Rzeszow buildings as an example

SITE VISIT to selected buildings that are the subject of the NEEST project

6. Reggae on the Wisłok 2024 - Playing for the Climate!

A cultural event that promotes the idea of environmental protection, including addressing the issue of climate protection and adaptation to the effects of climate change, while actively involving residents.

Part of the team taking part in educational workshops

Workshop for children on climate change adaptation

7. ARCHIT DEBATE

Participation in the ArcHit debate organized by the Rzeszów Smart City Association. The event was attended by members of the association, architects, representatives of the city team, students of urban planning, interested residents - an example of the participation of the city unit (Department of Climate and Environment) in external climate events.

8. ADAPTATION TO CLIMATE CHANGE THROUGH ART

Engaging residents through participation in an ecological competition and participation in a theatre performance – drawing attention to climate education topics.

Ecological theatre art for primary school students

Awarding prizes for participation in the ecological competition.

Information tent, where talks with residents about climate change adaptation and Project Neest.

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of the Rzeszów City

rzeszów
capital of innovation

NetZeroCities has received financing from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Table of contents

1 Introduction

Introduction

Vision for the City in 2030

The development of Rzeszów will proceed in accordance with the vision outlined in the "Development Strategy of the City of Rzeszów until 2025": Rzeszów – the growth hub of the Podkarpacie region – is a city that is friendly to people, offering and expanding numerous metropolitan functions. It is a place where it's worth living, with a high quality of life and environment, as well as comprehensive economic, social, and cultural development.

The sectoral strategic goals for the development of the City of Rzeszów, which are based on the Vision and Mission for the Development of the City, include:

1. *Smart City – creating favorable conditions for the development of Rzeszów as an attractive location for business activities, as well as for the advancement of education, higher education, science, and culture.*

The development of economic activity will lead to the creation of new jobs, which in turn will increase employment levels and contribute to income growth. This, in turn, will improve the standard of living by providing better access to services, housing, and other goods. Investments in higher education, science, and education contribute to raise the overall level of knowledge and skills among residents. The development of the cultural sector enriches the social life of residents. An increased number of cultural events, festivals, art galleries, and theaters will offer more opportunities for recreation and personal development. Culture fosters community cohesion, strengthens local identity, and encourages active engagement in public life. Access to green spaces, bicycle paths, sports events, and cultural centers fosters an active and healthy lifestyle, which in turn contributes to improved health and well-being.

2. *A socially cohesive and integrated city – improving both the living conditions of residents and public safety.*

A socially cohesive and integrated city fosters an environment where residents can experience an improved quality of life through strong social bonds, a sense of security, equal opportunities, and active participation in community life. In integrated communities, individuals are more inclined to offer help and support to one another Social cohesion promotes balanced development across different neighborhoods in the city, helping to prevent the marginalization of specific social groups. Social cohesion contributes to increased trust in public institutions such as local administration, healthcare, and education. Residents who feel heard and represented are more likely to cooperate with city authorities, leading to improved public services and more efficient city management.

3. *Urban mobility and infrastructure – development and improvement of the functioning of the transportation and technical infrastructure system.*

Systematic and well-planned development of technical infrastructure, including transportation, is essential for the city's growth and the quality of life for its residents.

4. *Utilization of resources – protecting clean energy and rich heritage, while managing the values and resources of the natural and cultural environment.*

The above has a multifaceted, positive impact on the quality of life for residents. It contributes to improving health, increase the city's attractiveness, preserving cultural identity, and promoting long-term sustainable development.

Achieving climate neutrality is one of the key and most ambitious goals, the realization of which will contribute to the city's development in line with the established vision.

City Goals: An Smart City and Socially Cohesive and Integrated Cities are fully coherent with the goals of the Mission, particularly in addressing social challenges and actively involving residents in this effort. Actions developed in collaboration with residents carry a strong social mandate, which can ensure their effective implementation.

City's background in climate actions.

Climate scenarios for Poland indicate that the frequency of heatwaves currently experienced in Rzeszów is expected to increase in the coming decades. Forecasts indicate a tendency for their for duration to increase, leading to the emergence of drought. Just as severe in Rzeszów are the short but very intense rainfalls that cause flooding, which may lead to more significant floods in the future.

The climate changes occurring before our eyes are impacting urban ecosystems, placing plants under increased stress, particularly due to their urban environment, which makes them more vulnerable to

pests and diseases. Furthermore, warmer winters extend the growing season of plants, altering their growth cycles and thereby reducing their resistance. Climate warming is associated with an increase in insect populations and the number of fungi that can survive the winter, leading to a higher number of infection foci in the following season. The impact of climate change on the species composition and condition of urban forests is significant and will become increasingly evident.

Cities, which are, on the one hand, significant emitters of greenhouse gases, and on the other hand, the primary recipients of the negative effects of climate change, are key actors in the climate transformation process. The urgent necessity thus becomes the need for coordinated actions that, complementing and intersecting with each other, will guarantee a horizontal approach towards achieving neutrality and resilience in urban areas. For this reason, the activities undertaken will be implemented across various areas, including air quality, energy transformation, zero-emission transportation, waste and wastewater management, as well as green spaces and urban water retention.

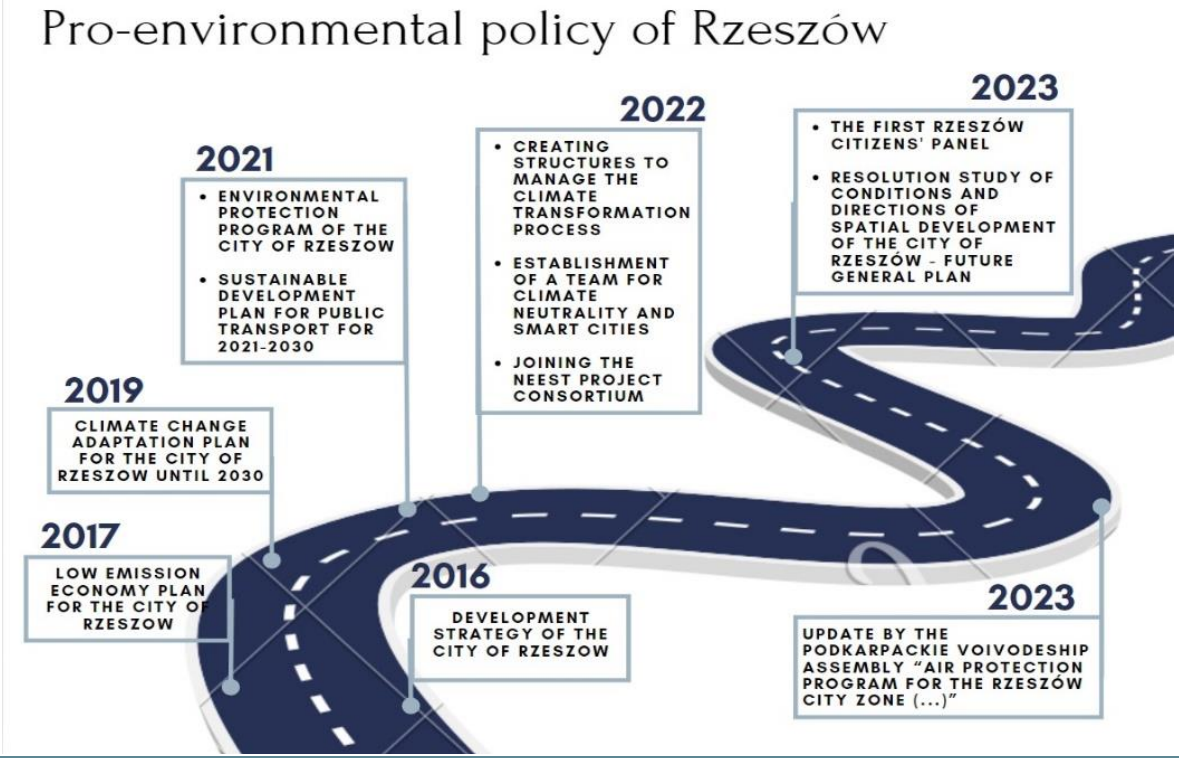
Recognizing the need for urgent and immediate action towards achieving climate neutrality, the city of Rzeszów has joined the "100 Climate-Neutral and Smart Cities" Mission and expressed its ambition to attain climate neutrality through a just, effective, and socially acceptable transformation. At the same time, it acknowledges the necessity of accelerating efforts to achieve climate neutrality and making it a priority in the city's policy in the City Municipality of Rzeszów.

Achieving climate neutrality will require a range of diverse actions that must be harmoniously combined and complementary to each other in order to maximize synergy in addressing the challenges posed by climate change. A joint effort and the engagement of stakeholders at various levels are crucial for achieving lasting and positive changes in both preventing the causes and adapting to the impacts of climate change. Effective management of air quality, energy transformation, transportation, as well as urban greenery and water retention, is a crucial element in creating a more sustainable and environmentally friendly city. However, it is important for the local community to also make responsible, eco-friendly choices. Responsible actions by residents, entrepreneurs, and local authorities are necessary to achieve positive outcomes for the environment and future generations. Regardless of the need for systemic changes, each of us can contribute to improving the quality of life in cities through informed decisions and changes in habits.

Environmental policy of Rzeszów
Rzeszów implements an environmental policy through the following actions:

- **2016** - adoption of the "Development Strategy of the City of Rzeszów until 2025", which is a document defining the directions of the city's development. Sustainable development, prioritization of environmental protection issues, including mitigation and adaptation to climate change, promotion of low- and zero-emission economy, investment in research and innovation, and raising awareness of residents and ecological education can significantly contribute to the reduction of greenhouse gas emissions and help achieve climate neutrality,
- **2017** - adoption of the "Low-Emission Economy Plan for the City of Rzeszów", which focuses on improving energy efficiency, increasing the use of renewable energy sources, and reducing greenhouse gas emissions. The essence of the Plan is to achieve economic, social, and environmental benefits resulting from actions reducing greenhouse gas emissions.
- **2019** - adoption of the "Climate Change Adaptation Plan for the City of Rzeszów until 2030", which sets out Rzeszów's policy on taking actions to prevent and mitigate the negative effects of climate change. The plan describes the most significant threats arising from climate change and the associated areas of risk for the City and its residents, and also indicates the directions of actions through which the City will protect itself from the negative effects of climate change phenomena.
- **2021** - adoption of the Environmental Protection Programme of the City of Rzeszów that aims to protect natural resources, preserve biodiversity, prevent pollution, promote sustainable development, and ensure a healthy environment for future generations, thus aligning with the goal of achieving climate neutrality. Work is currently underway on a new document for the years 2025–2029,

- **2021** - adoption of the "Sustainable Development Plan for Public Mass Transport for the years 2021-2030 with elements of electromobility development strategy for the city of Rzeszów and neighboring municipalities", which defines sustainable public mass transportation not only for Rzeszów, but also for neighboring municipalities, thus contributing significantly to the reduction of greenhouse gases and being a key document in the context of the climate neutrality goal to be achieved in the coming years.
- **2022** - establishment of structures for managing the climate transformation process. The establishment of the Department of Climate and Environment, whose tasks include, among others, coordinating the city's climate policy, initiating actions and processes related to climate change mitigation and adaptation, and shaping the city's energy security policy.
- **2022** – The establishment of the Climate Neutrality and Smart City Team, whose primary goal was to initiate actions aimed at achieving climate neutrality for the city of Rzeszów by 2030, particularly within the framework of the "100 Climate-Neutral and Smart Cities by 2030" EU Mission.
- **2022** - application to the Pilot Cities Programme under the 100 EU Cities Mission, receiving a grant and joining the consortium of the "NEEST - Neutral and Environmentally Sustainable Municipal Areas" project.
- **2023** - updating by the Podkarpackie Voivodeship Assembly the document "Air Protection Programme for the Rzeszów city zone - due to the identified exceedance of the permissible level of suspended particulate matter PM10 and the permissible level of suspended particulate matter PM2.5, along with the expansion related to achieving the national goal of reducing exposure and taking into account the target level of benzo(a)pyrene and the Short-Term Action Plan". It specifies the directions of corrective actions, the implementation of which is intended to improve air quality. Given that the source of these pollutants is the burning of fuels in the municipality and household sector for heating buildings or in vehicle engines, implementing measures to reduce these pollutants will align with efforts to cut greenhouse gas emissions. Thus, the implementation of the Update of the Air Protection Program for the Rzeszów City Area aligns with the goal of climate neutrality.
- **2023** – conducting Rzeszów's first Citizens' Panel entitled "How Can Rzeszów Achieve Climate Neutrality by 2030?",
- **2023** - adoption of the Study of Conditions and Directions for Spatial Development of the City of Rzeszów, which, due to changes in Polish law, will be transformed into a so-called master plan, but already at present, as a fundamental document shaping the spatial policy of the city, it plays a crucial role in the context of undertaking mitigation and adaptation actions.



Documents outlining the climate policy of Rzeszów

At present, Rzeszów's climate policy is determined by two documents:

1. "Environmental Protection Programme of the City of Rzeszów"

The document sets forth the primary objective as "The development of the city of Rzeszów through continued efforts to improve the state of the environment, guided by the principle of sustainable development". It encompasses the analysis and evaluation of the environmental state within the city of Rzeszów, addressing intervention areas for which the following strategic objectives have been defined:

- climate and air quality protection: improving air quality and effective energy management,
- noise hazards: reducing the negative impact of noise on the residents of the city of Rzeszów and the natural environment,
- water and wastewater management: modernization and development of water and wastewater infrastructure in the city of Rzeszów, as a part of efforts to improve the condition of groundwater and surface water,
- waste management and waste prevention: implementing actions aimed at improving the waste management system,
- natural resources: preserving the richness of nature and the landscape values of urban spaces.

2. "Climate Change Adaptation Plan for the City of Rzeszów until 2030"

The document was created in response to one of the most important environmental protection issues, which is climate change and the need to adapt to its effects. The plan outlines a vision, overarching goal, and specific objectives for adapting the city to climate change, which should be achieved through the implementation of selected adaptation actions in four of the city's most vulnerable sectors: public health/vulnerable groups, water management, transportation, and tourism, specifically in recreational areas. The adaptation plan aims to prepare the city for climate change, reduce its vulnerability to extreme events, and increase its capacity to manage the impacts of those events and their consequences.

The adaptation plan includes a diagnostic section that describes the climate phenomena and their impacts on the city, assesses the city's sensitivity to those phenomena, and evaluates the city's ability to independently manage the consequences of climate change. In response to the risks identified in the diagnostic section of the document, adaptive actions necessary to increase the city's resilience to current and future phenomena have been outlined.

The above documents do not clearly indicate the climate goal expressed as a % reduction in greenhouse gas emissions from the city area. This goal, however, was outlined in the Resolution of the Rzeszów City Council No. LXVIII/1502/2022 of October 25, 2022, regarding the achievement of climate neutrality by the city of Rzeszów by 2050. The resolution clearly indicates that the City Municipality of Rzeszów will strive to achieve climate neutrality by 2050 through a just, efficient, and socially acceptable transformation. Furthermore, it is deemed necessary to accelerate efforts to achieve climate neutrality and make it a priority in the city's policy in the City Municipality of Rzeszów.

Rzeszow's participation in the European Commission's "100 Climate-Neutral and Smart Cities by 2030" Mission is a crucial step towards achieving climate neutrality. The city's participation in such an ambitious Mission is seen as an opportunity to gain the following benefits:

- sustainable development — by achieving an ambitious goal of reducing greenhouse gas emissions across all areas of the city's activities,
- financing and support — through access to expert/technical and advisory support from the European Union level, as well as dedicated financing, which can accelerate the implementation of pro-ecological and innovative projects,
- innovation and technology — through the implementation of smart solutions in the city's management process,
- improvement of quality of life through the implementation of activities related to climate neutrality and smart city management, leading to better air quality, reduced noise, improved infrastructure, and more efficient management of urban resources, which directly improves the quality of life for residents,
- strengthening the City's image: participation in a prestigious initiative helps build a positive image of Rzeszów as an innovative, eco-friendly city actively engaged in combating the climate crisis, which can attract investors, tourists, and new residents,

- international cooperation: enabling the establishment of contacts and collaboration with other European cities, fostering the exchange of experiences, knowledge, and best practices in city management.

The key action is the development of the Urban Climate Contract, which, through the pathways included in it to achieve the planned - extremely ambitious goal of reducing greenhouse gas emissions by 80% compared to the baseline year, will enable significant and necessary acceleration of actions indicated in strategic documents. The developed Urban Climate Contract will take the form of a strategic umbrella document, overarching other future documents in the field of environmental protection.

Needs and engagement of residents

The city is aware that, to achieve climate neutrality, it must actively engage its citizens - therefore, the first citizens' panel took place in 2023, where a representative group of residents was asked "How can Rzeszów achieve climate neutrality by 2030?" It was an excellent opportunity for educating residents, building awareness, dialogue, and open communication. The suggestions of the residents have influenced the city's Climate Contract being developed and have been reflected in the planned actions to be implemented.

Sixty randomly selected residents of Rzeszów, representing a "city in a nutshell" in terms of the diversity of its inhabitants, spent 5 days collectively pondering the answer to the abovementioned question. Participants selected from 10,000 households in Rzeszów were educated by non-governmental organizations, experts, and City Office officials on the energy efficiency of buildings and the future of sustainable transportation. Empowered by scientific knowledge, they took a practical look at the city in three moments of the panel:

- about the values that the city should follow when making any decisions regarding climate neutrality,
- about the visions of city development in two areas of the panel in the long-term perspective,
- about detailed recommendations that they have developed or modified themselves.

The actions of city authorities aiming for climate neutrality should, according to the panel partecipants, be based on expert knowledge, long-term, systemic, and resistant to politics, and should take into account the diverse situation of residents.

The citizens' panel clearly showed that the residents of Rzeszów are convinced about the need to take action for a just climate transformation is evident from the recommendation supported by 92% of the panel participants, which states: "the city recognizes the importance and urgency of energy transformation in budget planning, not avoiding large and challenging investments that bring savings in the longer term". Furthermore, residents want to actively co-create the development of the city in which they will live, because they feel responsible for it. The recommendations were officially accepted by the Mayor of the City of Rzeszów in the presence of the Minister for Civil Society Affairs and representatives of the residents, which further emphasized the role of the panel as an effective tool for influencing reality.

The residents emphasized the importance of systematic education in the field of climate neutrality, which is why the developed Action Plan includes, in addition to investment tasks directly affecting the reduction of greenhouse gas emissions, a wide range of educational activities.

To continue the successful and effective collaboration with residents, the well-known space Urban Lab will be used. It hosts numerous meetings, conferences, and debates, including those on ecology and climate transformation.

The Consultation and Information Point "Clean Air", operated by the Department of Climate and Environment of the Rzeszów City Office, is also an excellent form of interaction with residents. Here, residents receive assistance in completing the necessary documentation to obtain financing for thermal modernization and replacement of heat sources, as well as information on applicable laws, solutions, and possibilities for modernizing their buildings.

Such a form of running the point and direct contact with residents inspires trust and shortens the distance between the resident and the official. Numerous consultations conducted within the Point allowed for the acquisition of knowledge regarding individual residents' needs, which was used in designing tasks in the Action Plan.

Recognizing the benefits of the above solution, in the near future residents will have access to energy advisors who will support them in a comprehensive way in planned activities.

Stakeholder engagement (business, universities, NGOs, institutions)
The Climate Contract for the city has strong support from various stakeholder groups. In the first stage of document creation, data was gathered on ongoing and planned climate-positive actions from internal stakeholders (departments, city units) and external stakeholders (municipal companies).
The next stages of creating the document and the pathways to achieving climate neutrality included in it were discussed during numerous meetings of the Climate Neutrality and Smart City Team, together with invited external stakeholders. Furthermore, the City's participation in the Mission and its goals, as well as the need for climate transformation, were presented to business representatives and universities during meetings of the Economic Council under the Mayor's office. During the meetings, business and science representatives proposed their solution for achieving climate neutrality. These proposals have been included in the Action Plan. Entrepreneurs recognize the urgent need to take action for a just climate transformation and are aware that local government alone cannot achieve this goal, which is why they declare close cooperation in this area. Representatives of universities express their willingness to cooperate with the Rzeszów local government in order to protect the climate and the environment, as well as promote sustainable development, while also indicating the areas in which they will actively work to achieve this goal.

The list of signatories supporting the city's actions is a result of strong stakeholder engagement in the process of creating and implementing the Climate Contract.

2 Goal: Climate neutrality by 2030

Goal

Rzeszów has declared its commitment to achieve climate neutrality no later than 2050, and this is a priority expressed in the Resolution of the Rzeszów City Council No. LXVIII/1502/2022 dated 25 October 2022. However, considering the enormous impact of climate change on the environment, especially how strongly the effects of climate change are felt in cities, it has been deemed necessary to accelerate actions towards achieving climate neutrality and make them a priority of the municipal policy in the City Municipality of Rzeszów. In view of the above, by joining the City Mission, Rzeszów has taken on the challenge of achieving the goal of climate neutrality by 2030, which means reducing greenhouse gas emissions by 80% compared to 2022. The above goal covers the entire administrative territory of the City Municipality of Rzeszów and is fully consistent with the goal of the City's Mission. Objects covered by the emissions trading system are excluded for reduction purposes.
The total reduction in greenhouse gas emissions will be **80.06%** Achieving the above goal will be possible thanks to planned actions that allow for the reduction of greenhouse gas emissions in the following manner:

- Stationary energy - **81.06%** of the reduction in this area (839,717 tCO_{2e}),
- Transport - **80.05%** of the reduction in this area (275,694 tCO_{2e}),
- Waste - **14.33%** of the reduction in this area (2114 tCO_{2e}).

It should be noted that the Stationary Energy and Transport sectors are the areas with the highest greenhouse gas emissions.
Additional benefits associated with taking action to achieve climate neutrality:

- ensuring the energy security of Rzeszów by becoming independent from fossil fuels and diversifying energy sources,
- reducing the operating costs of the city by increasing energy efficiency and the number of its own diversified energy sources,
- reducing energy costs for residents through increased energy efficiency and the development of a prosumer energy generation model,
- raising ecological awareness and engaging residents in climate transformation and actions for the city, building co-responsibility for the city,
- improvement in the quality of life and health of residents resulting from the reduction of air pollution and the decrease in environmental pollution levels caused by noise and light; improvement in the well-being of residents (both physical and mental), reduction in healthcare costs,
- improvement of the quality and aesthetics of urban space and increasing its attractiveness,
- optimizing space utilization through sustainable design,

- increasing the city's resilience to the effects of climate change through increased biodiversity and the expansion of blue-green infrastructure,
- impulse for sustainable economic development through the development of new sectors working towards climate and energy transformation and increasing the economic competitiveness of the city,
- creation of new - also "green" jobs,
- stimulus for scientific development and innovation,
- greater social integration through the involvement and cooperation of various stakeholders,
- greater social integration and stimulation of sustainable economic development through the creation of calm traffic spaces that can serve as local centers of social life,
- development and testing of tools to mitigate energy poverty,
- improving the quality of life for residents and improving the tourist appeal of Rzeszów and its surroundings through the expansion and diversification of the urban ecosystem, as well as the creation of recreational and relaxation areas,
- increase in surface area and protection of valuable natural areas, increase in biodiversity and better access to valuable natural areas for residents,
- improving the comfort of connections and the availability of public transportation and cycling, as well as improving the safety of pedestrians and cyclists,
- lower traffic density, fewer traffic jams thanks to reducing the share of individual transportation in road traffic and increasing the number of public transportation users,
- improving road safety,
- reducing the amount of waste sent to landfills and improving local waste management and recycling levels,
- new business models enabling the acquisition of investors with private capital,
- educated staff with desired competencies in the Office.

3 Strategic priorities

Strategic priorities

Strategic priorities were established based on the results of greenhouse gas inventory for Rzeszów, taking into account the results of an economic model - a tool supporting climate transformation planning based on existing data and assumptions.

Main sources of emissions

The conducted inventory clearly indicates the main sources of emissions for Rzeszów. The total amount of inventoried greenhouse gas emissions in carbon dioxide equivalent from the area of the City Municipality of Rzeszów in 2022 amounted to 1,395,839 tCO_{2e}. The sector with the largest share of carbon dioxide emissions in the city was the Stationary Energy sector - 74% of the total balance, followed by the Transport sector - 25% of the total carbon dioxide emissions balance. The Waste sector was responsible for approximately 1% of total emissions.

In light of the above, the strategic and systemic priorities for Rzeszów to achieve its reduction target by 2030 are:

I. Generating electricity from renewable sources within and beyond the city's boundaries.

The key issue in achieving climate neutrality is the development of the city towards an energy-sustainable area, i.e. one that is able to balance its energy demand through production from sources located within this area. An ambitious plan is being developed for the Rzeszów area to balance the demand for electrical and thermal energy used by buildings and structures, as well as to replace fossil fuel consumption in the transportation sector with energy sourced entirely from renewable sources. Strategic partnership with the energy sector (energy distributors and producers) will be necessary in implementing the strategy for achieving climate neutrality, in areas such as: increasing the production of energy from non-fossil sources (e.g. biogas), modernization of energy networks enabling optimal utilization of energy produced by prosumers, utilization of waste energy, energy storage, increasing the supply of certified green energy, searching for new energy supply sources (hydrogen energy, modular SMR reactors, geothermal energy). The involvement of private capital will also be crucial -

discussions are currently underway with developers of clean energy solutions who have the technical/technological and financial potential to implement the planned activities.

The key stakeholders in implementing this priority are:

- State energy companies - energy producers, due to the fact that the pace of decarbonization of power plants supplying the city with energy depends on the pace of decarbonization of the entire city,
- Energy distributors - continuous and consistent efforts are necessary to modernize and increase the efficiency of the network, also to unlock the potential of RES,
- The government of the Republic of Poland and relevant ministries - the main shareholder in energy companies is the government of the Republic of Poland, which has an influence on their policies, as well as on the national decarbonization policy. Furthermore, legislative initiatives are needed to support the development of RES and the prosumer energy market, such as more favorable settlements with prosumers for the electricity they feed into the network, or regulations allowing for the establishment of energy cooperatives in cities,
- Entrepreneurs - obtaining private capital for the implementation of highly capital-intensive activities will guarantee their implementation,
- Neighboring local governments (municipalities) - in order to implement ambitious investments (e.g. new RES installations), it will be necessary to acquire land beyond the administrative boundaries of Rzeszów.

The priority in question is characterized by a very high level of ambition, which makes it very complicated. Given the numerous factors that need to be considered throughout the long-term process of creating and building an energy self-sufficient area, from 2024 to 2030 (and beyond), the following steps have been proposed: identifying needs and development plans, preparing a detailed consumption profile, developing investment options to meet current and future demand, formulating a development plan with a detailed schedule, commencing work and obtaining the necessary implementation permits, carrying out construction according to the approved schedule, and integrating the components of the sustainable development area with system management.

II. Reducing the demand for thermal and electrical energy from fossil sources.

The priority in question will be implemented mainly through increasing the energy efficiency of buildings. It primarily involves the thermal modernization of municipal residential and commercial buildings, as well as the thermal modernization of private buildings, cooperative housing, and those owned by companies and institutions not related to local government. Rzeszów will focus on carrying out modernization of its own buildings in the next 3-5 years, in order to increase their energy efficiency, as well as on creating incentives and support systems for private building owners to undertake such actions.

Currently, as part of preparatory projects involving the preparation of analyses, building selection, and development of modernization models (e.g. NEEST project), the city is preparing to increase the scale of thermal modernization activities for urban buildings.

The implementation of the priority will also include the implementation of a free energy advisory system for residents in the coming months, covering technical issues and the use of municipal, regional, and national financing programmes.

The key stakeholders in implementing this priority are:

- The Polish government, the National Fund for Environmental Protection and Water Management, and other operators of financing programmes - deep thermal modernization of buildings is associated with enormous costs (for own investments or financial support for residents), hence the key role here is to ensure adequate financing for local governments from external sources,
- The science sector - reducing the demand for primary energy requires continuous search and implementation of innovative solutions in the form of: methods of reducing consumption, energy recovery methods, ways of utilizing waste energy, efficient energy storage,
- Municipal companies and production, commercial, and service companies - those are entities that consume a large amount of energy and have a significant potential for reducing consumption and utilizing waste energy,
- Construction companies, renovation companies, as well as housing cooperatives and housing communities - entities operating in the construction industry and entities managing buildings have a huge impact on the development and implementation of new energy standards in new and renovated buildings. Without their commitment, it will be difficult to carry out effective actions in this area,

- Residents, especially in the area of ensuring fair energy transition and protecting vulnerable groups, such as those at risk of energy poverty.

III. Increasing the level of electrification of public transportation and reducing the scale of individual car transportation.

Transport is the second, after stationary energy, source of greenhouse gas emissions in Rzeszów - accounting for 25% of all emissions and a very serious source of air pollution. These emissions are mainly caused by road transportation, with the largest share being individual car transportation. Therefore, the key actions of the discussed priority focus on the development of low-emission alternative ways of getting around the city, which will become an attractive (comfortable, accessible, safe) alternative for a large number of people who currently use individual car transportation in the city.

Rzeszów systematically increases the level of electrification of public transportation and takes actions to make public transportation the preferred solution for residents, not only of the city but also of the neighboring municipalities. This integrated approach will enable us to achieve the goal of significant reduction of greenhouse gas emissions and air pollution from this area. Currently, the plan includes the purchase of zero-emission buses along with the necessary charging infrastructure (20 units of 12-meter buses powered by electricity from hydrogen fuel cells). Buses will be adapted to the needs of people with limited mobility and parents/guardians with children, ensuring a comfortable and safe trip. The activities will also include the preparation of appropriate infrastructure - bus shelters and pylons with timetables - selected objects will be green and equipped with energy-saving LED lighting powered by PV energy, and integral elements of the shelters will be planters allowing for planting various types of climbers and grasses.

The next element aimed at reducing emissions from individual car transportation will be the development of electromobility through investment, together with private partners, in appropriate infrastructure: expanding the network of electric vehicle charging stations, parking spaces for electric vehicles, preferences for moving around urban roads (access to bus lanes). Car-sharing and other forms of vehicle sharing (such as electric bicycles, scooters, and mopeds) will also be promoted.

<u>The key stakeholders in implementing this priority are:</u>

- The Polish government, the National Fund for Environmental Protection, and other operators of financing programmes - investments in public transportation are costly, so ensuring adequate financing for local governments from external sources plays a crucial role here. However, the development of electromobility requires support through, for example, appropriate tax incentives or subsidies for the purchase of electric vehicles,
- Companies - operators of vehicle charging stations, which allow for the expansion and maintenance of the necessary infrastructure to encourage the purchase and use of electric vehicles,
- Municipal companies - responsible for the development of pedestrian and cycling infrastructure as well as public transportation networks,
- Residents - issues related to restricting car traffic and changing transportation habits are socially sensitive topics, therefore residents of the areas affected by the changes will be, each time, included in the consultation process for specific solutions.

IV. Development of blue-green infrastructure

According to data from the Statistical Office, Rzeszów clearly surpasses other voivodeship cities in terms of the total area of greenery per capita. It also ranks first in terms of the share of green areas in the city's total area. The city is investing heavily in new greenery and the protection of existing greenery. Maintenance and development of blue-green infrastructure are crucial both in terms of carbon dioxide sequestration and adaptive actions that increase the city's resilience to the effects of climate change and improve residents' access to recreational areas. The activities planned to be implemented under the discussed priority will focus on:

- the constant and systematic development of green areas within the city,
- de-paving of concrete surfaces, including parking lots,
- application of solutions for retaining a portion of stormwater on new development sites,
- planting trees and trellises with climbers on heavily sealed streets,
- developing or modifying spatial development plans and other planning documents to increase public spaces with new green areas, blue-green infrastructure solutions, and de-paving of high-density urban areas,

- broad education in the field of protection of nature and the natural environment; promotion/information about the undertaken and planned actions in the city regarding urban greenery.

The key stakeholders in implementing this priority are:

- City Greenery Management Board in Rzeszów - in terms of investments in blue-green infrastructure on the areas under its jurisdiction and in terms of establishing and enforcing green management standards, as well as other municipal units and companies on the areas owned by them (or under their management),
- Housing cooperatives, building and land administrators, housing communities,
- Companies and institutions,
- Higher education institutions and scientific institutions in the field of searching for new solutions regarding the development of blue-green infrastructure,
- Residents, both in the context of consulting on the method of land development and in the context of promoting the introduction of solutions on land belonging to residents.

4 Process and principles

Process and principles

The city of Rzeszów considers the EU mission "100 Climate-Neutral and Smart Cities by 2030" and participation in the mission as a very important element of climate policy.

Principles guiding the implementation of the Municipal Climate Contract:

- integrated approach - taking into account all aspects influencing the goals indicated in the document and multi-level coordination between different sectors and levels of administration,
- scientific foundations - basing decisions and actions on the latest scientific research and evidence, and close collaboration with experts and research institutions,
- social participation - engaging society in the process of planning and implementation with simultaneous education and information on the importance of the Climate Contract,
- transparency and fairness - full transparency in actions taken, maintaining open and transparent communication with all stakeholders, considering the impact of actions on different social groups, especially the most vulnerable; fair distribution of costs and benefits associated with actions taken,
- risk management - ongoing identification of potential risks and implementation of strategies to minimize them,
- monitoring and evaluation - monitoring progress of implementation based on established indicators, regular reporting of results and making necessary adjustments, clear mechanisms for accountability for actions taken and results achieved.

Management structure of the City Climate Contract

The Urban Climate Contract, developed as part of the Urban Climate Contract Mission, is the first step towards synchronizing and optimizing all urban actions that fully or partially address the goal of the Municipal Mission. The Climate Neutrality and Smart City Team will be responsible for managing the Climate Contract of the city, which will synchronize various activities that have been carried out separately by departments, units, or municipal companies. The team will collaborate in this area with all stakeholders, including city residents.

In the implementation process of the Municipal Climate Contract, we will base on previous good experiences and practices, enriching them with the experiences and knowledge gained during the implementation of actions: from our project partners, advisors, other cities, stakeholders, etc.

The priority is also the systematic involvement of new stakeholder groups, including residents, in the entire process - greater agency and co-responsibility for its appearance and functioning mean that City Managers have a stronger mandate to implement investments and actions developed jointly with residents.

Planned actions within the iterative process.

Achieving climate neutrality goals requires not only project management but also reflective learning. Therefore, the Climate City Contract will be a "living" document that will continuously adapt to ongoing changes as needed. It will take the form of a strategic umbrella document, overarching other future

documents in the field of environmental protection. Acquiring reliable data will be extremely important, as its analysis will enable making the right decisions and implementing actions with the highest possible efficiency. Therefore, the implementation of a platform automating data management, aggregation, analysis, monitoring, and reporting is planned.
As part of the iterative process of continuous improvement, the Climate City Contract will be reviewed within 2 years of its approval. It should be kept in mind that as a result of this process, many changes and improvements will be introduced - some of the planned tasks will be significantly detailed. The second iteration is planned for 2028, while in 2030 an analysis is scheduled to determine whether the contract's goals and assumptions have been met.
Various data necessary for assessing the implementation of the Climate City Contract will be collected from different sources in one place to facilitate their analysis. The data will be checked for accuracy and consistency. Any errors or inaccuracies will be addressed or corrected. The analysis of the acquired data will be conducted from both a quantitative perspective—statistical analysis to understand trends and patterns—and a qualitative perspective—evaluation of qualitative data, such as stakeholders' opinions gathered through interviews and surveys.
Regular reports on the progress of environmental actions will be produced based on the collected data, highlighting the results achieved in comparison to the set goals. The data will be visualized for easier presentation of the results. All the above-mentioned elements will enable the assessment of the effectiveness of planned actions and provide the opportunity to make modifications to the plan based on the results of the analysis in order to increase its effectiveness.
Furthermore, progress in achieving the goals of the Climate Contract will be verified through greenhouse gas inventories, which will annually monitor emission levels in Rzeszów. Based on it, it will be possible to assess at what stage of transformation the city is currently at and how much remains to be done. Additionally, in the near future, there are plans to expand greenhouse gas inventory from the Basic level to the Basic+ level. Planned inventory expansion will include the following sectors: Industrial Processes and Product Use (IPPU) and Agriculture, Forestry and Other Land Use (AFOLU) and additional greenhouse gases.
All stakeholders will be regularly informed about the progress and results of the environmental actions being carried out and will be invited to provide their feedback to ensure effective implementation of the actions.
Upon completion of the action cycle, a thorough analysis will be conducted to identify strengths and areas for improvement. In subsequent cycles, improvements derived from the analyses and monitoring conducted will be implemented.
Effective monitoring of progress will require a systematic approach and the involvement of all stakeholders, enabling the optimization of actions and the achievement of the intended environmental goals.
The decision regarding the acceptance of the document by a resolution of the Rzeszów City Council will be made at a later stage. If the decision is positive, the document will be widely consulted and undergo a formal procedure of social consultations. It will be presented to various stakeholder groups, and their comments will be collected in accordance with the requirements of the law. The conclusions drawn from this process will be reflected and mirrored in subsequent versions of the document.

5. Signatories

The table below enlists the signatories[1] who are committing to this CCC, and thereby to help the city achieve its goal to reach climate neutrality by 2030. Specific agreements that articulate the details of the climate action(s) between the municipality and signatories are added to the individual contracts in Appendix 1 (see sample in section 6). The number and relevance of signatories' commitments is likely to increase over time.

Name of the signatory (organisation)	Sector / Domain / Level of operation[2]	Legal form	Name of the responsible person	Position of the responsible person
Ministry of Climate and Environment	Climate and Environment Coordination with national climate policy, creation of legislative framework, coordination of cooperation with the government side.	Central administration	Paulina Henning - Kloska	Minister of Climate and Environment
Office of the Marshal of the Podkarpackie Voivodeship	Policies Coordination with regional climate policy and sustainable development policy.	Regional administration	Władysław Ortyl	Marshal of the Podkarpackie Voivodeship
Rzeszów Functional Area Association (ROF)	Integrated Territorial Investment Management; Intermediary institution	Association - regional level	Paweł Potyrański Damian Kosiarski	President of the Management Board Office Director

[1] Climate City Contract signatories may be individuals or organisations. They ideally include national and/or regional governments, for example concrete agreements/ commitments made through the multi-level governance engagement processes supported by NetZeroCities, CapaCities, and other emerging national level initiatives.
[2] Please mention if the organisation is active at local, regional, national, or international level.

Rzeszow University of Technology	Energy, buildings, blue-green infrastructure	Higher Education Institution	Jarosław Sęp	Vice-Rector for Development and Cooperation with the Environment
University of Information Technology and Management	Energy, buildings, blue-green infrastructure	Higher Education Institution	Andrzej Rozmus	Rector
ECOSCOPE	Education	Association	Katarzyna Ruszała	President of the Management Board
Rzeszow Regional Development Agency	Cooperation, among others, in the field of innovation, projects	Agency	Mariusz Bednarz	President of the Management Board
Miejskie Przedsiębiorstwo Wodociągów (City Waterworks Company)	Supplying the city with water and wastewater treatment	Municipal company	Marcin Lewandowski	President of the Management Board
Miejskie Przedsiębiorstwo Komunikacyjne (City Transport Company)	Transport	Municipal company	Marek Filip	President of the Management Board
Miejskie Przedsiębiorstwo Gospodarki Komunalnej (City Public Utility Company)	Waste	Municipal company	Sławomir Progorowicz	President of the Management Board
Municipal Housing Authority	Residential buildings	Municipal company	Roman Szczepanek	President of the Management Board
Miejskie Przedsiębiorstwo Energetyki Cieplnej (City Heat Energy Company)	Heat transmission and distribution	Municipal company	Dariusz Kotowicz	President of the Management Board
Resgraph spółka z o.o.	Business	Company	Janusz Kuś	President of the Management Board

7R S.A.	Business	Company	Ryszard Grotkowski	Vice President of the Management Board
CWK Operator spółka z o.o.	Business	Company	Agata Brożek	Vice President of the Management Board
DELOITTE CE BUSINESS SERVICES spółka z o.o.	Business	Company	Małgorzata Kubiś	Head of HR
METKOM spółka z o.o.	Business	Company	Paweł Grędysa	Vice President of the Management Board
HARTBEX DEVELOPMENT spółka z o.o.	Business	Company	Paweł Bącal	President of the Management Board
HARTBEX PRZEDSIĘBIORSTWO BUDOWLANE spółka z o.o.	Business	Company	Paweł Bącal	President of the Management Board
IDEO spółka z o. o.	Business	Company	Arkadiusz Michno	President of the Management Board
GEOKART – INTERNATIONAL spółka z o. o.	Business	Company	Sebastian Skalski	President of the Management Board
TERMWALL	Business	Company	Rafał Zieliński	Owner
FRAC spółka z o. o.	Business	Company	Agnieszka Frąc	President of the Management Board
HELIOS	Business	Company	Jan Bogdan	Vice President
IBG INSTALBUD spółka z o. o.	Business	Company	Grzegorz Abram	President of the Management Board

HOTEL FALCON spółka z o. o.	Business	Company	Małgorzata Dymek Armata	President of the Management Board
BIMAT GRUPA spółka z o. o.	Business	Company	Bartosz Blok	President of the Management Board
Piotr Kamiński Robert Kamiński Kancelaria Radców Prawnych	Business	Company	Piotr Kamiński	President of the Management Board
PZL Sędziszów S.A.	Business	Company	Bogusław Satława	President of the Management Board
Rzeszówdis spółka z o. o.	Business	Company	Elżbieta Rusak	Development Director
MTU AERO ENGINES POLSKA spółka z o. o.	Business	Company	Jan Florian	Operations Director
BESTA spółka z o. o.	Business	Company	Jarosław Mrozik	Member of the Management Board
CTP spółka z o. o.	Business	Company	Bogumiła Gabrovic	Member of the Management Board
HURT-PAPIER	Business	Company	Ryszard Cebula	Shareholder
ZKS STAL Rzeszów	Sports club	Sports club/company	Bogusław Balicki Marcin Słowik	Member of the Management Board Member of the Management Board
INNOVO Institute for Innovation and Responsible Development	Business	Institution	Agnieszka Sznyk	President of the Management Board

Pad Res Development Sp. z o.o.	Business	Company	Mariusz Adamczewski Michał Pryca	President of the Management Board Member of the Management Board
PGE Energia Ciepła S.A. PGE Obrót S.A.	Business	Company	Grzegorz Krystek Sebastian Janda	President of the Management Board President of the Management Board The letter of intent regarding green energy is currently in the process of being signed by representatives of PGE companies. The process will be completed in the near future. A working group was formed to implement the provisions of the letter.

I, the undersigned, hereby commit to implementing actions aimed at achieving climate neutrality by the City of Rzeszów by the year 2030 as part of a just, effective and socially acceptable transformation.

I agree on the joint ambition and commitments, as formulated in the Climate City Contract of Rzeszów.

Date of signature Name Signature

_____

Mayor of Rzeszów

Minister of Climate and Environment
Republic of Poland

Paulina Hennig-Kloska

DAM-WP.4228.2.2024.KN
3301232.13238155.10697364
Warsaw, 12-09-2024

Mr.
Konrad Fijołek
Mayor of the City of Rzeszów

Dear Mayor of the City of Rzeszów,

This is the letter of appreciation for the City of Rzeszów for undertaking efforts to develop the Climate City Contract.

The Ministry of Climate and Environment recognizes the urgent need for actions to be taken to achieve climate neutrality, mitigate the effects of climate change, and accelerate the efforts towards a sustainable future of cities. Therefore, we support the initiative of the City of Rzeszów, which aims to develop and implement the Climate City Contract.

The aforementioned Climate City Contract of the City of Rzeszów is closely related to national actions undertaken to implement international climate commitments. We strongly believe that we can accelerate progress on our common goals and create significant changes at the local and national level by supporting and participating in these commitments.

The Ministry of Climate and Environment coordinates the implementation of the National Energy and Climate Plan until 2030. The National Plan is a strategic document developed by the Member States of the European Union, in which they define the goals and means for achieving the so-called EU climate and energy targets. In particular, this concerns the aim of climate neutrality in 2050. The plan includes strategies for: reducing greenhouse gas emissions, increasing the contribution of energy from renewable sources, improving energy efficiency and other actions aimed at limiting the impact of human activity on climate change.

The National Energy and Climate Plan until 2030 presents objectives and targets as well as policies and actions in 5 fields of the energy union, i.e.: energy security, internal energy market, energy efficiency, decarbonisation and research, innovation, and competitiveness. The Ministry of Climate and Environment approves all actions of the City of Rzeszów defined in the Climate City Contract that will contribute to these goals.

In addition, the Ministry of Climate and Environment expresses its willingness to jointly overcome challenges and conduct a permanent dialogue in order to systematically increase climate resilience of the cities and help them to achieve climate neutrality. The Ministry of Climate and Environment will also make efforts to build a cooperation platform involving other ministries, using the previous experience of the Ministry and local governments participating in the Mission of 100 Climate-Neutral and Smart Cities by 2030.

Your sincerely

Paulina Hennig-Kloska
Minister of Climate and Environment

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