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D4.5. Integrated SECAP Report for Reșița Municipality

March 2024

This document contains the translated English version of the SECAP uploaded on the Covenant of Mayors platform. The original document is in Romanian

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PV Works

denkstatt create sustainable value

Reșița

Leader: Sonnenplatz Großschönau

Dissemination Level

PU	Public	X
CO	Confidential	

History

Version	Description	Lead author	Date
V1	Renewed the Covenant commitment	RES/DENK	July 2023
V2	Workshop 1	DENK	July 2023
V3	First Template	DENK	August 2023
V4	First draft Chapter 1 & 2 of the report	DENK	September 2023
V5	First draft Chapter 4 of the report	DENK	October 2023
V6	Workshop 2	DENK	November 2023
V7	First draft Chapter 3 of the report	DENK	December 2023
V8	SECAP Report Draft 1: Final version	DENK	January 2024
V9	SECAP Report Draft 2: Final version	DENK	February 2024
V10	SECAP Report Draft 3: Final version	DENK	February 2024
V11	SECAP Report Draft 4: Final RO sent to Reșița	DENK	March 2024
V12	SECAP Report Draft 4: Final EN	DENK	March 2024
V13	Final SECAP draft approved by Reșița	DENK	November 2024
V14	Submitting the SECAP via CoM platform	DENK	December 2024

Disclaimer

This project has received funding in the framework of the PED Program, which is implemented by the Joint Programming Initiative Urban Europe and SET Plan Action 3.2. The project is supported by the Austrian Ministry of Climate Action, Environment, Energy, Mobility, Innovation, and Technology (BMK) and the *RVO (the Netherlands Enterprise Agency), reference number ERANETPED-02767306.* This work was supported by a grant of the Ministry of Research, Innovation and Digitization CNCS/CCCDI – UEFISCDI, project number PED-JPI-SIMPLY POSITIVE, contracts number 325/2022 and 326/2022, within PNCDI III and by a grant of the Ministry of Education and Merit - Department for Higher Education and Research, project number PED_00042, from the Fund for Investment in Scientific and Technological Research (FIRST/FAR) and/or Special Accounting Account no. 5944.

Executive Summary

The Sustainable Energy and Climate Action Plan (SECAP) represents the official commitment of the local public administration of Reșița to reduce CO_2 emissions throughout the municipality, in line with the voluntary objectives undertaken within the European initiative **"Covenant of Mayors for Energy and Climate".**

This plan includes most of the measures proposed in the initial version of the Sustainable Energy Action Plan (SEAP) of Reșița, but with an extension to the 2030s and adds new initiatives on adaptation to climate change. The aim is to achieve the objectives of reducing greenhouse gas emissions by improving the energy efficiency of public buildings, optimizing energy consumption in housing and tertiary sector buildings, promoting a sustainable urban transport system, modernizing public lighting, increasing renewable energy production, and, at the same time, increasing the quality of life and competitiveness of the municipality.

The Sustainable Energy and Climate Action Plan also takes a consistent approach to adapting to climate change already occurring or anticipated at the local level, to increase community resilience and improve the quality of life of residents.

The Municipality of Reșița is a member of the CoM (Covenant of Mayors) since 2009, the initial SEAP was developed in 2016, subsequently approved by resolution of the City Council, and in 2017 received the positive opinion of the JRC ((Joint Research Center), the technical organization evaluating the SEAPs submitted to the CoM Office in Brussels.

As part of the transition from the Covenant of Mayors to the new Sustainable Energy and Climate Action Plan, with the definition of the new emission reduction target, the Municipality of Reșița has aligned itself with the new commitment by integrating these targets into the new ECCP. This document not only includes the newly set targets but also provides comprehensive data on greenhouse gas emissions (monitoring inventory) and presents the status of implementation of the previous action plan. In addition, the new SECAP provides an update on progress on the matter of sustainable energy.

The new Action Plan for Sustainable Energy and Climate was developed by the Municipality of Reșița in collaboration with the Reșița Local Development Agency (ADLR) and denkstatt Romania. This document represents an essential framework for the energy policies of the local administration for the next 7 years, with the clear objective of reducing CO_2 emissions by at least 40% throughout the municipality. In addition, SECAP 2030, also includes a Climate Change Adaptation Plan which summarizes the response actions at the municipal level to mitigate the impacts of climate change already observed or underway in the local community. The Municipality of Reșița also supports the commitment of the Covenant of Mayors to achieve climate neutrality by 2050, thus living in decarbonized, resilient cities with access to safe, sustainable and affordable energy.

The year 2008 continues to serve as the baseline for the greenhouse gas (GHG) emissions inventory. This inventory covers energy consumption in the priority sectors: buildings and adjacent facilities (municipal, tertiary, residential), public infrastructure (street lighting, waste management, water and wastewater services) and transport (municipal, public, private).

It is essential to point out that some data were obtained by estimation. For example, some information on the transport sector has been estimated, given that in the municipality of Reșița there is no direct monitoring of the average number of kilometers travelled annually by a vehicle. Also, as regards the consumption of natural gas in the municipal sector, the data were calculated by estimating the consumption in the reference year. This was necessary since there is no separate category for natural gas consumption in buildings belonging to the municipality, according to information provided by the natural gas distribution company for the municipality of Reșița, DEL Gaz. These estimates were carefully interpreted during the evaluation process of the data.

The current report contains the translated final version of the SECAP, which was approved by the Municipality of Reșița by Local Council Decision no. 531/11.11.2024, following a public consultation procedure. The approved version is developed in Romanian and the current report presents the English translation and an extract of the monitoring plan which was delivered in Excel format (containing specific calculation formulas) to the Reșița Municipality for the purpose of future Emissions Monitoring Inventory.

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List of Abbreviations and Acronyms

PAED	Sustainable energy action plan (SEAP)
SECAP	Sustainable energy and climate action plan (SECAP)
GHGs	Greenhouse gases
GRAZE	Climate Change Adaptation Plan
PED	Positive Energy District
UEFSCDI	Executive Unit for Education Financing
CoM	Covenant of Mayors on Energy and Climate eng. Covenant of Mayors
EU	European Union
MILLET	CoM/PAED/PAEDC Emission Monitoring Inventory
EIB	Basic Emission Inventory of the CoM/SEPDP/SEADP
CO2	Carbon dioxide
EU-ETS	European Union Emission Trading System
LCA	Life Cycle Analysis
RVA	Risks and Vulnerabilities Assessment
SIDU	Integrated Urban Development Strategy
tCO2	tons (mass) Carbon Dioxide
ADLR	Reșița Local Development Agency
CO2e	Equivalent Carbon Dioxide
JRC	Joint Research Centre (of the European Union) eng. Joint Research Centre (of European Union)
UNFCCC	United Nations Framework Convention on Climate Change
ODD	Sustainable Development Goals
IPCC	Intergovernmental Panel on Climate Change

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1 Introduction

1.1 Premises

In the context of the global challenges related to climate change and the urgent need to develop a sustainable future, initiatives aimed at combating these problems are becoming overwhelmingly important. One of these large-scale initiatives, which brings together local communities from all over the world under its umbrella, is known as the **Covenant of Mayors**. This initiative not only recognises the seriousness of climate change, but also puts at its heart the need to develop energy and climate action plans. Thus, action plans become a vital bridge between generous intentions and concrete actions, based on essential premises that underline the need for a unified approach and concerted efforts to bring about meaningful change.

Through SECAP, mayors and local leaders from different cities and regions join forces to develop and implement action plans tailored to local specificities, but aligned with global greenhouse gas emission reduction goals.

The prerequisites for the need to develop an energy and climate action plan:

1. **The impact of climate change:** Climate change has become an obvious and alarming reality, with consequences that are felt globally. Rising average temperatures, extreme weather events, rising sea levels and declining biodiversity are just some of the signs of climate change affecting the planet.
2. **Importance of energy resources**: Energy resources are essential for socio-economic development, but we are highly dependent on fossil fuels, which release significant amounts of greenhouse gases into the atmosphere. Finding alternative and sustainable sources of energy thus becomes a priority.
3. **Local responsibility**: Local communities account for a significant share of greenhouse gas emissions. Therefore, actions taken at local level can have a significant impact on total emissions. Mayors and local authorities have a crucial responsibility in the efficient management of energy resources and in promoting sustainable practices.
4. **International efforts:** International agreements such as the Paris Agreement set clear targets for reducing greenhouse gas emissions. It is therefore essential that local communities align their actions with these goals to contribute to global efforts.
5. **Multiple benefits:** Reducing energy costs, increasing the quality of life in communities, boosting innovation and jobs in the green sector, as well as building resilience to the impacts of climate change.

In the context of these premises, the Sustainable Energy and Climate Action Plan of the Municipality of Reșița is configured as a medium and long-term strategic document. The plan outlines the directions of local energy and environmental policy for the 2030 perspective, with the objective of achieving the European target of **reducing CO2 emissions by 40% compared to the 2008 level**, considered the reference year. This will be achieved by optimizing energy efficiency, exploiting renewable energy sources and implementing measures to adapt local infrastructure to climate change.

Purpose of the Sustainable Energy and Climate Action Plan of the Municipality of Reșița

The purpose of the Sustainable Energy and Climate Action Plan of the Municipality of Reșița is to provide the local public administration with a comprehensive planning tool, which sets the development direction of the municipality of Reșița until 2030. Failure to comply with the minimum measures provided for can have potentially devastating consequences for the environment, including the impact of climate change, natural hazards, degradation of natural resources and pollution.

The Sustainable Energy and Climate Action Plan of the Municipality of Reșița contains a set of ambitious initiatives, with the aim of supporting the transition of Reșița towards an ecological city, characterized by low CO2 emissions and capable of coping with climate change. Such a plan is also a particularly valuable operational tool, because:

- It allows obtaining funds (European, national, regional and local) to meet the European objectives of reducing fossil energy consumption and adapting to climate change;
- It facilitates the access of municipalities to a European network, allowing the exchange of experiences between different administrative units and the possibility of constantly improving the proposed actions;
- It allows the systematization and monitoring of the progress of the various proposed actions, respectively the preparation of corrective actions through regular monitoring of the actions;
- Creates employment opportunities in the local economy in the areas of the proposed projects;
- It increases the level of awareness and motivation of stakeholders regarding their involvement in achieving the proposed targets.

Also, at the level of SECAP Reșița, the main financial resources necessary to be used for the implementation of the actions are identified, but also a description of the way in which the local authority intends to ensure the continuation of the actions and the monitoring of the results.

In conclusion, the development of an energy and climate action plan of the municipality of Reșița is crucial to respond to the current climate challenges and to contribute to building a more sustainable future in terms of energy and the environment. This initiative is an important step towards sustainable development and a world less affected by climate change.

1.2 Climate change – adaptation and mitigation for a sustainable city

The recent report of the Intergovernmental Panel on Climate Change warns that without drastic measures to reduce CO emissions(IPCC, n.d.)$_2$ and to reduce energy consumption, the target of limiting the increase in global average temperature to 1.5 °C above pre-industrial levels is unlikely to be achieved.

In the context of the European Green Deal and the Smart and Climate Neutral Cities Mission, cities and municipalities across Europe are at a turning point. Climate neutrality has reached both companies' business strategies and authorities' development plans. In its current form, today's communities are CO2 generators and contribute massively to environmental pollution. As a result of the burning of fossil fuels, conventional energy sources are responsible for a considerable amount of chemicals and harmful particles released into the atmosphere, so the creation of PEDs (Positive Energy Districts) has become a necessity.

The EU's role in reducing emissions

The EU is poised to step up global emissions reductions to a much greater extent. Building on the success of the Covenant of Mayors, the Mayors Adapt initiative was launched in 2014, based on the same governance model, and calls on signatory cities to make political commitments and act in a way that anticipates and prepares for the inevitable impact of climate change.

Adaptation and mitigation for a sustainable Reșița

By signing the 2009 Covenant of Mayors and reconfirming its commitment in 2016 to the extended form of the Convention, then in 2023 on new initiatives and adaptation to climate change, the Municipality of Reșița aims to increase the level of climate ambitions and implement actions at the pace dictated by science, in a joint effort to keep the global temperature increase below 1.5 °C – the highest ambition of **the Paris Agreement.**

The municipality of Reșița supports the transition to a climate-neutral Europe, a transition that will have an impact on all spheres of our society. That is why, together with the other European leaders, Reșița aims for a fair, inclusive transition that respects the citizens and resources of our planet.

Thus, the Sustainable Energy and Climate Action Plan of the Municipality of Reșița includes adaptation actions, which aim at the city's resilience to the impact of climate change, and mitigation actions, which aim to reduce the city's impact on the climate.

The adaptation measures are developed following a study of the vulnerability of the territory regarding the effects of climate change that was carried out for the territory of the Municipality of Reșița. Heavy rains and extreme temperatures are the most significant climate risks for the city. Mitigation measures are mainly measures to reduce anthropogenic greenhouse gas emissions.

The accession of the Municipality of Reșița to the Covenant of Mayors in 2009 and the reconfirmation of its commitment in 2016 for the extended form of the Convention, then in 2023 on new initiatives and adaptation to climate change obviously means the concretization in the energy and climate field, of the decision taken for

sustainable development at local level, the implementation into action of the need to transform the Municipality of Reșița into a modern European city.

1.3 International agreements, plans, programs, strategies

The topic of climate change has been a topic of global debate for many decades. In 1992, the United Nations agreed on the Framework Convention on Climate Change and adopted Agenda 21. The Kyoto Protocol followed in 1997, based on the principle of common but differentiated responsibilities in addressing climate change. In 2015, the Paris Agreement was adopted, setting targets to limit global temperature rise to below 2°C above pre-industrial levels, with efforts to keep the increase below 1.5°C. Also in 2015, states adopted the 2030 Agenda for Sustainable Development, which includes the 17 Sustainable Development Goals. This agenda is based on three pillars: social fairness, economic growth and environmental protection.(UNFCCC)(SDG)

As far as the European Union is concerned, reducing energy consumption and waste is becoming increasingly crucial. The Energy Efficiency Directive (2012/27/EU) establishes a common framework of measures to promote energy efficiency across the EU (transposed into Romanian law by Law no. 121/2014 on energy efficiency).

In 2001, Romania signed the Kyoto Protocol, and in 2013, by Government Decision no. 529/2013, adopted the National Strategy on Climate Change for the period 2013-2020. Later, this document was revised through the National Strategy on Climate Change and Low-Emission Economic Growth, as well as the National Action Plan for the Implementation of the National Strategy on Climate Change and Low-Carbon Economic Growth for the period 2016-2020, according to Government Decision no. 739/2016. The primary goals set out in these documents are focused on reducing greenhouse gas emissions in line with the objectives set at European Union level and on adapting to the impact of climate change. In 2020, Romania submitted to the European Commission the National Integrated Energy and Climate Change Plan for the period 2021-2030.

By Government Decision no. 877/2018, Romania ratified the "National Strategy for Sustainable Development of Romania 2030", a document that outlines the main paths of action for the implementation of the 2030 Agenda. The 17 objectives of this strategy comprise three central pillars: economic development, social justice and environmental protection. These objectives are closely interlinked and depend on each other, for example being Goal 13 - Action against climate change. SDG 13 aims to initiate immediate action to tackle climate change.

Integration of SECAP with existing plans and strategies

Updated Sustainable Energy and Climate Action Plan is integrated into the strategic perspectives set out mainly by "**Local Development Strategy of the Municipality of Reșița 2015 – 2025 (SDL)**", **"Integrated Strategy for Urban Development of the Municipality of Reșița 2022 – 2030"** (SIDU)and by **"Smart City Strategy for the Municipality of Reșița Horizon 2027".** (Smart City 2027)

According to the "Local Development Strategy of the Municipality of Reșița 2015-2025", (SDL 2015-2025) The vision for the future of the Municipality of Reșița focuses on the idea of **"REȘIȚA THE CITY FOR THE PEOPLE".** This vision implies an economic transformation by attracting new investors, who will change the local economic dynamics. At the same time, Reșița intends to capitalize on its distinct geographical advantages to stimulate the development of local tourism.

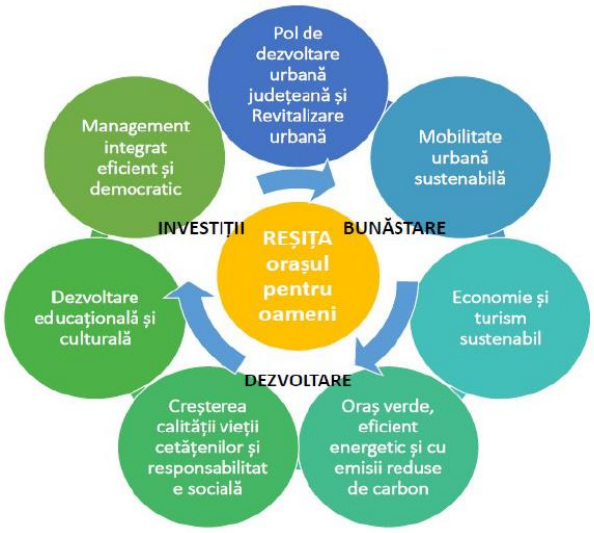


***Figure 1** - Local vision (SDL 2015-2025, p. 19)*

In the context of the local vision, Reșița has set a set of priorities:

1. Urban development and revitalization pole

- Sustainable urban development and revitalization of degraded areas.
- Ensuring adequate technical infrastructure for water, sanitation and sanitation.
- Ensuring citizens' easy access to urban utilities.

2. Sustainable urban mobility

- Modernization of the local transport infrastructure.
- Improving public transport to make it efficient and attractive to citizens.

- Development of an efficient network of bicycle lanes and parking spaces.

3. Sustainable Economy and Tourism
- Promoting innovation and attractiveness for investors.
- Development of investments in production, services and sustainable tourism.
- Exploiting nearby tourist areas to increase tourism.

4. Green, energy-efficient and low-carbon city
- Creating a green and well-planned infrastructure.
- Promoting energy efficiency in buildings and transport.
- Reducing carbon emissions and maintaining a clean urban environment.

5. Increasing citizens' quality of life and social responsibility
- Ensuring the safety of citizens.
- Promoting equal opportunities and opportunities.
- Reducing social disparities and providing quality health and social services.

6. Educational and Cultural Development
- Educational development adapted to local needs.
- Supporting cultural, sports and leisure activities.

7. Efficient and democratic integrated management
- Ensuring effective local governance through institutional collaboration.
- Promoting a participatory approach in solving local problems.

In this direction, Reșița aims to be a city responsible for the needs of its citizens, ensuring optimal living conditions and providing high-quality public services. Particular attention will be paid to ensuring equal opportunities for all citizens in terms of access to education and cultural development, all in a clean, safe and refreshed environment.

1.4 Vision. Objectives. 2030 targets

The vision of the Municipality of Reșița aligns with the common vision of the Covenant of Mayors, namely that by 2050, we should all live in decarbonized and resilient cities, having access to safe, sustainable and affordable energy.

As part of the Covenant of Mayors of Europe, Reșița will continue to:

(1) Reduces greenhouse gas emissions on the territory of the municipality
(2) Increase resilience and prepare for adverse impacts of climate change
(3) Address energy poverty as a key action to ensure a just transition

The Covenant of Mayors of Europe is, first and foremost, a movement of Mayors committed to promoting local solutions and inspiring each other towards this vision. Thus, together with the other mayors of the Reșița Convention, he undertakes to take the following measures:

1. **COMMITMENT** to set medium and long-term objectives, in line with those set at European level and at least as ambitious as the national objectives. The goal is to achieve climate neutrality by 2050. Given the current climate emergency, we will make climate action a priority and communicate it to our citizens.
2. **INVOLVEMENT** of citizens, business and administrations at all levels in the implementation of this vision and in the transformation of our social and economic systems. Develop a local climate pact with all actors that could help achieve these goals.
3. **DRIVE** to fit into the chart and speed up the necessary transition. Implementation and reporting within the established deadlines, an action plan to achieve the targets. The plans will include provisions on how climate change can be mitigated and how we can adapt to it, while preserving inclusiveness.
4. **ESTABLISHING RELATIONSHIPS** with other mayors and leaders from Europe and beyond, for mutual inspiration. Encouraging them to join the World Convention of Mayors, wherever they are in the world, and to adopt the objectives and vision described in the Convention.

Thus, the objectives set by the municipality of Reșița within this plan are aligned with the Sustainable Development Goals (SDGs) developed by the United Nations. In this regard, the objectives set by the Municipality of Reșița through the SECAP contribute to the achievement of the following SDGs:

- **SDG 13: Take urgent action to combat climate change and its impacts**

by reducing greenhouse gas emissions from the territory of the municipality and increasing resilience and preparedness for the adverse impacts of climate change

- **SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all**

by addressing energy poverty as a key action to ensure a just transition

In addition to aligning the strategic objectives with these three SDGs, the 2024-2030 action plan also addresses other SDGs, such as:

- SDG 9: Building resilient infrastructure, promoting inclusive and sustainable industrialisation and promoting innovation
- SDG 11: Inclusive, safe, resilient and sustainable cities and human settlements
- SDG 12: Ensure sustainable consumption and production patterns

The alignment of measures with the targets set by the SDGs is presented in section 6 "Action plan 2024-2030" of this report.

1.5 Simply Positive Project

The development of PAEDC Reșița is one of the activities within the SIMPLY POSITIVE project - an international project that unites 8 partners from 4 countries, developed within the international program "Neighborhoods and PEDs (Positive Energy Districts) for Sustainable Urban Development" (Positive Energy Districts Program), which is implemented by the Urban Europe Joint Programming Initiative (JPI Urban Europe) and contributes to the ambitious objectives of the European Strategic Energy Technology Plan (SET) (Action 3.2 of the SET-Plan). (Simply Positive)

Role of the project

The SIMPLY POSITIVE project aims to develop innovative strategies, concepts and guides to facilitate the implementation of these concepts, but also to increase the level of participation of municipalities and cities in the transition to climate neutrality. At a time of important sustainability transitions, projects such as SIMPLY POSITIVE are essential to achieve the objectives set out in the European Green Deal and the Smart and Climate Neutral Cities Mission. Through collaboration and innovation, we can build greener and more sustainable cities for our future and for future generations.

Objective

In order to promote the creation of such communities and sustainable neighborhoods, projects such as SIMPLY POSITIVE aim to develop innovative strategies and directions aimed at increasing the level of community involvement.

At the same time, through the nature of the project and the activities carried out within it, **Simply Positive contributes to supporting the UN Sustainable Development Goal: SDG 7** (Ensure access to affordable, reliable, sustainable and modern energy for all), **target 7a** "By 2030, strengthen international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and technology and promoting investment in energy infrastructure and clean energy technology."

Role of districts

The project aims to stimulate and support the development of PED (Positive Energy Districts) at European level, by joining four key districts, from different European countries, each with a specific context:

1. Großschönau - Austria
2. Amsterdam - Olanda
3. Reșița - Romania
4. Settimo Torinese – Italy

Following the example of these four focus districts, strategies will be established and tested to address the necessary energy transition. Innovative strategies, concepts and guidelines will be developed to increase the level of participation of municipalities and cities to stimulate the creation of positive energy districts and positive energy neighbourhoods by:

- focus on existing urban strategies to maximise clean energy
- creating a standardised process for calculating the energy balance based on available data
- monitoring system to see, qualify and verify actions
- evaluate engagement strategies based on impact and acceptance

Further information on the activities carried out within the project and the progress made is available on the official website: http://simplypositive.eu/ .

2 Municipality of Reșița context

2.1 The natural environment

Reșița is a city located in southwestern Romania, being part of the historical province of Mountainous Banat. As the capital of Caraș-Severin County, the city is located at an altitude of approximately 208-245 meters, on the upper reaches of the Bârzava River, being located at the intersection of the parallel of 45º18'00" north latitude with the meridian of 21º53'25" east longitude. (România Geografică)

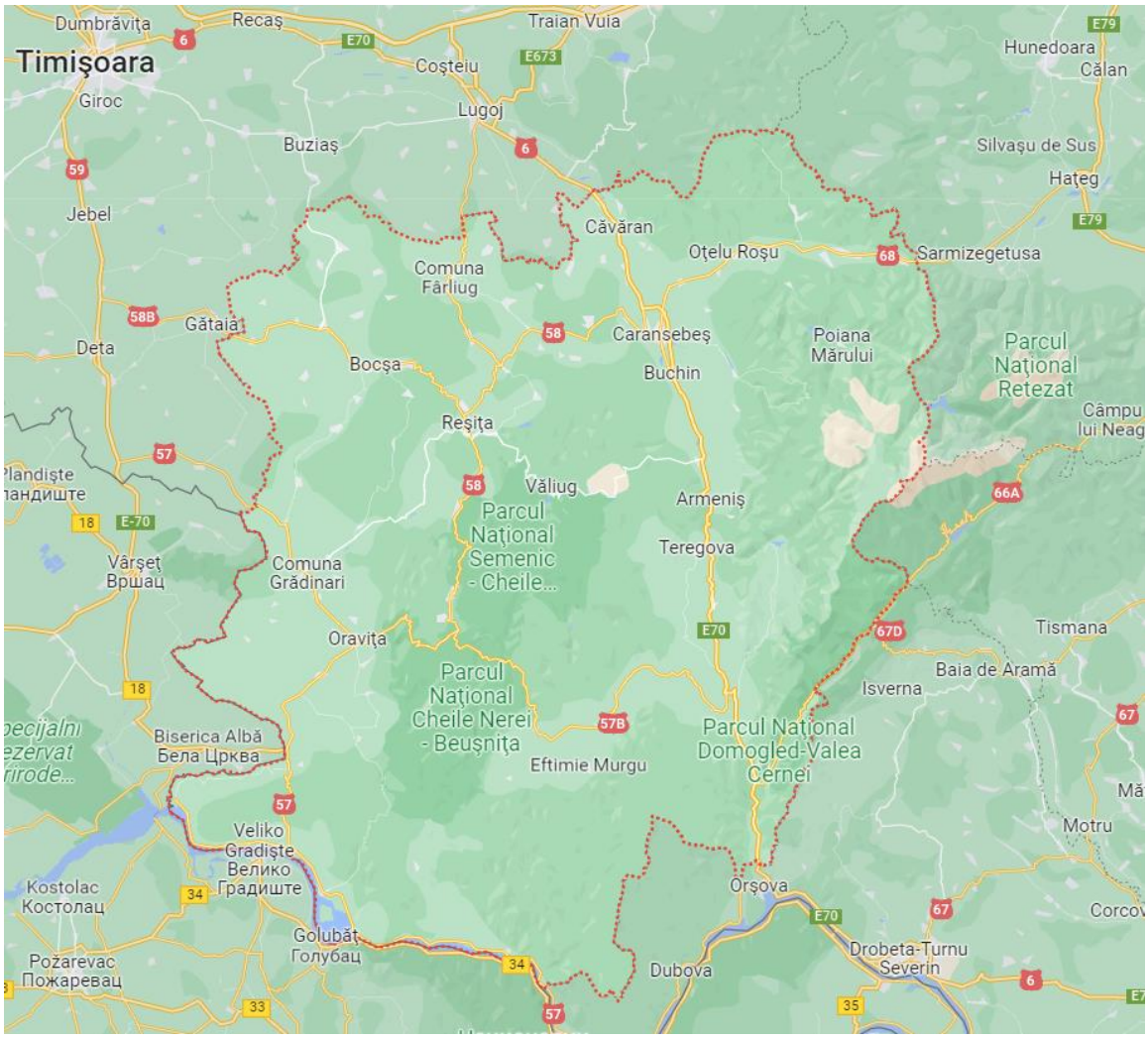


***Figure 2** - Reșița - geographical location at the level of Caraș-Severin county, Source:* (Google Maps)

The municipality of Reșița is located to the north-east of the commune of Văliug, to the north-west by the commune of Lupac and the town of Bocșa, to the west by the commune of Buchin and to the south by the communes of Ezeriș, Târnova and Păltiniș. The territorial area covers approximately 19,765 ha. Six localities in the vicinity (Câlnic, Cuptoare, Doman, Moniom, Secu and Țerova) are administratively subordinated to Reșiței.

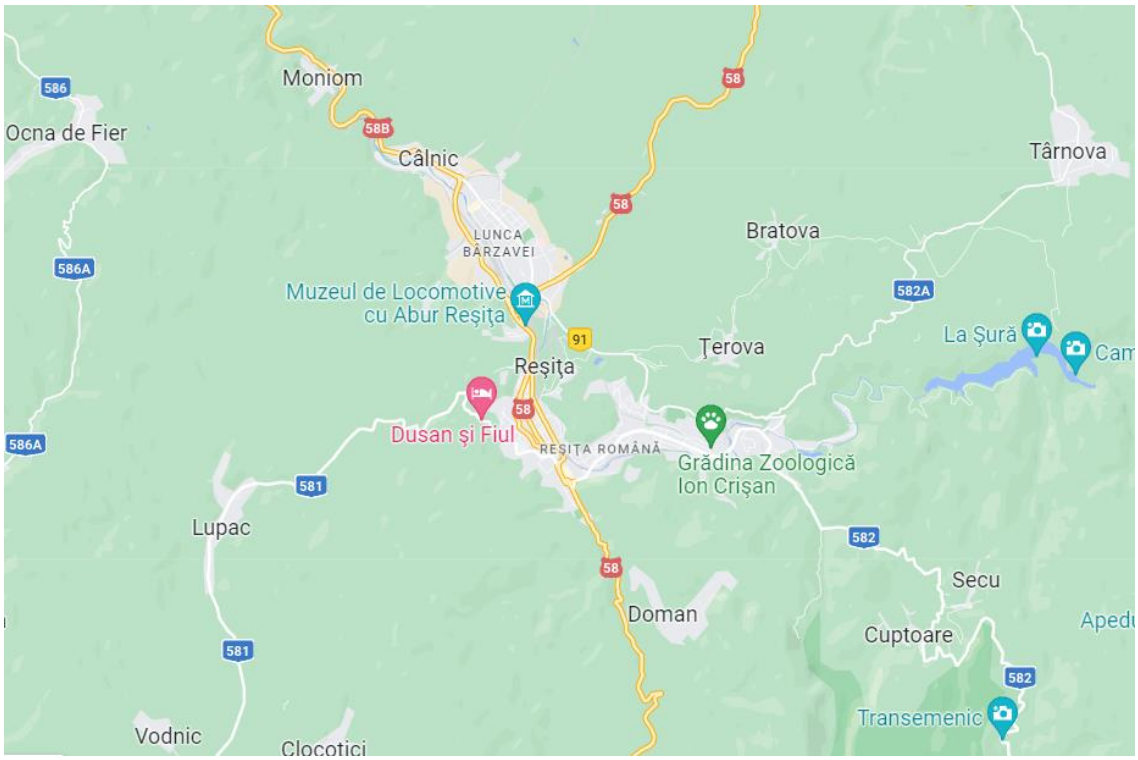


Figure 3 *- Reșița, neighboring localities and neighborhoods (Source: Google Maps)*

The climate that characterizes the municipality of Reșița and the county of Caraș-Severin is a moderate temperate-continental one, with Mediterranean nuances. The average annual temperatures recorded are around 11.7^{o} C and the average rainfall amounts reach 701 l/m2. In this geographical area can be found different species of coniferous and deciduous trees, arable areas, pastures and meadows, orchards and nurseries. About 2% of the total forested area consists of degraded forests or deforested areas. The Bârzava River, which crosses the city in the NW-SE direction, together with its tributaries, forms the hydrographic network of the municipality of Reșița. Coal deposits and ores are the main natural resources of the region. (Strategia de dezvoltare locală a Grupului de Acțiune Local Reșița, 2019)

The locality, called Rechyoka and Rechycha is mentioned in the fifteenth century, and at the beginning of the seventeenth century it was given the name of Reszinitza, paying taxes to the pashalac of Timisoara at that time. In its current hearth, the Romanian village called Reșița Romanian (1779) and a workers' colony near the factories, called Reșița Montană, merged.

The municipality of Reșița, which became the county seat in 1968, is located in a particularly picturesque area, with interesting tourist attractions, with a rich history and an industrial tradition of over 245 years.

The municipality is structured in three main neighborhoods, as follows:

- **New Town** with the following areas: Micro (district) I, Micro (district) II, Micro (district) III, Micro (district) IV and Calea Timișoara;

- **The city center** with the areas: Center, Valea Domanului, Lunca Pomostului, Moroasa I and II, Reșița Romanian, Colonia Poiana Golului and Mociur;
- **Old Town** with the areas: Driglovățul Nou, Driglovățul Vechi, Stavila, Minda, Bașovăț and Lend or Marginea Lend. (Smart City 2027)

2.2 Socio-demographic profile

At the end of the eighteenth century, the first mentions of the population living in Reșița appear, around 300 people, so that at the beginning of the twentieth century, the city counted over 10000 inhabitants. The population grew spectacularly to 17384 inhabitants (1910), following the rapid development of the local industry, at that time Reșița representing an important steel and machine production center of the country. In 1925, Reșița received the status of city and in 1941 the population reached over 25000 inhabitants.

If we examine the evolution of the demographic situation at national level after the 2000s (according to the National Institute of Statistics), we can observe an obvious negative trend in both urban and rural areas. The reason behind this development was the economic restructuring and privatization of large state-owned companies, which began in the 1990s.

The evolution of the population of Reșița is similar to that at national level, decreasing by 9.1% between 2002 and 2016 (INS). If we refer to the distribution of the population by age categories, an obvious aging trend can be observed, with a decrease in the young population (under 15 years old) to the detriment of the elderly population (over 65 years old).

Migration is another determining factor that has contributed and continues to contribute to the reduction of the population in the municipality. According to the Social Barometer commissioned by the municipality and conducted by the Eftimie Murgu University in 2016, 8.5% of the people residing in Reșița lived in other countries, and another 3% in other localities in Romania. The same study also found that in the last ten years, 8% of the inhabitants of Reșița have left the country, and 13% have expressed their intention to leave the country in the next three years. (Strategia de dezvoltare locală a Grupului de Acțiune Local Reșița)

The results from the last Population and Housing Census (2022) show that in the period since the previous census (2011), Reșița lost almost 15000 inhabitants, the resident population of the county seat municipality reaching 58393 people (National Institute of Statistics). Although this demographic decline is attributed to the change in the census methodology compared to the previous census, this steep decrease in the resident population is an alarm signal regarding the future economic and social development of the city.

2.3 Economic profile

The economic profile of the area is predominantly industrial – agrarian, the urban environment being assigned the activities of an industrial nature, trade and services and the rural environment specific activities of the agricultural sector (plant crops and animal husbandry).

Reșița developed as a powerful economic industrial center with the construction and expansion works on the current site of the plants, the colonization of specialized labor coming from Bohemia, Tyrol, Slovakia, Italy and France and last but not least, the replacement of the steel center in Bocsa. The rich forests, timber resources, coal deposits, the local hydrographic network were just some of the development opportunities that this relocation offered.

The date of July 3, 1771 remained in history as a landmark, the Reșița factories being the place of foundation of the oldest and most important metallurgical center on the European continent.

Nowadays, the main fields of activity at the level of the municipality of Reșița can be grouped into several industries: food industry, clothing industry, metallurgical industry, manufacture of machinery, machinery and equipment, but also retail trade. At the level of 2008, there were about 11500 employees in the industry, a number that began to drop sharply the following year, when less than 10000 employees were still working in the industry.

The industrial decline recorded in recent years was due to economic problems and social migration that led to a high unemployment rate in the municipality as well as to modest incomes of those who remained in the field of work in the important branches of local industry.

Structure of the local economy

According to the document "Integrated Urban Development Strategy of the Municipality of Reșița for the period 2022-2030", the local economy is mainly focused on activities specific to the traditional manufacturing industry.

The highest number of companies operate in the services sector (except commerce) in which about a quarter of the employees of the local private sector work, services generating the most important part of the companies' profits. This is due to the economic developments recorded but also to the decline of some large-scale manufacturing activities, which are recording losses. The commercial sector ranks third in the equation of the local economy, with a significant number of active firms.

The industrial transition processes have led to notable transformations in the structure of the local economy (e.g. deindustrialization). These included the tumultuous and instable period of the 1990s, which led to a decline in the community's standard of living and a significant migratory phenomenon, and then the economic crisis of 2008-2012, another difficult time that led to macro-structural economic and financial problems.

The adoption of an economy that adapts to current needs, such as the digitized one with a high degree of automation, offers various opportunities and benefits. Communities that have a well-trained workforce and know how to harness resources intelligently and innovatively are the ones that will benefit from the industrial transition.

Currently, in Reșița, the share of the knowledge-based economy is relatively low, while most of the employees work in low-tech activities and services that do not require a high degree of knowledge.

The distribution of employees on the local labor market is balanced, with almost 50% working in large and medium-sized enterprises, and the difference in small or micro enterprises.

The developments of the traditional local historical companies, which concentrated most of the industrial activity in the region, were closely linked to the changes that occurred during the industrial transition process. Therefore, after the privatization of the largest industrial platform in Romania (UCM Reșița and the Steel Plant) the industrial activities experienced an accelerated regression.

Developments of local companies

If the number of local companies is relatively constant in recent years, the number of employees is continuously decreasing compared to 2014.

The profit margin of large and medium-sized enterprises has increased steadily, with turnover values remaining relatively constant. However, the largest share of profits in the local economy is held by small companies, with an advance of over 80% compared to 2014. Although the average profitability rate has increased to around 5%, it is lower than other cities in the country of the same size. (SIDU)

In 2019, Forbes Romania magazine placed the municipality of Reșița on the 12th position in the top of the best cities for the business environment in Romania, thanks to the industrial tradition it enjoys.

Currently, Reșița has four large industrial platforms located as follows:

- in the northern area of the city – an industrial platform with activities focused on machine building and light industry;
- Triaj - Mociur area – related to the heavy steel and machine building industry; The area is currently undergoing an extensive process of urban reconversion and regeneration, one of the most ambitious projects of its kind in Romania;
- Valea Țerovei industrial area – where there is a surplus of buildings and spaces available;
- the old industrial area – with a tradition of over 250 years, which occupies an important area of the Old Town (Smart City 2027)

While the number of employees continues to decline in the industrial sector, the turnover and profit of companies are increasing. Due to the fact that the main local traditional players register modest economic performances, the share of this sector in the total profits of the local economy is reduced.

The local industry focuses on several branches of tradition, such as the manufacture of machinery, machinery and equipment with an average technological level and steel activities that use state-of-the-art metal melting furnaces. In addition to these, we can also mention the production of equipment for the automotive industry and, last but not least, the most recent investment in the production of components and systems for large household appliances.

The reorganization of the industrial sector from the '90s to the present, as well as the postponement of the structural and functional reconversion processes have led to the appearance in the city of those "brownfield"

areas, made up of former buildings, abandoned or poorly used land or facilities, often associated with the presence of pollutants resulting from the activities carried out in the past.

In recent years, local authorities have paid special attention to this issue, becoming aware of the negative impact on the development of the city as a whole. Here we can mention those marginalized, poorly developed urban areas with poor public services, characterized by a high risk of social exclusion, overcrowding, lack of jobs or low-paid jobs. (SIDU, n.d.)

Spectrum of urban regeneration

In recent years, Reșița has entered an extensive process of urban regeneration of the former disused industrial areas, an example of this being the Mociur Platform Urban Regeneration project, which will include the arrangement of a leisure area (aquapark), the construction of a shopping center, a retail area and office buildings, a hotel unit, residential buildings but also a new street network that will streamline traffic in the area.

The **Integrated Urban Regeneration** projects on the agenda will include a series of **smart-city** components and functions such as: automated irrigation and sprinkler systems for green spaces; systems for the recovery of rainwater and its use for irrigation of green spaces; the implementation of multi-modular and multifunctional residence parking lots by lowering cars underground, the space thus freed up being able to be used dynamically for other functionalities (arrangement of green spaces, playgrounds for children, parks, sports fields, spaces for community activities, etc.); Smart-parking digital platforms that will also integrate automated ecological bins (buried platforms for selective collection) and smart bicycle parking.

The smart city is a type of urban development that aims to improve the lives of citizens, develop the community and protect the environment. This type of development involves the implementation of smart systems and technologies that allow the safe and efficient management of local resources.

In line with the urban development approach promoted by the European Commission, the **smart-city of Reșița**, integrates six intertwining and citizen-centric development axes: Smart-People, Smart-Governance, Smart-Living, Smart-Environment, Smart-Economy and Smart-Mobility. (Plan de mobilitate urbana durabila PMUD)

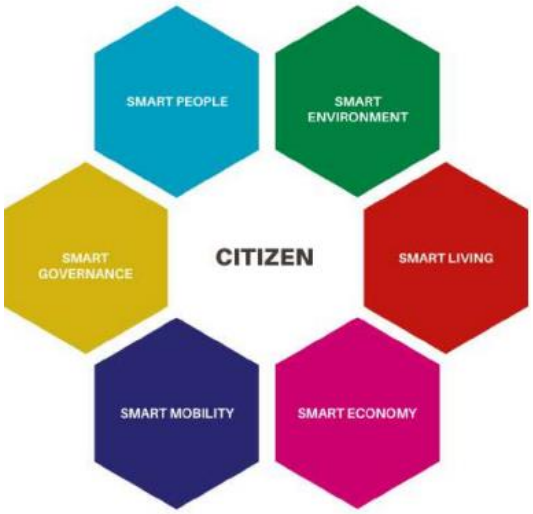


Figure 4 *- Reșița Smart City Strategy (Smart City 2027)*

The six development axes of a smart city are based on a high level of citizens' training, participation in public life, social well-being and inclusion, optimised modern urban transport networks, smart water supply infrastructure, efficient waste collection and treatment management, high-performance lighting and heating systems with low energy consumption in buildings, an interactive and accessible local administration for citizens, as well as the anticipation and management of the needs of the vulnerable population (the elderly, children, people with disabilities, etc.). (Smart City 2027)

3 Report on the Sustainable Energy Action Plan

In 2009, the City Hall of Reșița signed the commitment to join the Covenant of Mayors with the firm determination to transform the Municipality of Reșița into a sustainable city, by reducing carbon dioxide (CO2) emissions by at least 20% by 2020. This initiative has been underpinned by environmental and social benefits, as well as economic benefits.

In this context, in 2016, an Action Plan on Sustainable Energy for the Municipality of Reșița was developed and approved. This plan included a total of 58 well-defined actions aimed at reducing CO2 emissions by around 44,192 tonnes compared to the base year of 2008.

In order to continue the efforts to combat climate change, in 2023, the Reșița City Hall signed a new adhesion to the Covenant of Mayors on Climate and Energy. Through this new commitment, the City Hall has set itself the goal of reducing CO2 emissions by 40% compared to the base year by 2030 and developing a Sustainable Energy and Climate Action Plan (SECAP) to achieve this ambitious goal.

3.1 Emission Monitoring Inventory (MEI)

Methodology for inventory and monitoring of emissions

The Sustainable Energy and Climate Action Plan is based on two key elements, namely the Baseline Emission Inventory (EIB) and the Monitoring Emission Inventories (MEI). They serve as an essential starting point in defining the specific objectives and measures necessary to achieve the commitments made.

The Reference Emissions Inventory (EIB) was drawn up for 2008 with the aim of setting a target of reducing carbon emissions by 20% by 2020. This EIB is a crucial reference for guiding and monitoring progress towards emission reduction targets.

By signing the new commitment within the Covenant of Mayors, the City Hall of Reșița has undertaken to develop a new Sustainable Energy and Climate Action Plan (SECAP) and to carry out inventories for monitoring emissions in the period 2015 - 2020.

In this process, the emissions calculated for the period 2015 to 2020 (MEI) were compared with the emissions inventoried for the reference year 2008. This comparison was of fundamental importance to assess the progress made and to identify emission trends in the Municipality of Reșița.

The development of an emissions inventory involved a number of resources to gather, review and interpret the necessary data. This process was an essential step in ensuring the correct development of this report, which would comply with the specific challenges existing in the Municipality of Reșița.

The necessary information was collected for all relevant sectors of activity, allowing the quantitative assessment of carbon dioxide (CO2) emissions generated by energy consumption during the analysis period.

3.1.1 Energy consumption in the main municipal sectors

Scope and sectors considered in emission inventories

The geographical limits of the emission inventories represent the boundaries of the Administrative-Territorial Unit (ATU). These CO 2 emission inventories are based on the final energy consumption in the main sectors of the municipality, resulting from the social and economic activities carried out. Quantitative data were collected on different consumptions by sectors of activity defined within the COMO methodology. Based on these consumptions, the related CO 2 emissions were quantified, using IPCC emission factors, LCA and emission coefficients from the electricity label.

The EIB and MEI cover key sectors of the city's economy, such as the residential sector, the tertiary sector, the municipal sector and transport, as well as others such as: waste and wastewater. However, special attention is paid to industrial activity in terms of reducing CO2 emissions at municipal level, and constant communication with stakeholders is maintained.

The necessary data on energy consumption at local level was collected from energy distributors and suppliers: electricity consumption was provided by E-distributie Banat, natural gas consumption was provided by DEL GAZ, and biomass consumption was provided by the responsible departments of the city hall. The data provided were analysed and interpreted, being the central object in the calculation of the carbon footprint of the Municipality of Reșița.

The evaluation of the emissions resulting from consumption in the transport sector was carried out using the data provided by the Reșița City Hall and the Reșița Urban Transport Company (TUR).

Data collection and analysis are carried out for the waste and water sectors, taking into account the amounts of waste generated and collected locally, as well as wastewater management. Particular emphasis is placed on the production of sludge from wastewater in this assessment.

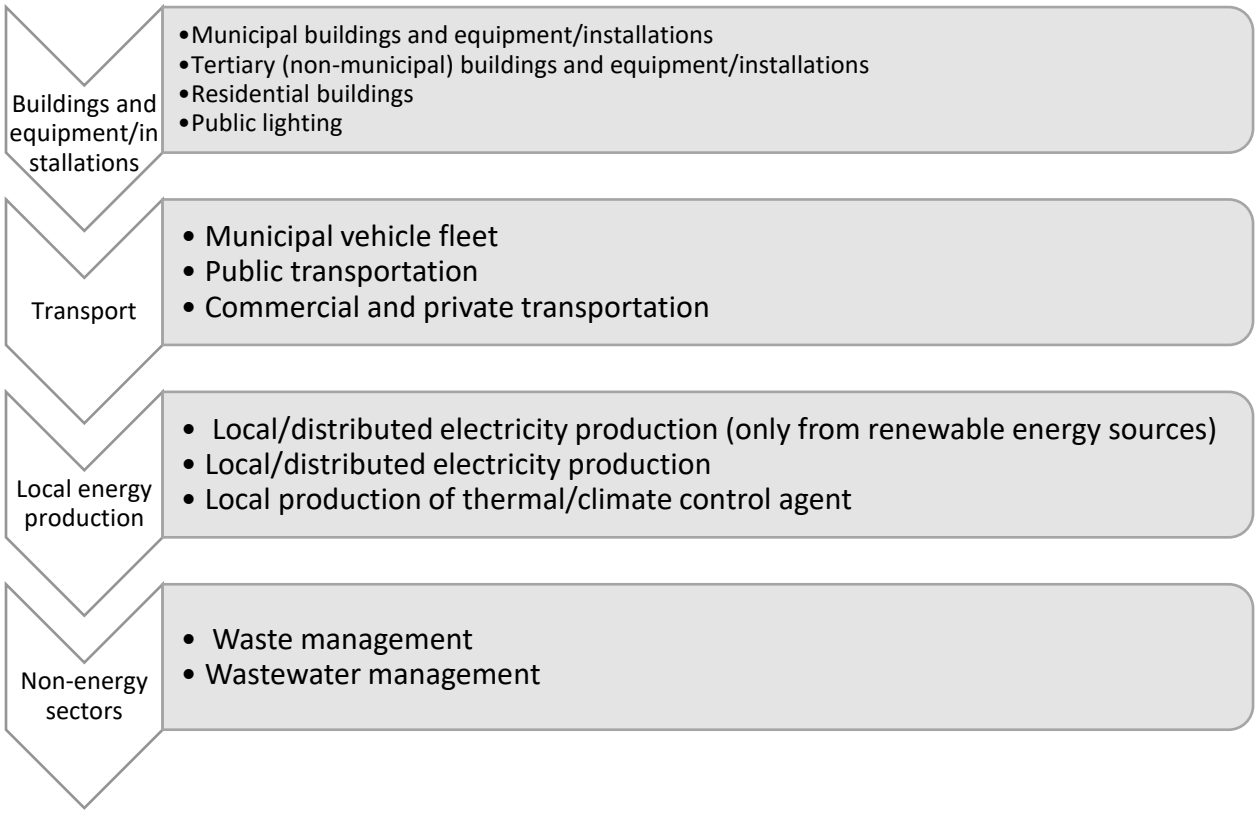
Vegetable waste is subject to the recovery process. Through an industrial shredder, they are palletized and transformed into compost, entering an efficient reuse cycle. This practice finds applicability in the field of landscaping, contributing to a sustainable management of vegetable waste and encouraging a greener environment in the municipality.

- **Direct** (locally generated) emissions are released within the Administrative-Territorial Unit (ATU) and are the result of burning fuel for the production of heat or electricity, including emissions from internal combustion engines (in the transport sector).
- **The indirect** (external) emissions for the TAUs (whose production cannot be directly controlled by local decision-makers) are released in other Administrative-Territorial Units (TAUs) and are associated with the production of electricity or heating agent (if there is a heating system between the TAUs) that is consumed in the analysed TAU.

**In the case of the Municipality of Reșița, for the analysed monitoring period there was no local production of heat/air conditioning agent, therefore only direct emissions were considered for the emission monitoring calculation.*

At the local level, the method of multiplying the amount of energy consumed in each municipal sector (expressed in MWh) by the corresponding emission coefficients (Table 1) was used to carry out the CO2 emissions accounting (Table 1).

The sectors covered by the emission inventories under the Sustainable Energy and Climate Action Plan are structured according to the latest version of the Covenant of Mayors.



EMISSION FACTORS

The Covenant of Mayors methodology accepts two ways of drawing up CO2 emission inventories.

'Standard' emission factors in line with the IPCC principles cover all carbon dioxide emissions generated as a result of energy consumption in the territory of the local authority, whether direct or indirect. Standard emission factors are based on the carbon content of each fuel, similar to what is used in national greenhouse gas emission inventories developed in the context of the Kyoto Protocol. CO2 emissions are considered the most important and there is no need to calculate methane (CH4) and nitrous oxide (N2O) emissions.

LCA (Life Cycle Analysis) emission factors take into account not only the emissions generated from the final combustion of fossil fuels, but also the emissions produced throughout the supply chain, thus including the emissions generated in the extraction, transport and processing process.

The CO2 emissions generated by the recorded consumption were quantified using the conversion coefficients recommended by the IPCC, and for municipal waste the LCA factor was also considered, presented in the table below.

Energy or fuel	Emission factor (tone CO2/MWh)							Source
	2008	2015	2016	2017	2018	2019	2020	
Electricity	0,701	0,465	0,444	0,470	0,452	0,457	0,379	IPCC
Gaz natural	0,202	0,202	0,202	0,202	0,202	0,202	0,202	IPCC
Diesel	0,267	0,267	0,267	0,267	0,267	0,267	0,267	IPCC
Petrol	0,249	0,249	0,249	0,249	0,249	0,249	0,249	IPCC
Woody biomass	0,403	0,403	0,403	0,403	0,403	0,403	0,403	IPCC (ns)
Municipal waste	0,33	0,33	0,33	0,33	0,33	0,33	0,33	IPCC/LCA

Table 1 *- Conversion factors used in the quantification of CO2 emissions*

According to the methodology of the Covenant of Mayors, it is suggested that the emission factors initially used in the Basic Emission Inventory (BEI) should be the same as those used in the subsequently developed Emission Monitoring Inventories (MEIs), in line with the monitoring schedule set by the Convention at local level. This encourages local authorities to implement the measures set out in the Sustainable Energy and Climate Action Plan (SECAP) to achieve the carbon reduction targets of the Covenant of Mayors.

In the monitoring of electricity emissions, we took into account the national factor according to the IPCC report for 2016, the year in which PAED Reșița was developed, thus ensuring consistency in the monitoring process. These factors were subsequently updated, and in order to monitor emissions, we integrated the latest national data taken from the https://data.jrc.ec.europa.eu/collection/id-00172 website (accessed in 2023).

As a result of monitoring emissions from the sectors analysed in 2020, we recorded a **7% reduction in the target for energy consumed (MWh)** and a **7.35% reduction in CO $_2$** emissions compared to the 2008 level, therefore the target was not achieved using the same emission factors.

It is essential to point out that by using the local factor in the calculation of emissions from the energy sector, i.e. the ENEL factor, for both the EIB and the MEI, we would have achieved the emission reduction of **22%** in 2020. This result successfully exceeded the target set by the local administration - **20%.**

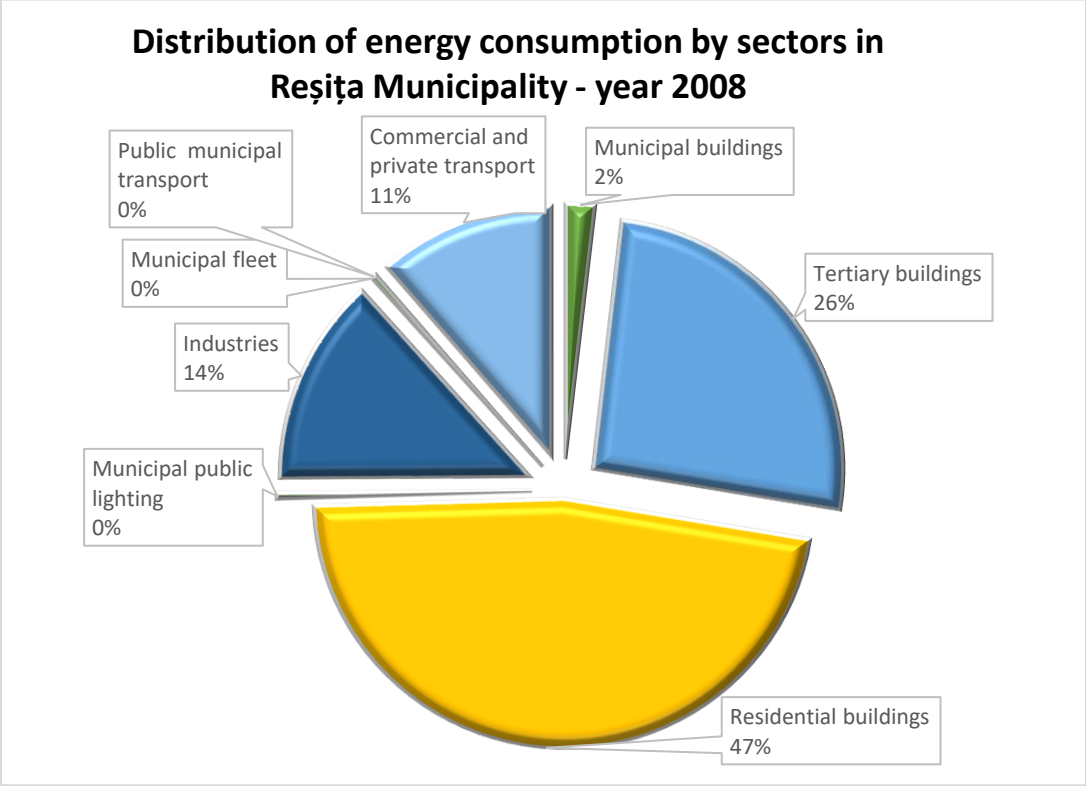
Also, according to the available data, in 2018, the Municipality of Reșița achieved a significant reduction in energy consumption, with a percentage of 13.46%, and a decrease in CO2 emissions by 5.14% compared to the EIB. It is important to highlight that, if the local consumption monitoring factor had been taken into account, in 2018 we would have achieved a 20% reduction in emissions from all sectors of activity. This performance would have meant achieving the target set out in the Sustainable Energy Action Plan.

Therefore, the choice of the emission factor in the calculation process is very important, as this aspect can lead to significantly different results. This analysis highlights the potential and impact that local decisions and

adaptation to the specifics of the context can have in achieving the objectives set in the field of energy and the environment.

Energy consumption in the main municipal sectors

- The final energy consumption in the reference year 2008 had a total of **779384** MWh/year.
- The final energy consumption per capita in 2008 was **8.24** MWh/inhabitant year.

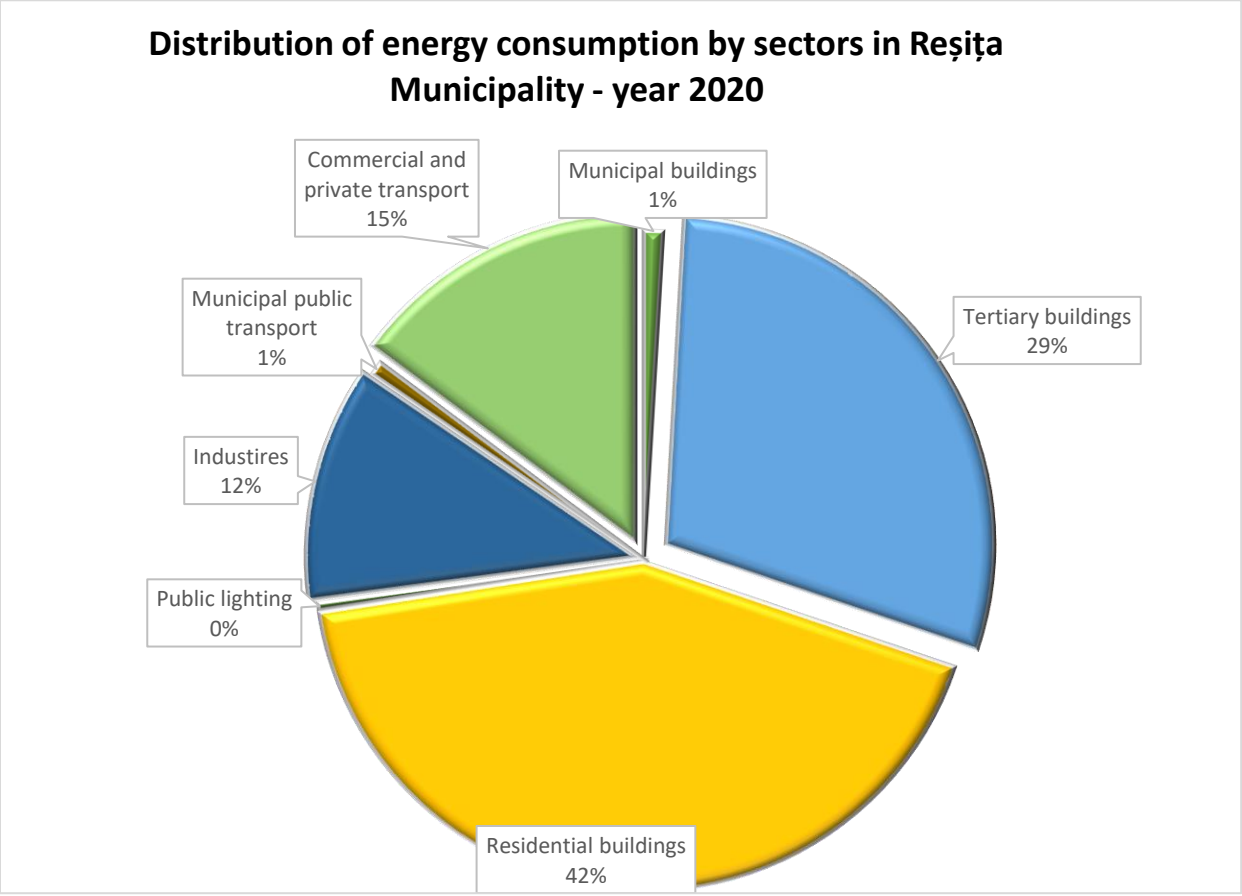


***Graph 1** - Distribution of energy consumption by sectors, Reșița Municipality - 2008*

The analysis of energy consumption in the different sectors included in the SECAP allows us to identify priorities and take concrete measures to optimize energy consumption. Here are some significant findings:

- **The Buildings sector** dominates energy consumption (accounting for about 75% of total consumption). Here, **residential buildings** hold the largest share, with a share of 47%. This sector must be a priority, as there is potential for significant improvements in the energy efficiency of homes.
- **The tertiary sector and municipal buildings** account for a significant share of consumption (around 28% in total). In this context, it is important to identify solutions to reduce energy consumption in these types of buildings, as well as to promote renewable energy and efficient technologies.
- **The industrial sector** has a significant share of about 14% in total energy consumption. This sector can benefit from investments in energy efficiency technologies, process optimisation and the use of cleaner energy sources.

- **Private and commercial transport** accounts for about 11% of total energy consumption. Improving vehicle efficiency and promoting sustainable transport can significantly contribute to reducing this consumption.



***Graph 2** - Distribution of energy consumption by sectors, Reșița Municipality - year 2020*

The analysis of energy consumption in the Municipality of Reșița for 2020 presents a diversified landscape of the use of energy resources in different sectors. A significant proportion of 42% of total consumption is allocated to residential buildings, highlighting the need for energy-efficient solutions for this category.

In contrast, municipal public lighting makes a marginal contribution, indicating possible opportunities for the implementation of energy-efficient lighting technologies. The industrial sector reaches a share of 12% of the total energy consumed in Reșița.

Transport, both public (1%) and private and commercial (15%), exerts a significant influence on total energy consumption, underlining the need for strategies geared towards sustainable mobility.

In the field of municipal (1%) and tertiary (29%) buildings, we identify opportunities for the implementation of energy-efficient solutions in public and commercial buildings.

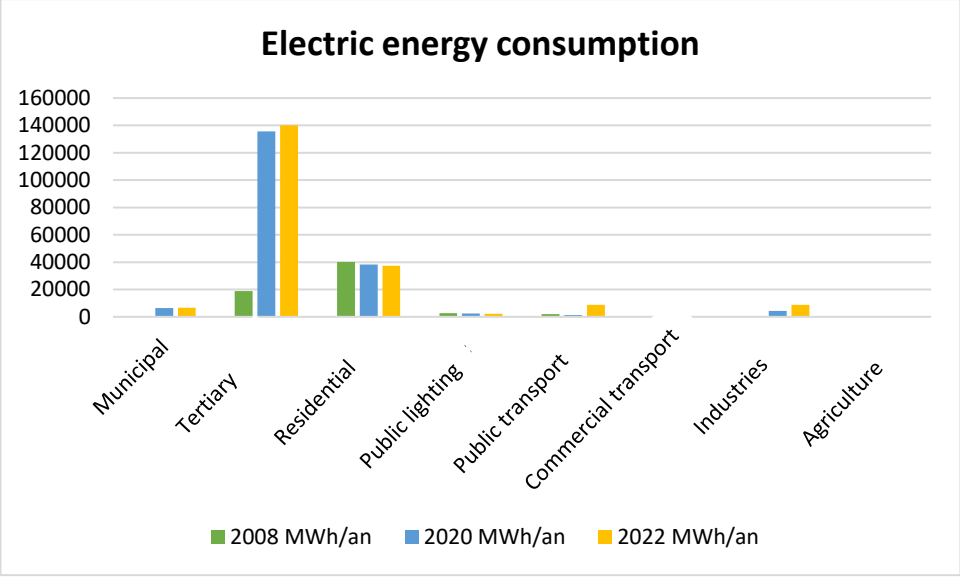
This analysis was the basis for the development of a framework for the development of energy efficiency strategies adapted to the specifics of the municipality, with a focus on the sectors with the greatest impact on energy consumption. However, we note that the sectoral distribution of energy consumption has not changed significantly compared to the reference year, i.e. 2008, indicating that certain sectors have maintained consistency in the use of energy resources. This is essential to identify areas of intervention and develop tailored sustainability strategies aimed at maximising energy efficiency in areas with the greatest potential for improvement.

Electricity consumption

Sector	2008 MWh/an	2020 MWh/an	2022 MWh/an
Municipal	561	6419	6764
Tertiary	18828	135659	140091
Residential	40134	38381	37232
Public lighting	2725	2541	2327
Transport public	1949	1286	8726
Commercial Transport	-	-	-
Industry	-	4228	8726
Agriculture	-	234	239
Total	**64197**	**231358**	**204105**

Table 2 *- Electricity consumption for 2020 and 2022 compared to the reference year 2008*

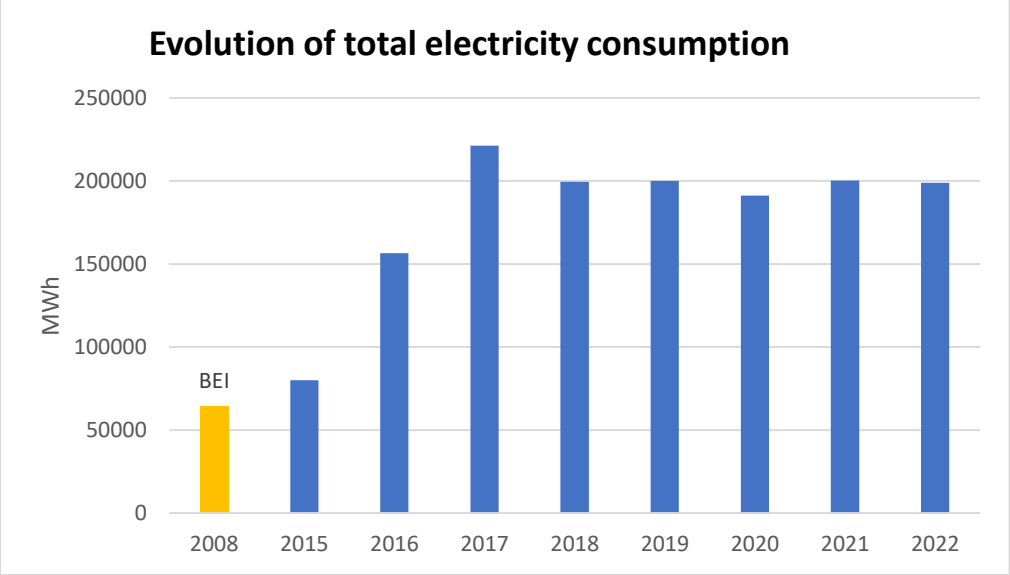
**For the industrial and agricultural sector there are no data available for 2008*



The data presented show the evolution of energy consumption in different sectors between 2008 and 2020. During this period, the municipal sector recorded a significant increase, going from 561 MWh/year in 2008 to 6419 MWh/year in 2020.

The tertiary sector registered a significant growth, increasing from 18828 MWh/year to 135659 MWh/year in the same period, an evolution largely attributed to the emergence and development of new commercial facilities in the city such as hypermarket. These new commercial locations brought with them an increase in energy demand for lighting, air conditioning, equipment and other necessities, thus explaining the significant increase in energy consumption in the tertiary sector during the mentioned period.

However, the residential sector recorded a slight decrease, going from 40134 MWh/year in 2008 to 38381 MWh/year in 2020. Energy consumption for public lighting and public transport has decreased, while data for commercial transport is not available. Overall, total energy consumption increased significantly, from 64197 MWh/year in 2008 to 184286 MWh/year in 2020, indicating the need to take action for energy efficiency and sustainable management of energy resources in these sectors.



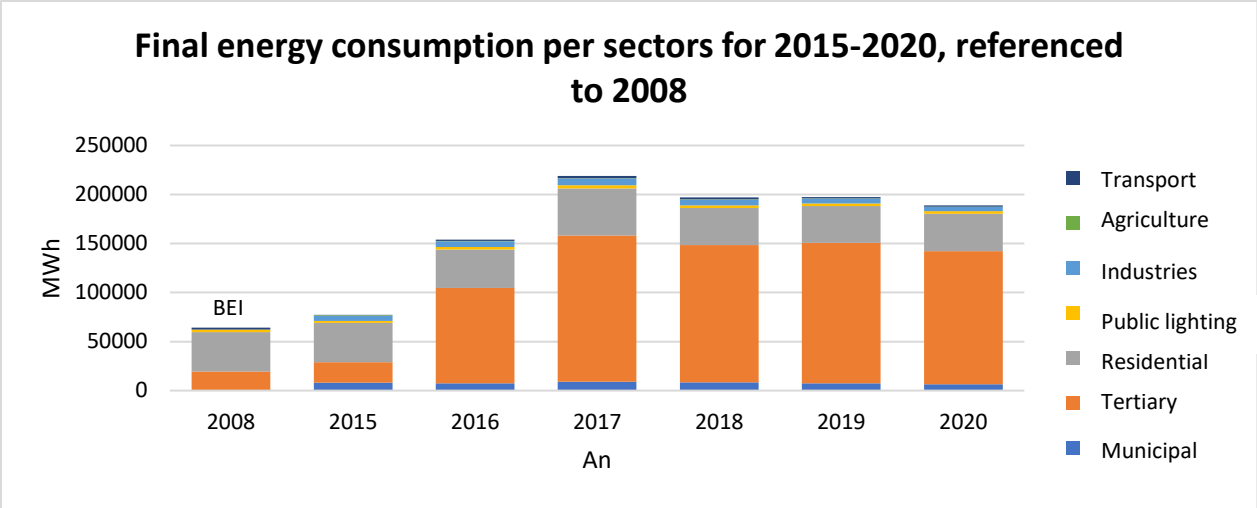
Graph 3 *- Evolution of total electricity consumption by sector for the period 2015 -2022, compared to the reference year 2008*

Graph 3 illustrates the evolution of total electricity consumption by sectors for the period 2015 -2022, compared to the reference year 2008. Analyzing these data, a significant increase in electricity consumption is observed over the analysed period.

- Between 2008 and 2015, electricity consumption increased considerably, from 64197 MWh in 2008 to 77179 MWh in 2015.
- The increase in consumption continued in the following years, reaching the highest value in 2017, when a consumption of 218813 MWh was reached. This significant growth was influenced by the economic expansion and changes in the energy sector of the municipality.
- In 2018, there was a slight decrease in electricity consumption, reaching 196986 MWh, but the values remained high compared to 2008.

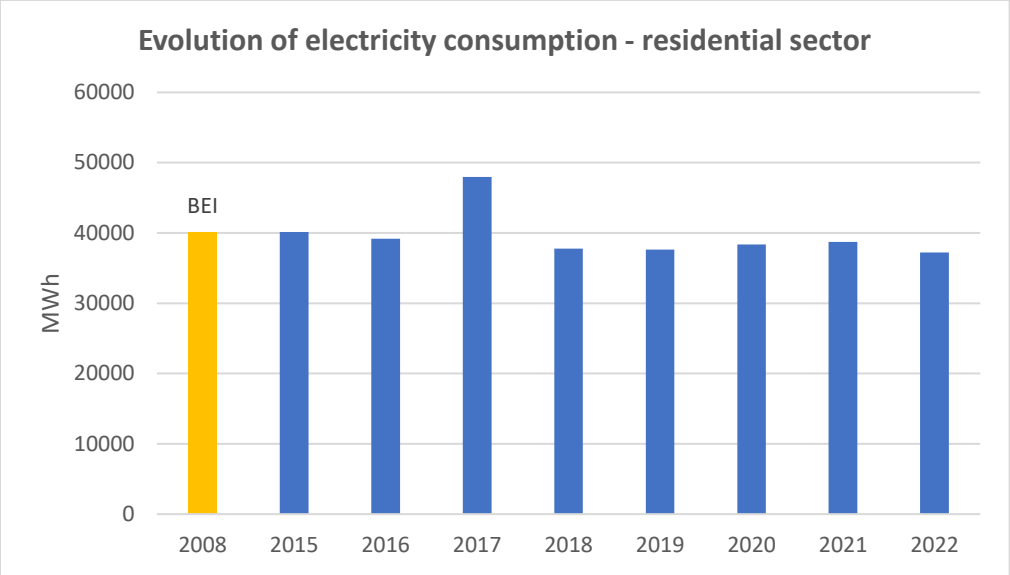
- In the period 2019-2022, electricity consumption remained relatively stable or had small fluctuations, without registering significant increases.

In conclusion, these data reflect the increase in electricity demand in the period 2008-2017, followed by a period of stabilization or slight decrease in the following years. Changes in electricity consumption are due to the increase in energy demand during this period.



Graph 4 *- Final energy consumption by sector for the period 2015 -2020, compared to the reference year 2008*

The increase in energy consumption in the tertiary sector can be explained by the expansion and opening of new commercial outlets, such as shopping malls. This brings with it several implications that contribute to an increased demand for energy such as: Increasing Commercial Area, Increasing the Use of Technology, Transport and Logistics, Air Conditioning and Ventilation, Lighting and Commercial Equipment, Extending Operating Hours. Therefore, the expansion of commercial outlets, especially shopping centers, can be a significant factor in increasing energy consumption in the tertiary sector.



Graph 5 *- Evolution of electricity consumption for the residential sector between 2015 and 2022 compared to the reference year, 2008*

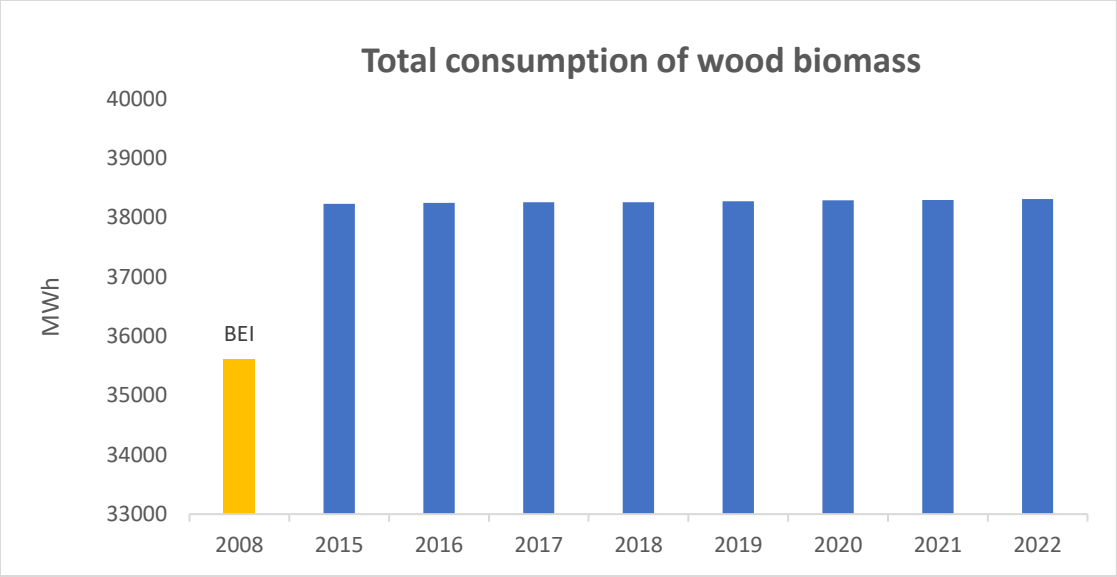
Regarding the evolution of the final electricity consumption for the residential sector in the period 2015-2022, compared to the level of 2008 (40134 MWh/year), we observe significant trends:

In 2015, electricity consumption (40147 MWh/year) was similar to the 2008 level, with a slight increase. In 2016 and 2017, consumption increased significantly, reaching a peak of 47948 MWh/year in 2017, which is a significant increase compared to 2008. From 2018 to 2021, electricity consumption was relatively stable, with values close to the level of 2008. However, in 2022, there was a significant decrease in consumption to 37232 MWh/year, indicating a significant change from previous trends.

These figures suggest that after a period of growth and stabilisation of electricity consumption for the residential sector between 2015 and 2021, a significant reduction occurred in 2022.

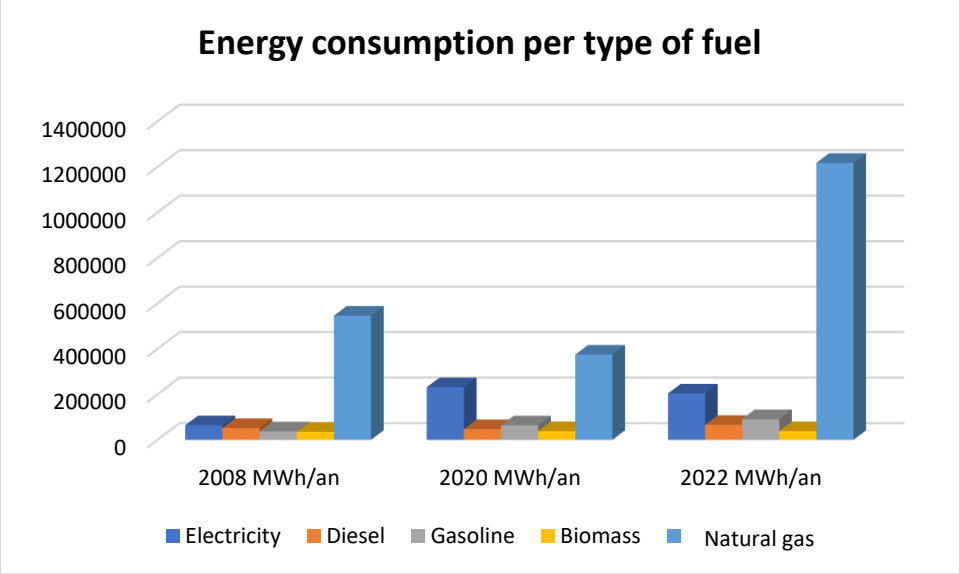
Biomass consumption

During the years of monitoring, the consumption of wood biomass in the residential environment has seen a slight increase, while in the municipal sector there has been a decrease. This evolution can be associated with adjustments in population dynamics and changes in energy source preferences. The municipal sector also highlighted a significant transition to alternative sources, such as natural gas.



Graph 6 *- Evolution of final consumption of wood biomass in the period 2015-2022, compared to the reference year 2008*

Distribution of energy consumption by fuel type

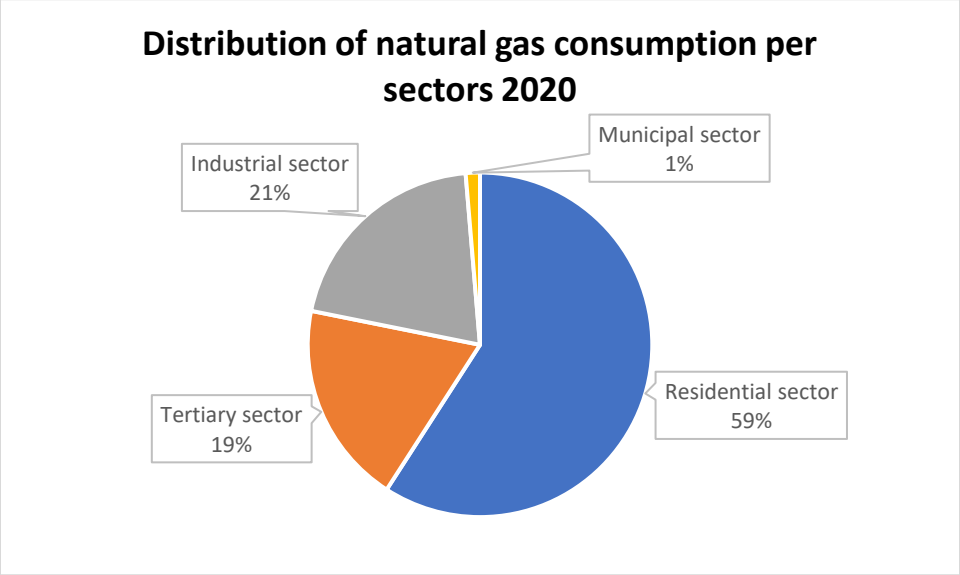


Graph 7 *- Distribution of energy consumption by type of fuel*

Between 2008 and 2022, the electricity sector experienced significant growth, peaking in 2020 and then recording a slight decline in 2022. Diesel consumption has decreased over the years. Gasoline consumption has been steadily

increasing, reaching its highest level in 2022. The use of wood biomass remained relatively constant throughout the period under review.

It is important to mention that, during the monitoring period, the Reșița thermoelectric power plant (CET) no longer produced thermal agent, and the main source of heating became gas. This change explains the increase in gas consumption in recent years. Total energy consumption increased between 2008 and 2022, reflecting changes in electricity and natural gas consumption, with a focus on increasing gas consumption in the context of changing the main heating source.



In assessing the consumption of natural gas in the Municipality of Reșița during 2020, we can see how various economic sectors influenced the way this resource was used.

The residential sector dominates consumption, contributing 59% to the total. It highlights the need to encourage energy-efficient technologies in homes to reduce dependence on natural gas.

The tertiary and industrial sectors, with shares of 19% and 21%, indicate a significant influence of business and industry on total consumption. This suggests that energy efficiency strategies and diversification of energy sources could bring significant benefits in these sectors. In contrast, the municipal sector registers a low consumption of 1%.

Therefore, these data present an important starting point for the development of the plan with sector-specific adaptation and mitigation actions. Promoting energy efficiency and adopting renewable energy sources are key opportunities for advancing towards a sustainable community in Reșița.

Local production of energy from renewable sources

During the monitoring period of this report (2015-2020), the Municipality of Reșița did not generate electricity, which is why there is no data available for analysis. However, since 2020, the local administration has taken measures to implement renewable energy sources. Therefore, in 2020, the municipal administration purchased photovoltaic panels for important educational institutions such as the Traian Vuia Theoretical High School, the

Traian Lalescu National College and the Diaconovici Tietz College. This investment generated a local electricity production totalling approximately 33301 MWh in the period 2020-2023.

At the same time, the Municipality of Reșița has an ambitious project underway to develop a photovoltaic park with a capacity of 8.6 MW. This innovative project aims to ensure 100% of the city's renewable energy needs for public transport, public buildings and public lighting. Once completed, the photovoltaic park will transform Reșița into an example of urban sustainability, significantly reducing dependence on traditional energy sources.

This gradual transition of the municipality to renewable energy sources will contribute not only to reducing the carbon footprint, but represents a significant step towards sustainability, and a step towards reducing dependence on traditional electricity sources, actively contributing to local efforts to combat climate change.

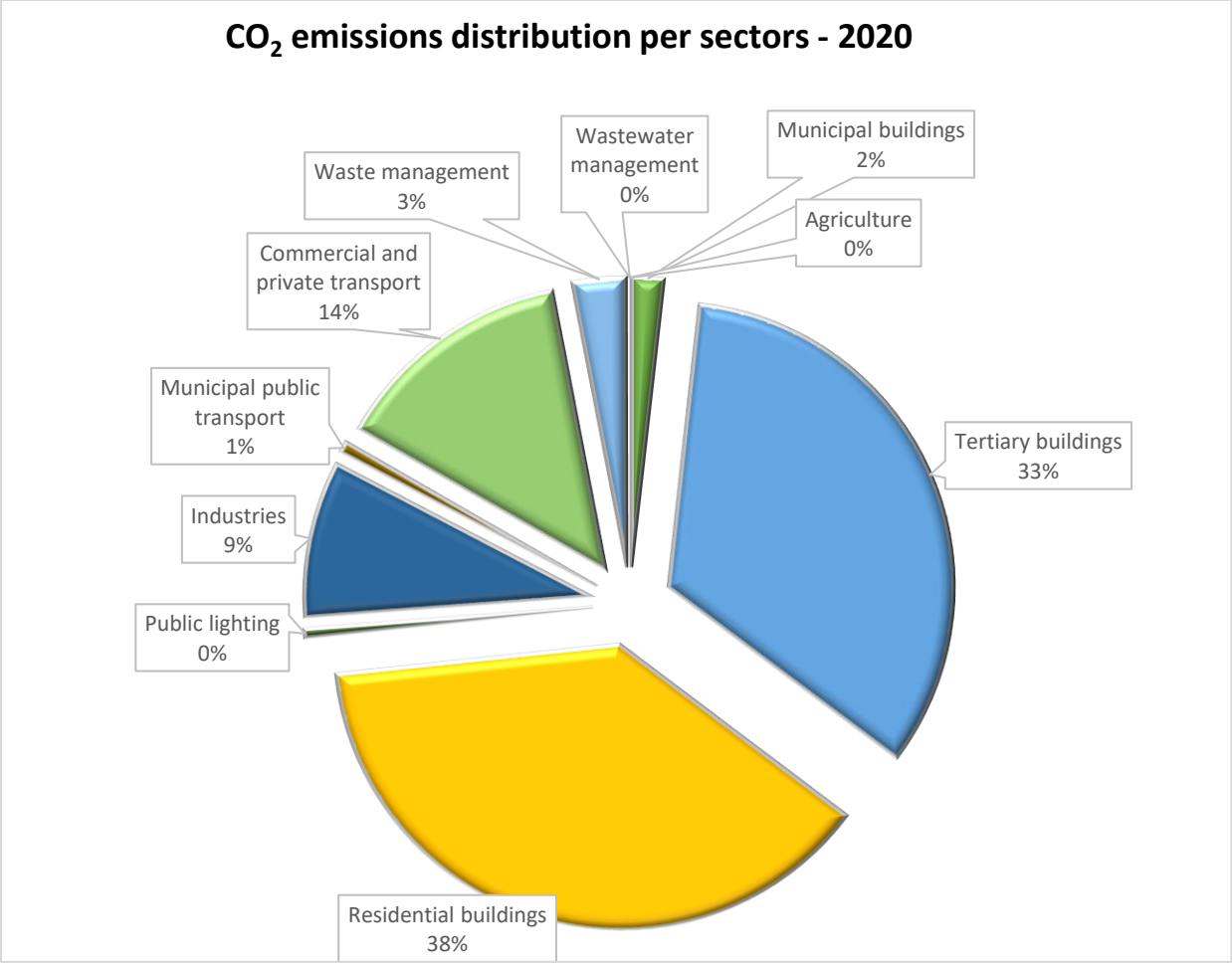
3.1.2. Inventory of CO2 emissions at local level

Local CO2 reduction targets have been closely monitored and quantified, including the measures taken to achieve them. In order to ensure a correct trajectory towards the fulfilment of these targets, the implementation status of the planned actions was monitored. The comparison of CO2 emissions at local level between 2008 (the reference year) and 2020 (the monitoring year) reflected the environmental impact associated with energy consumption in the various sectors of activity and their evolution after the implementation of the SEAP and the corresponding measures.

For the calculation of the carbon dioxide (CO2) emissions inventory at the level of the Municipality of Reșița, the emissions from the industrial sector were not taken into account, because the local authorities do not have the necessary tools to directly influence and control the companies in this sector.

Summary of results:

- **200849 tons of CO2** total CO2 emissions in 2020
- **2.38 tons CO2/year** emissions per capita in 2020



Graph 8 *– Distribution of CO_2 emissions by sectors in 2020 – Reșița Municipality*

The analysis of CO2 consumption in the Municipality of Reșița for 2020 reveals a detailed perspective on the environmental impact in different sectors.

As for residential buildings, they contribute 38% to CO2 emissions. Municipal street lighting also does not generate significant CO2 emissions, indicating the adoption of more energy-efficient lighting sources, such as replacing LED light bulbs.

The industrial sector, with a share of 9%, presents opportunities for implementing sustainable production practices to reduce environmental impact. Transport, whether public (1%) or private and commercial (14%), is a significant source of emissions, highlighting the need to adopt low-emission transport solutions.

Waste management and wastewater management indicate the need for a sustainable approach in these areas, with a focus on recycling and efficient resource management.

As for municipal and tertiary buildings, they contribute 2% and 33% respectively to CO2 emissions, highlighting the importance of implementing energy-efficient technologies and practices in public and commercial buildings.

This analysis provides a holistic look at the sources of CO2 emissions in the municipality, providing clear directions for the development of sustainable and energy-efficient strategies, necessary to achieve the carbon footprint reduction objectives in the Municipality of Reșița.

SECTORS and areas assessed by SEAP monitoring		CO2 emissions, tone CO2/2008	CO2 Emissions, CO2/2020
BUILDINGS, EQUIPMENT/INSTALLATIONS AND INDUSTRIES	Municipal buildings	3309	3494
	Tertiary buildings	49972	67304
	Residential buildings	90725	76495
	Municipal public lighting	1910	963
	Industries	21056	17742
Subtotal SECTOR		**166973**	**165998**
TRANSPORT	Municipal Park	27	N/A
	Transport public municipal	1553	1222
	Private and commercial transport	22728	27560
Subtotal SECTOR		**24308**	**28782**
OTHERS	Waste management	25497	6006
	Wastewater management	4	13
	Agriculture	N/A	50
Total		**216783**	**200849**
Total number of inhabitants		**94594**	**84567**
Local IMPACT – CO2 emissions, tons of CO2/capita		**2.29**	**2.38**

Table 3 *– Centralization of energy consumption and CO2 emissions at sectoral level*[1]

[1] N/A no data were available or required for the purpose of quantifying CO2 emissions

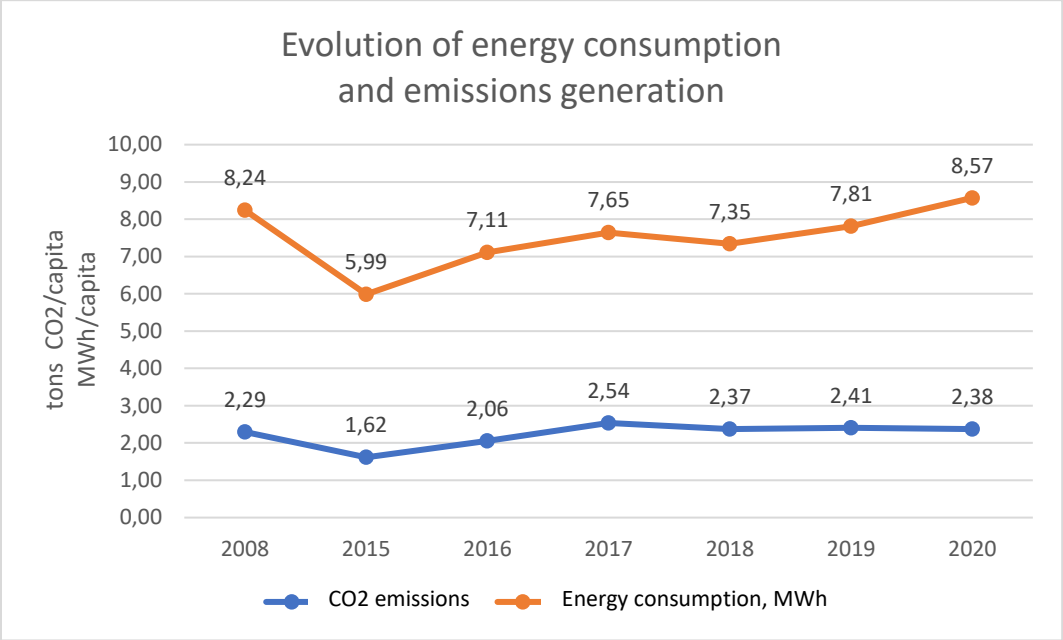


Figure 9 *- Greenhouse gas (GHG) emissions and final energy consumption per capita for the period 2015-2020, compared to the reference year 2008*

The impact of energy consumption on the carbon footprint at local level in the Municipality of Reșița is highlighted by the emissions expressed in tons of CO2/year/capita. Overall, there is a decreasing trend in CO_2 emissions at local level in 2015, followed by a relative increase in the following years. Through the implementation of measures at the community level, the per capita carbon footprint in 2020 was 2.38 tons of CO2/year. These developments underline the need for a thorough analysis of the factors that influenced the observed changes, in order to identify possible measures and policies that contribute to reducing CO2 emissions and optimizing energy consumption in the future.

3.1.3. Progress of measures implemented between 2016 and 2020 by sector

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
1	*Municipal buildings, equipment/facilities*	Reconstruction, restoration, reconditioning, refunctionalization of representative buildings, with historical, memorial and environmental value	Reșița City Hall	2016-2020	5000000	Partially	50%	
2	*Municipal buildings, equipment/facilities*	Rehabilitation, modernization and expansion of the existing housing stock (including social housing)	Reșița City Hall	2016-2020	2800000	Partially	90%	Estimated energy savings: 400 MWh Emission reductions: 81 tons CO2
3	*Municipal buildings, equipment/facilities*	Roof structure with attic at the gym – Economic College of Mountainous Banat	Reșița City Hall	2015-2016	545963	Completed	100%	Estimated energy savings: 165 MWh Emission reductions: 33 tons CO2
4	*Municipal buildings, equipment/facilities*	Exterior thermal insulation on the facades of the P+3E building of the Traian Lalescu National College - primary school	Reșița City Hall	2015-2016	117812	Completed	100%	Estimated energy savings: 165 MWh Emission reductions: 33 tons CO2
5	*Municipal buildings, equipment/facilities*	Thermal rehabilitation of the façade of the high school and secondary school Traian Lalescu National College	Reșița City Hall	2016-2016	133333	Completed	100%	
6	*Municipal buildings, equipment/facilities*	Thermo-energetic rehabilitation at the Technical College	Reșița City Hall	2016-2020	800000	Completed	100%	Estimated energy savings: 200 MWh Emission reductions: 40 tons CO2
7	*Municipal buildings, equipment/facilities*	Thermo-energetic rehabilitation at the Cărășan Technical College	Reșița City Hall	2016-2020	800000	Delayed		
8	*Municipal buildings, equipment/facilities*	Thermal rehabilitation of the attic floor of the Sabin Păuța Art High School in Reșița	Reșița City Hall	2016-2020	159764	Delayed		Estimated energy savings: 261 MWh Emission reductions: 53 tons CO2

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
9	*Municipal buildings, equipment/facilities*	Modernization and endowment of the building in the Govândari neighborhood (former PSI shed/former laundry near the Gloria stadium) in order to create an Intervention Center for the Voluntary Service for Emergency Situations	Reșița City Hall	2016-2018	1893662	Delayed		
10	*Municipal buildings, equipment/facilities*	Energy Efficiency – The premise of an environment in the Romania-Serbia cross-border area. Installation of solar panels for heating water at the Olympic swimming pool	Reșița City Hall	2016-2018	1288731	Completed	100%	Estimated energy savings: 500 MWh Emission reductions: 101 tons CO2
11	*Municipal buildings, equipment/facilities*	Modernization and endowment of the cultural center in Câlnic for the establishment of a Cultural Center for the preservation and promotion of traditions in Reșița	Reșița City Hall	2017-2018	828313	Delayed		
12	*Municipal buildings, equipment/facilities*	Rehabilitation and modernization of the Didactic Swimming Pool on December Revolution Boulevard	Reșița City Hall	2016-2018	2126372	Partially	90%	Nearing completion
13	*Municipal buildings, equipment/facilities*	Arrangement of a medical space for hydrokinetotherapeutic recovery	Reșița City Hall	2016-2020	186001	Delayed		
14	*Municipal buildings, equipment/facilities*	Rehabilitation and equipping of medical offices	Reșița City Hall	2016-2020	28889	Partially	90%	Nearing completion
15	*Municipal buildings, equipment/facilities*	Modernization of the "Mircea Chivu" football stadium	Reșița City Hall	2016-2020	7587090	Delayed		
16	*Municipal buildings, equipment/facilities*	Rehabilitation of the school infrastructure of the Municipality of Reșița, kindergartens (Enchanted Palace, Pinochio, Riki-Priki, PN3, Floarea Soarelui, Dumbrava Minunată) and Mihai Peia Secondary School.	Reșița City Hall	2016-2020	5800000	Partially	80%	

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
17	*Municipal buildings, equipment/facilities*	Energy audits of all administrative buildings and identification of energy saving opportunities	Reșița City Hall	2016-2018	20000	Partially	50%	
18	*Residential buildings*	Increasing the energy efficiency of the tower blocks of flats in the Municipality of Reșița – 2000 apartments (included in Annex 1)	Reșița City Hall	2016-2020	10000000	Partially	90%	Estimated energy savings: 4300 MWh Emission reductions: 869 tons CO2
19	*Residential buildings*	Supporting Investments in Energy Efficiency of Apartment Blocks, 18, 19, 20 I.L. Caragiale Street – 120 apartments	Reșița City Hall	2015-2016	420402	Completed	100%	Estimated energy savings: 345 MWh Emission reductions: 70 tons CO2
20	*Residential and institutional buildings*	Increased energy efficiency of approx. 80% of the total residential blocks in the Municipality, and institutional buildings. Citizen awareness, support in the process and creating incentives for the process	Reșița City Hall	2016-2020		Partially	90%	Estimated energy savings: 87500 MWh Emission reductions: 17675 tons CO2
21	*Municipal public lighting*	Modernization and extension of the public lighting system in the Municipality of Reșița. Introduction of the architectural lighting system of buildings and objects of heritage and public forum in the Municipality of Reșița – 1590 lighting fixtures	Reșița City Hall	2016-2020	984280	Partially	90%	
22	*Municipal public lighting*	Extension and modernization of the public lighting system by replacing the existing lamps with LED ones – road – 1512 street lighting fixtures	Reșița City Hall	2016-2020	182503	Partially	90%	Estimated energy savings: 414 MWh Emission reductions: 290 tons CO2

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
23	*Municipal public lighting*	Pedestrian lighting – installation of poles equipped with LED lighting fixtures – 414 pedestrian lighting fixtures	Reșița City Hall	2016-2020		Partially	90%	Estimated energy savings: 116 MWh Emission reductions: 81 tons CO2
24	*Transport public*	Modernization of streets – roads of local interest – in neighborhoods belonging to the Municipality of Reșița – Doman, Câlnic, Țerova, Secu, Cuptoare and Moniom village	Reșița City Hall	2016-2020	3604320	Partially	50%	Partially realized (Secu)
25	*Transport public*	Modernization of streets in the Municipality of Reșița	Reșița City Hall	2016-2020	10000000	Partially	60%	Estimated energy savings: 12549 MWh Emission reductions: 3304 tons CO2
26	*Transport public*	Modernization of roads and public transport, with the arrangement of bicycle lanes, sidewalks, green alignments, urban furniture.	Reșița City Hall	2016-2020	25000000	Partially	90%	Estimated energy savings: 6136 MWh Emission reductions: 1573 tons CO2
27	*Transport public*	Arrangement of bicycle lanes between the Lunca Bârzavei neighborhood and the Old Center.	Reșița City Hall	2016-2020	947676	Completed	100%	
28	*Transport public*	Bypass for diverting heavy traffic from the city	CNADR	2016-2030	17471610	Delayed		Estimated energy savings: 3200 MWh Emission reductions: 854 tons CO2
29	*Transport public*	Rehabilitation of roads of local interest to the Secu tourist area (administrative limit of the municipality of Reșița)	Reșița City Hall	2016-2018	3465646	Delayed		

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
30	*Transport public*	Road connection between Calea Timișorii and the Military Unit in Reșița Municipality	Reșița City Hall	2016-2018	657380	Completed	100%	
31	*Transport public*	Restoration of paved road, footbridges and retaining walls affected by calamities, str. Butovăț	Reșița City Hall	2015-2016	145257	Completed	100%	
32	*Transport public*	Agricultural road development in Reșița Municipality	Reșița City Hall	2016-2020	1179812	Delayed		
33	*Photovoltaic*	Arrangement of domestic hot water production facilities using solar panels or hybrid panels, located at sports facilities that have large capacity locker rooms	Reșița City Hall	2016-2018	250000	Delayed		Estimated energy savings: 100 MWh Emission reductions: 20 tons CO2
34	*Local thermal energy production*	Installation of individual heating plants in each educational unit, in order to punctually solve the supply of thermal energy	Reșița City Hall	2016-2016	756181	Completed	100%	Estimated energy savings: 1352 MWh Emission reductions: 273 tons CO2
35	*Strategic urban planning*	Arrangement of Parks: Tricolorului, Cărășana, Moroasa and arrangement of green spaces in the Municipality of Reșița	Reșița City Hall	2015-2016	1521054	Partially	90%	
36	*Strategic urban planning*	Arrangement of a leisure area (according to the Picnic Law 54/2012) in the Municipality of Reșița	Reșița City Hall	2016-2020	1000000	Delayed		
37	*Strategic urban planning*	Rehabilitation of the Dacia Cinema	Reșița City Hall	2016-2018	4017310	Delayed		Estimated energy savings: 200 MWh Emission reductions: 40 tons CO2

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
38	*Strategic urban planning*	Paved road restoration	Reșița City Hall	2016-2016	201315	Partially	50%	
39	*Strategic urban planning*	Sustainable Urban Mobility Plan for the Municipality of Reșița	Reșița City Hall	2016-2016	28523	Completed	100%	Estimated energy savings: 9174 MWh Emission reductions: 991 tons CO2
40	*Strategic urban planning*	We learn outdoors and protect the environment! Landscaping 200 m2planting 22 trees	Euroland Banat Association Parents' Association The Enchanted Palace Kindergarten in Reșița	2016-2016	2516	Completed	100%	
41	*Strategic urban planning*	Ecoschoolchildren TLNC, 630 sqm of green space and planting of 204 trees	The Association of Parents of the Traian Lalescu Theoretical High School Traian Lalescu National College Reșița Municipality	2015-2016	2273	Completed	100%	
42	*Strategic urban planning*	Garden TheatreArrangement 650 m2 with flowers	RICKI-PRICHI Kindergarten Parents' Committee Association RICKI-PRICHI Reșița Extended Kindergarten Reșița Municipality	2015-2016	2673	Completed	100%	

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
43	*Strategic urban planning*	Installation of a street monitoring system in the Municipality of Reșița	Reșița City Hall	2016-2020	1000000	Partially	90%	
44	*Energy efficiency requirements/standards*	Implement ISO 50001 certification	Reșița City Hall	2016-2017		Partially	90%	
45	*Green procurement*	Development of criteria for green procurement at local level. Their inclusion in the specification for purchases of products and services	Reșița City Hall	2016-2017		Completed	100%	
46	*Local awareness and networking*	Promoting joint initiatives in the field of tourism	Reșița City Hall	2016-2018	688353	Completed	100%	
47	*Local awareness and networking*	Improving the quality and time of service provision by the Reșița City Hall	Reșița City Hall	2016-2016	500000	Partially	90%	
48	*Local awareness and networking*	Annual organization of the ENERGY DAY. Annual awareness of citizens on energy efficiency at home level.	Reșița City Hall	2016-2020	15000	Delayed		Estimated energy savings: 22000 MWh Emission reductions: 6456 tons CO2
49	*Local awareness and networking*	Promoting employment and strengthening basic services for inclusive growth, social and cultural inclusion	Reșița City Hall	2016-2018		Delayed		
50	*Local awareness and networking*	Sourcing firewood from sustainable sources. Promoting this concept and strengthening the control of uncontrolled deforestation	Forest District	2016-2018	3500	Delayed		Emission reductions: 3575 tons CO2
51	*Local awareness and networking*	Awareness of the tertiary sector regarding energy efficiency. Creating a good practice guide and distributing it locally	Reșița City Hall	2016-2018	15000	Completed	100%	Estimated energy savings: 6799 MWh Emission reductions: 2782 tons CO2

Nr.crt	Sector	Action	Responsible	Planned deployment	Estimated costs (Euro)	Status	Progress (%)	Observations
52	*Waste*	Extension of the integrated waste management system in the municipality of Reșița	County Council	2015-2016	1000000	Partially	90%	Emission reductions: 3824 tons CO2
53	*Waste*	Developing a simple guide to raising awareness of the selective collection process and the tools offered to the citizen	Reșița City Hall	2016-2017	6000	Completed	100%	Emission reductions: 785 tons CO2
54	*Water/Sewerage*	Domestic sewerage and wastewater treatment plant in Doman - Reșița Municipality	Reșița City Hall	2016-2020	1310220	Delayed		
55	*Water/Sewerage*	Domestic sewerage and treatment plant in Secu, Cuptoare and Moniom village - Reșița Municipality	Reșița City Hall	2016-2020	2409030	Partially	90%	Partially realized (Secu)
56	*Water/Sewerage*	Water supply in Doman - Reșița Municipality	Reșița City Hall	2015-2016	1086877	Delayed		
57	*Water/Sewerage*	Water supply in Secu, Cuptoare and Moniom village - Reșița Municipality	Reșița City Hall	2015-2016	1406503	Partially	90%	Partially realized (Secu)
58	*Water/Sewerage*	Rehabilitation and extension of water distribution and sewerage network transfer pipes - Reșița Municipality	Reșița City Hall	2016-2016	14800000	Partially	90%	Estimated energy savings: 552 MWh Emission reductions: 387 tons CO2

4 Climate Risk and Vulnerability Assessment (RVA)

4.1 Methodologies

Within the analysis of climate risks and vulnerabilities, carried out according to the specific PAEDC methodology, those risks and vulnerabilities that can endanger the municipality of Reșița were identified, following the following steps: (Center, 2018)

At the beginning, the physical-geographical elements specific to the region in which Reșița is located were identified, such as the main landforms, the hydrographic network, the climatic characteristics and the types of vegetation. Then, the demographic and economic aspects of the city were analysed, as well as the climatic events and incidents that have caused damage and victims on the territory of the locality in recent years.

The analysis and assessment of climatic hazards at the level of the municipality of Reșița was carried out taking into account the reference period 2005–2022, by processing data provided by the National Meteorological Administration, correlated with other information provided by the Inspectorate of Emergency Situations "Semenic" of Caraș-Severin County, regarding the interventions within the Reșița ATU that were related to meteorological phenomena. Other related information regarding certain trends and forecasts of short, medium and long-term climate factors were taken from the "Report on the state of the environment in Caraș-Severin County 2022" and from the assessment provided by the European Environment Agency for Climate ADAPT.(Climate Adapt)

Also, within the analysis and assessment of climate hazards at the level of the municipality of Reșița, a series of existing reports were taken into account, regarding the risks and impacts caused by climate change in the area of interest or carried out at national level. The following documents were consulted and analysed:

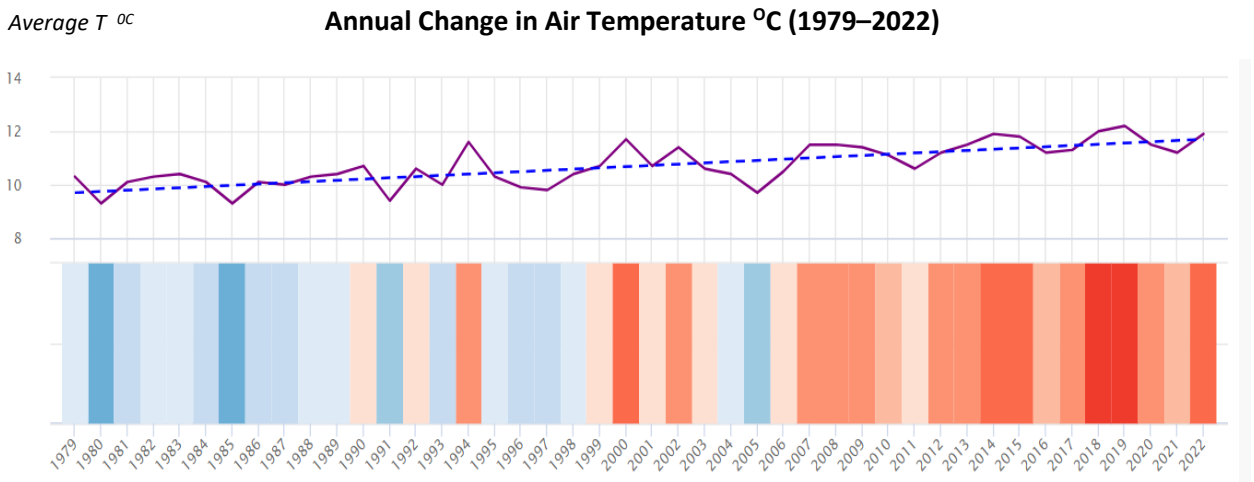
- National Strategy - Adaptation to Climate Change 2022-2030 with a 2050 perspective (SNASC), Plan for the implementation of the National Strategy on Adaptation to Climate Change (PNASC) published in 2022;
- The National Strategy for Romania's Sustainable Development 2030, developed by the Romanian Government and published in 2018;
- Risk Analysis and Coverage Plan of Caraș-Severin County, published in 2021;
- Flood risk management plan – Banat Water Basin Administration, updated;

4.2 Local diagnostic

The recent past has shown us that climate change and the extreme weather events associated with it have come to negatively affect more and more aspects of daily life and the notion of climate resilience has begun to play an important role in this context. The way we respond to these changes and impacts caused by climate change is closely linked to the way we adapt management models, develop processes, make decisions, undertake action plans, develop infrastructure that is easy for the population and protect it against the effects that lead to the deterioration of health or even cohabitation in the city.

The analysis of the evolution of the climatic parameters was based on two approaches. The first one considered an analysis of the evolution of the climatic parameters at the level of the region to which the city of Reșița belongs and is based on a series of **estimated meteorological data**, provided by the www.meteoblue.com website. The data source used by the meteoblue.com is ERA5, the fifth generation ECMWF atmospheric reanalysis of global climate, covering **the 1979-2022 time frame**, with a **spatial resolution of 30 km**. The diagrams below highlight how climate change has already affected **the Reșița region** over the past 40 years. At the same time, we mention that the temperatures in the city of Reșița will often be higher than those shown in the graphs and the rainfall may vary locally, depending on the topography.

Analysis of air temperature developments



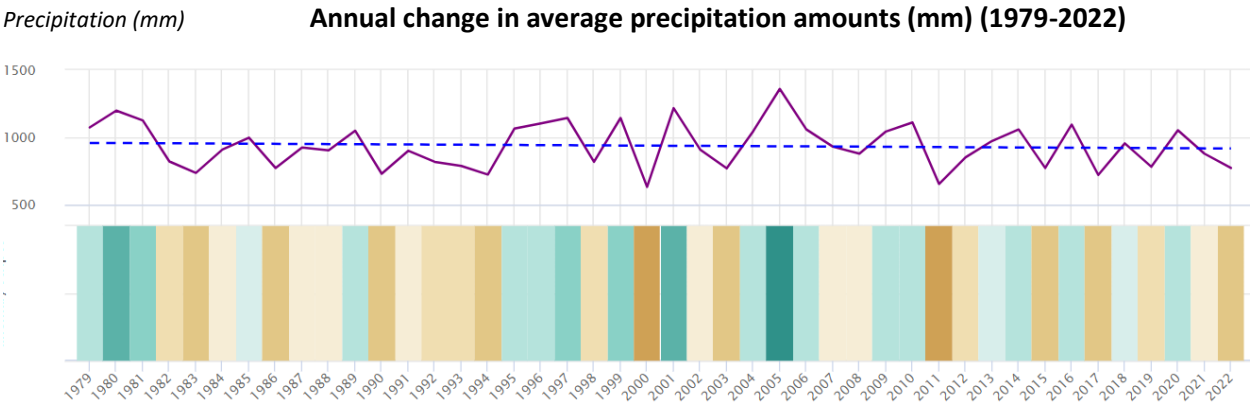
Source: meteoblue.com

***Graph 10** - Annual change in air temperature OC (1979–2022)*

The graph above captures an estimate of the evolution of the average annual air temperature in the last 43 years for the region where Reșița was located, the blue line dotted ascending from left to right highlighting a clear trend of temperature increase due to climate change. At the bottom, the graph shows

a series of colored bands for average temperatures by year, with shades of blue assigned to colder years and shades of red to warmer years. Bands in deeper shades of red are increasingly common after the year 2000, indicating a warming of the average annual air temperature locally.

Analysis of precipitation trends



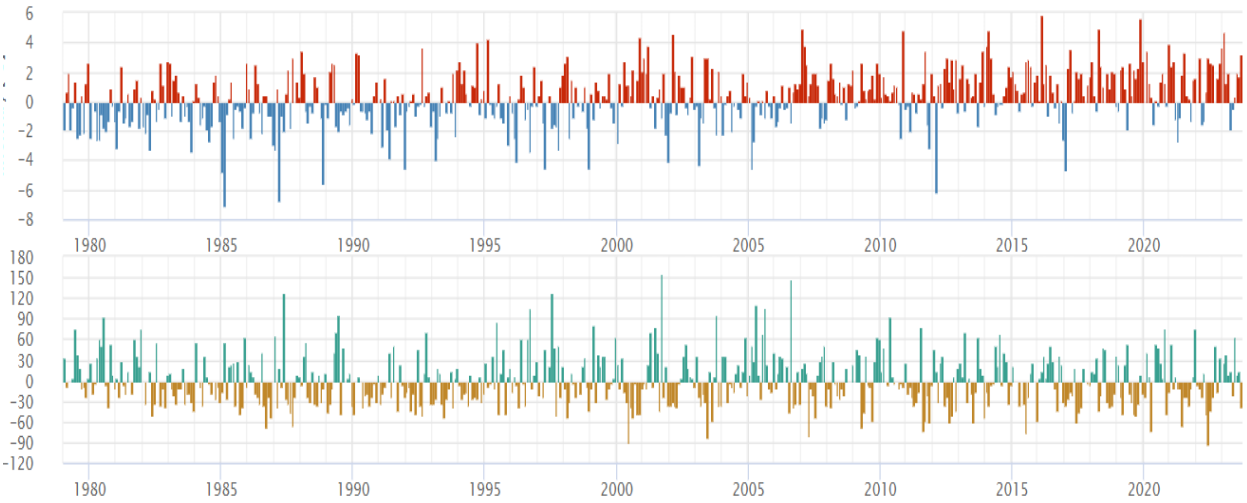
Source: meteoblue.com

***Graph 11** - Annual change in average precipitation amounts (mm) (1979-2022)*

The diagram shows the estimated evolution of the average total precipitation amounts for the region in which Reșița is located. The linear trend represented by the dotted blue line is a slightly downward one, signaling a significant decrease in the amounts of precipitation fallen. The colored bands represent the total rainfall of a year, green for years with higher rainfall and brown for drier years.

Analysis of monthly temperature and precipitation anomalies

Monthly temperature and precipitation anomalies (1979-2022) - Climate change Reșița



Anomaly - precipitation (mm) Source: meteoblue.com

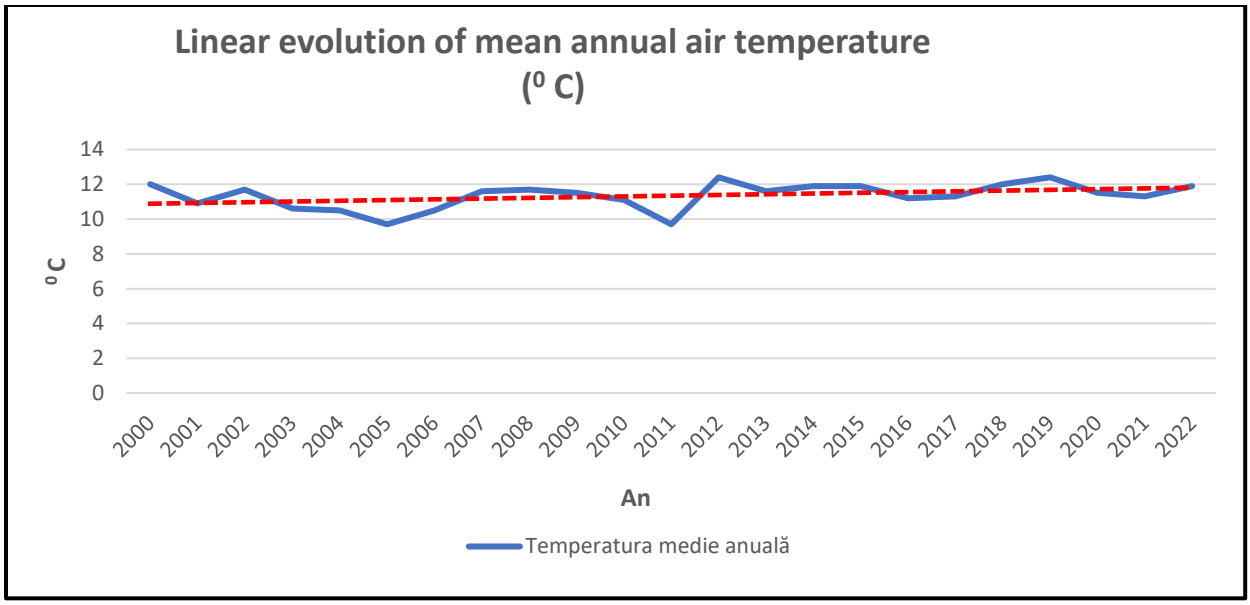
***Graph 12** - Monthly temperature and precipitation anomalies (1979-2022) - Climate change Reșița*

Temperature-related anomalies for each month from 1979 to 2022 are shown at the top of the graph, indicating how many degrees Celsius was estimated to have been warmer or colder relative to the 30-year climate average from 1980 to 2010. The red vertical lines represent moons that were warmer and the blue ones colder than normal. In the last 20 years, an increase in warmer than average months can be seen quite obviously over the years, which reflects a warming associated with climate change. At the bottom of the graph you can see the anomalies related to the amounts of precipitation fallen for each month from 1979 to the present, compared to the 30-year climate average from 1980 to 2010. Thus, the green vertical lines represent the months richer in precipitation than average, and the brown vertical lines represent the drier months than normal. The ratio between the two variables is a relatively balanced one, with a small predominance of drier months in the last 10 years.

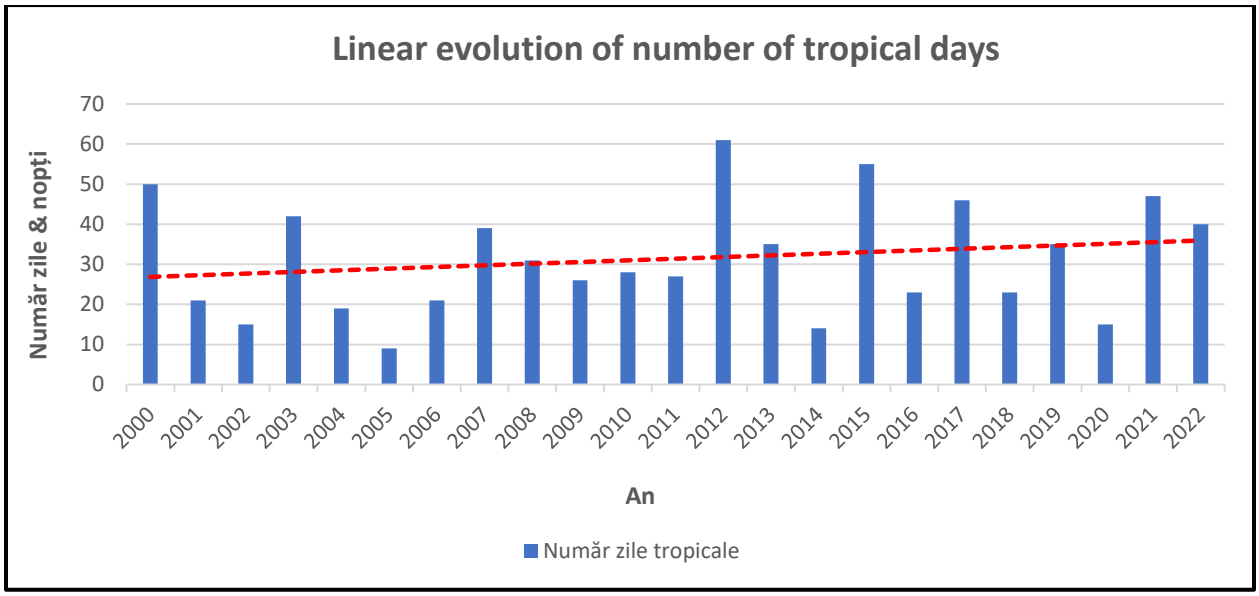
The second approach to the analysis of the evolution of climatic parameters is based on **a series of data measured locally**, at the Reșița weather station, for the time interval 2000–2022, the data being provided by the National Institute of Meteorology. The main climatic parameters analysed were the average annual air temperature, the number of tropical days and nights, the total amounts of precipitation fallen annually and in 24 hours, as well as the average wind speed, being grouped in the table below, as follows:

ANALYSIS OF THE EVOLUTION OF CLIMATIC PARAMETERS – REȘIȚA (2000-2022)						
YEAR	**Average annual air temperature ^{0}C**	**Number of tropical days**	**Number of tropical nights**	**Total amount of precipitation mm**	**Average amount of precipitation in 24h mm**	**Average wind speed m/s**
2000	12,0	50	4	443	13,7	9,5
2001	10,9	21	2	930	19,4	9,3
2002	11,7	15	2	710	19,8	9,1
2003	10,6	42	4	721	18,2	13,4
2004	10,5	19	1	836	20,3	15,4
2005	9,7	9	0	1101	26,7	11,4
2006	10,5	21	1	831	23,8	10,3
2007	11,6	39	5	904	22,8	11,6
2008	11,7	31	2	836	23,1	11,2
2009	11,5	26	1	843	19,8	10,8
2010	11,1	28	1	882	19,1	12,5
2011	9,7	27	2	747	20,0	9,9
2012	12,4	61	4	636	17,7	10,4
2013	11,6	35	0	812	18,7	11,2
2014	11,9	14	1	1022	29,2	10,3
2015	11,9	55	3	552	14,7	9,4
2016	11,2	23	2	1048	30,1	10,7
2017	11,3	46	3	701	21,6	12,4
2018	12,0	23	2	985	27,0	9,9
2019	12,4	35	0	771	20,0	10,5
2020	11,5	15	0	946	28,9	11,2
2021	11,3	47	6	711	19,8	10,5
2022	11,9	40	0	724	18,2	10,7

Based on these primary data, several summary diagrams were generated to capture, in the most suggestive way, the evolution and trends observed at local level of the main climatic parameters analysed.



The graph above captures a slightly upward linear evolution of the average annual air temperature in the municipality of Reșița, indicating a gradual warming effect, being a direct result of climate changes.

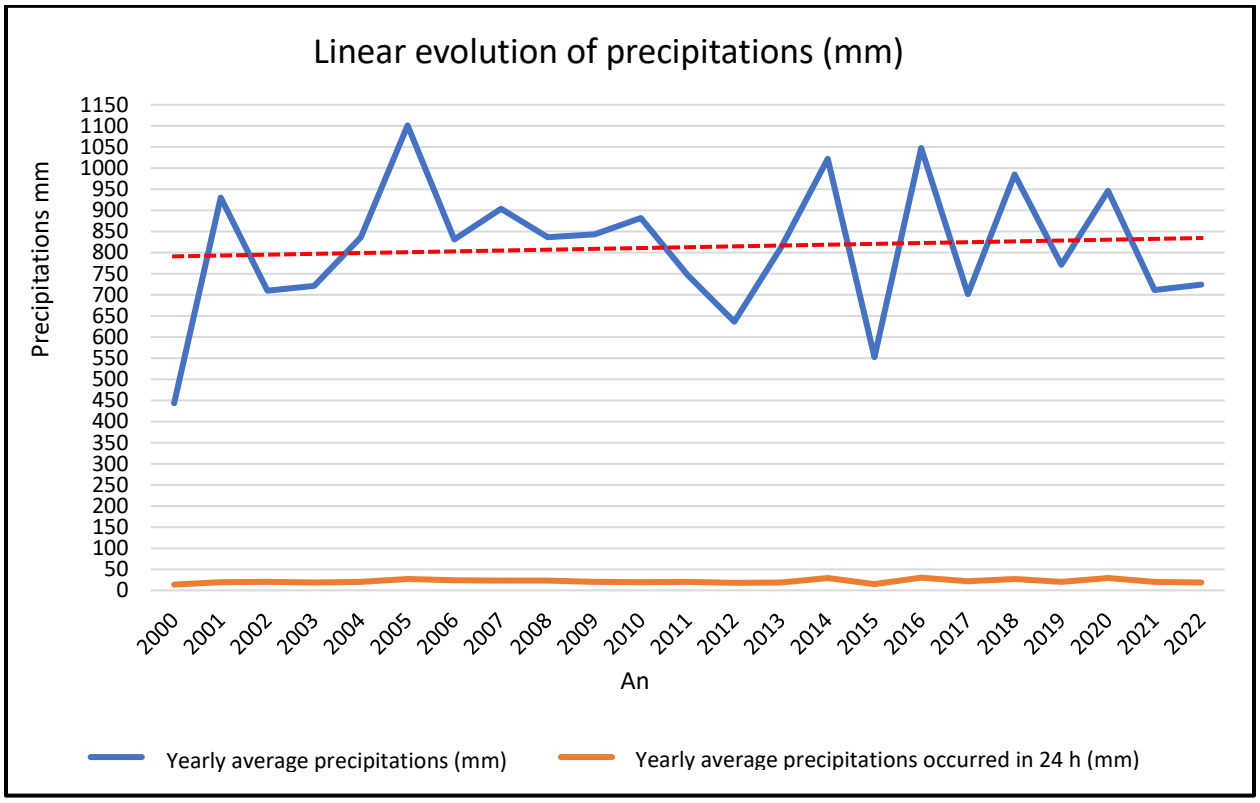


Graph 13 *- Monthly temperature and precipitation anomalies (1979-2022) - Climate change Reșița*

The graph referring to the linear evolution of tropical days (days with air temperatures above 30 ^{0}C) also highlights an increase in their number at local level, with a direct impact on the local climate.

In cities, the air temperature is often higher compared to adjacent areas, the phenomenon being known as the "urban heat island". This phenomenon occurs in all seasons of the year, but the strongest negative effects are felt especially in the summer season. The temperature differences recorded between urban and rural areas can exceptionally exceed 10 ^{0}C, but most of the time, cities are 1-5 0C warmer at night, and 0.5 -2 ^{0}C during the day, a situation that also applies to Reșița. If in the cold season the phenomenon is rather beneficial, reducing the heating costs of buildings, during the summer the heat island amplifies the effect of heat waves and causes accentuated thermal discomfort, with major risks for the health of the resident population. The increase in temperature is mainly caused by the type of materials used and the structures encountered in the urban environment, but also by the activities carried out by man. The strongest effect is encountered during dry periods, when the movement of air currents is reduced, the weather is calm and the sky is clear. Green spaces, areas with trees and shrubs and water shine have a protective role and favour air cooling, while concrete and asphalt, for example, store more heat during the day than natural surfaces, gradually giving it to the environment during the night.

As mentioned earlier, human activities also play an important role in "urban heat islands". As a result, machines, construction sites, industrial plants and air conditioning units emit heat into the environment.



Graph 14 *- Monthly temperature and precipitation anomalies (1979-2022) - Climate change Reșița*

The meteorological data regarding the annual precipitation amounts recorded in Reșița as well as the average annual precipitation amounts recorded locally in 24 hours were processed in the above graph. A

slightly upward trend in the annual precipitation intake can be observed on the one hand and a greater fluctuation in the amounts of precipitation fallen in 24 hours. Although water resources from precipitation, rivers and lakes upstream easily cover the water requirement at the municipal level, the fluctuation and amounts of precipitation that fall in a 24-hour period often exceed the capacity of the local hydrographic network, green areas and the city's drainage and sewerage system, leading to floods, landslides, alluvial deposits, etc.

The risks generating emergency situations at the level of Caraș-Severin county, which have been identified and assessed by ISU Semenic, are presented in the "Scheme with territorial risks in the area of competence", being grouped into the following risk categories:

A. NATURAL RISKS

This category includes:

- **Dangerous weather phenomena**: storms (accompanied by strong winds, massive precipitation, hail); floods (water overflow, runoff from slopes, dam breaks); tornadoes, drought, frost (bridges and ice dams on water, massive snowfall, frost, sleet).
- **Fires**: forest fires, dry vegetation or straw cereal crops.
- **Avalanches**
- **Destructive phenomena of geological origin**: landslides, rockfalls and earthquakes

B. TECHNOLOGICAL RISKS

They are grouped into:

- **industrial accidents, damages, explosions and fires** (including landslides caused by mining or other technological activities; land, air and naval transport, tunnels and cable transport), transport and storage of products, transport, nuclear
- **water pollution** due to discharges from production units, commercial units or households
- **collapses of constructions, installations or landscaping**
- **failure of public utilities**: important radio, television, telephone, communications, electricity, gas, heat, water supply, sewerage and wastewater and rainwater treatment networks.
- **falling objects from the atmosphere or the cosmos**
- **Unexploded ordnance**

C. BIOLOGICAL RISKS:

- **epidemii**
- **epizotii/zoonoze**
- **accidental pollution**

A. SOCIAL RISKS

According to the latest risk analysis and coverage plan of Caraș – Severin county published in 2021, a series of natural risks generating emergency situations have been identified at the level of the municipality of Reșița, which have been assimilated to dangerous weather phenomena: (Consiliul Jedetean Caras-Severin)

FLOODS

Floods resulting from heavy torrential rains that fall in short periods of time, which may be accompanied by intensifications of the wind with the appearance of a gale;

At the level of the municipality, on the Bârzava River, the floodable areas from the overflows of the watercourse extend over an area of approximately 105 ha. Among the most notable events of this kind recorded in Reșița, also reported in the local and central press, we mention: in 2018, at least 15 streets were affected by floods; In July 2020, a torrential rain flooded several streets, blocking car and public transport traffic; this year (2023) in May, Reșița was affected by serious floods, a special situation being recorded on Mihail Kogălniceanu Street where the streams coming from the slopes led to floods that blocked the sewerage system so that the entire street was swept away by a real flood, about 20 cars being taken by the water.

DROUGHT PHENOMENA

The phenomena of accentuated drought (hydrological and pedological) have also left their mark on the locality, including the prolonged hydrological drought in the winter of 2011–2012, when it was necessary to take measures to optimize the water supply of Reșița.

LANDSLIDES

Another destructive phenomenon, of geological origin, which has repeatedly affected the municipality of Reșița, is **represented by landslides**, the area (Târnova-Carașova-Gărâna-Reșița-Văliug) being classified in the area with a high probability of occurrence of these phenomena. Here we can mention the landslides that occurred in 2005 between March-April-May, on Dealul Ciorii (Dealul Lupacului) that affected the houses on 24 Janeiro Street, a street located at the end of the Moroasa Carter or the landslides at a privately owned building located on Murelor Street; in 2015 two houses on Aviatorilor Street were endangered after the hill behind them went downhill; in 2018 on str. Canalului, a landslide affected a number of two households.

From the report drawn up by the Inspectorate for Emergency Situations "Semenic" of Caraș – Severin County, regarding the interventions within the Reșița ATU that were related to extreme weather phenomena in the period 2005-2023, we can see that every year there were floods and storms that caused significant material damage and even loss of human lives. Also, drought phenomena and heavy snowfalls also affected the municipality once every few years. In terms of material damage produced, we mention that 2023 is a reference year, with total reported damages of over 10000000000 lei and one person died as a result of a storm.

Year	Type of emergency situation	ISU CS Intervention		Value of damages from CJSU summary reports	Victims
		Number	Damage value (RON)	Damage value (RON	
2005	Drought	2	334000	21199900	0
	Flood	31			
2006	Flood	7	0	128018000	0
2007	Storms	5	1000	0	0
	Flood	13			
2008	Storms	4	0	0	0
	Flood	9			
2009	Flood	18	0	0	0
	Heavy snowfall	12	0	0	0
	Storms	2	0	0	0
2010	Drought	5	0	0	2 (caught by the flood)
	Flood	28	0	0	
	Storms	5	0	0	
2011	Flood	22	0	0	0
	Drought	6	0	0	0
2012	Flood	3	0	0	0
2013	Flood	7	0	0	0
	Drought	3	0	0	0
2014	Flood	43	0	78621000	0
	Storms	7	0		0
	Drought	4	0		0
2015	Heavy snowfall	11	0	0	0
	Flood	2	0	0	0
	Drought	2	0	0	0
2016	Flood	74	0	449291000	0
	Storms	3	0		0
	Drought	2	0		0
2017	Drought	6	0	60713000	0

Year	Type of emergency situation	ISU CS Intervention		Value of damages from CJSU summary reports	Victims
		Number	Damage value (RON)	Damage value (RON	
	Flood	11	0		0
	Storms	20	0		0
2018	Flood	41	0	131677000	0
	Storms	30	0		0
	Heavy snowfall	32	0		0
2019	Flood	19	0	150317000	0
	Storms	13	0		0
2020	Flood	14	0	0	0
	Storms	17	0	0	0
2021	Storms	11	1000	171000	0
	Flood	8			0
2022	Storms	1	0	34863000	0
	Flood	2	0		0
2023	Storms	111	660000	1154252000	1
	Flood	105			0

Table 4 *- The situation of floods and their damages on the territory of the municipality of Reșița in the period 2005 – 2023 (Source: ISU Semenic)*

Regarding the climate and climate change in Caraș – Severin County, according to the projections made with a set of 6 regional climate models within the EURO-CORDEX Programme, future trends show important changes in the evolution of the main climate parameters.

By 2050, depending on the scenario of global increase in the concentration of greenhouse gases, compared to the reference interval 1971–2000, the main climatic parameters at the level of Caraș-Severin County could evolve as follows:

in the case of a moderate scenario of global increase in greenhouse gas concentration (**RCP 4.5, IPCC),** the increase in the average annual temperature could be around **1.3-1.4°C**; as regards extreme weather events, projections suggest an increase in the average annual number of hot days (above 35°C) with high thermal discomfort, especially in the western regions of the county, and a higher average annual number of days with higher daily precipitation 20 l/m2;

in the case of a more severe scenario with a strong global increase in greenhouse gas concentration (**RCP 8.5, IPCC),** the increase in the average annual temperature could reach values of **up to 1.5°C**; the increase

in the average annual number of days with temperatures above 35°C and the average annual number of days with daily precipitation amounts **above 20 l/m2** are more pronounced;

The estimated annual precipitation amounts for the county will undergo changes in the sum of the annual precipitation quantities, with values ranging from **-1% and 2%**, depending on the scenario analysed (**CPR 4.5 and CPR 8.5**); Also, the amounts of summer precipitation will decrease by up to 15% in the southern areas of the county.(APM Caras Severin , 2023)

	Current risks	**Anticipated risks**			
Type of climate hazard	**Current level of hazard risk**	**Expected change in intensity**	**Expected change in frequency**	**Time frame**	**Risk indicators**
Extreme heat	Elevated	Increase	Increase	Short term	Number of tropical days / year; Frequency and duration of heat waves /year
Extreme cold	Reduced	Increase	No change	Short term	Number of frost days
Extreme rainfall	Elevated	Increase	Increase	Short term	Amount of precipitation m2/24 h Quantity of alluvium m3/24 h
Flood	Elevated	Increase	Increase	Short term	No. of events, affected area, damage value
Droughts	Moderate	Increase	Increase	Short term	Number of events, damage value
Storms	Elevated	Increase	Increase	Short term	Number of events, damage value
Heavy snowfall	Reduced	Increase	Increase	Short term	Number of events, damage value
Forest fires, vegetation fires	Reduced	Increase	Increase	Medium term	Number of events, damage value
Landslides	Moderate	Increase	Increase	Short term	Number of events, damage value
Biological hazards	Reduced	Not known	Increase	Long term	Number of illnesses Crop damage value

Table 5 *- Risks of climate hazards with specific relevance for the Municipality of Reșița*

Type of climate hazard	Level of risk	Expected change in intensity	Expected change in frequency	Time frame
Extreme heat	!!!	↑	↑	|►
Extreme cold	!	↑	↔	|►
Extreme rainfall	!!!	↑	↑	|►
Flood	!!!	↑	↑	|►
Droughts	!!	↑	↑	|►
Storms	!!!	↑	↑	|►
Heavy snowfall	!	↑	↑	|►
Forest fires, vegetation fires	!	↑	↑	|►►
Landslides	!!	↑	↑	|►
Biological hazards	!	**[?]**	↑	|►►►

Table 6 *- Risk assessment matrix*

!:Reduced	↑: Growth	|:Currently
!!:Moderate	↓: Decrease	|►: Short term (0-5 years)
!!:Elevated	↔: Nicio schimbare	|►►: Medium term (5-15 years)
[?]: Not known	**[?]**: Not known	|►►►: Long term (over 15 years)
		[?]: Not known

The following socio-economic and environmental vulnerabilities have been identified:

Type of vulnerability	Description of the vulnerability		Vulnerability indicators
	Vulnerability	Impact	
Socio-economic	Rising temperatures and periods of extreme temperatures, respectively	Substantial increases in energy consumption for cooling buildings	Annual energy consumption kWh/institutional or residential buildings
	Falling temperatures and increasing intensity of periods of extreme temperatures	Substantial increases in energy consumption for heating buildings	Annual energy consumption kWh/institutional or residential buildings
	Torrential rains, with large amounts of water falling in short intervals of time	Flooding of land surfaces, streets, basements of buildings, etc.	Annual rainfall (mm)/year Maximum precipitation (mm)/year
	Strong winds with the appearance of a gale	Material damage and human victims: breaking or uprooting of trees, discoveries of buildings, breaking of cables, falling poles, etc.	Number of events/year Număr victime/an
	Excessive heat waves, accentuated thermal discomfort	Illnesses, worsening of some diseases Increasing mortality of the elderly	Number of illnesses/1000 inhabitants Number of deaths/ 1000 inhabitants
	Periods of prolonged drought or heavy rainfall	Decrease in drinking water quality (increased turbidity, nitrates, nitrates, microbiology, etc.)	Hours of drinking water interruption due to drinking water quality/year
	Freezing rains and massive snowfalls	Material losses due to breakage of electrical cables, compromise of agricultural/fruit crops, collapse of roofs of buildings and industrial halls, car accidents	Pagube Material: RON/an
	Diseases or pests (insects)	Damage to agricultural/fruit crops and forests	No. of hectares affected/annual

Type of vulnerability	Description of the vulnerability		Vulnerability indicators
	Vulnerability	Impact	
	Boli (animal)	Animal diseases	No. of heads slaughtered/annually
	Extreme weather phenomena, soil drought	Damage to agricultural/fruit crops and forests	No. of hectares affected/annual
Physics and Environment	Increase in temperatures and periods of extreme temperatures, hydrological drought respectively	Decrease in the amount of water resources	No. of interruptions/year
	Extreme weather events	Degradation of green spaces Alluvial deposits on slopes – affecting buildings, utility infrastructure, roads and bridges	No. m2 affected/annual No. of buildings affected/year Km of road affected/year No. of affected bridges/year

Episodes of heavy rainfall recorded in short periods of time and storms will increase in intensity and frequency and will negatively affect the municipality, causing floods, runoff on slopes, landslides, damage to housing, commercial space and local infrastructure. These phenomena are amplified by the large impermeable surfaces present in the city and the lack of green spaces, trees and shrubs that could have played a "sponge" role in absorbing precipitation and stabilizing soils. In addition to the material damage caused by these phenomena, it is worth taking into account the increased risk of loss of human life. As for the increase in the frequency of hydrological and pedological drought episodes, this will affect the availability of water resources (both for human consumption and for agriculture (irrigation), animal husbandry, industry, etc.), in the sense of decreasing water reserves.

Extreme temperatures (positive and negative), heat waves and increasingly frequent frosty periods will directly affect the health of the resident population, especially vulnerable groups such as the elderly, the chronically ill and children, but also the productivity of the work performed by employees and implicitly the profitability of companies. Air quality will also suffer and the demand for energy for cooling and heating homes, administrative, commercial and industrial spaces will be increasingly high.

The assessment of climate risks and vulnerabilities affecting urban areas plays a key role in the response that municipalities can provide in terms of the adaptation and mitigation process in relation to them. The intensity of the effects generated by climate risks is directly proportional to the degree of vulnerability of people, the community, the environment and the economic spectrum.

Areas characterised by poverty, economically marginalised, high unemployment, an ageing population and poor health, people with disabilities and children are most exposed to the effects of climate change. The resources of these communities are very limited in remedying the damage caused and even more so in preventing future ones.

4.3 Resilience to climate change

After assessing the historical, current and projected climate vulnerabilities in the future, as well as the vulnerable sectors, a series of specific measures have been designed to reduce the sensitivity or increase the capacity to respond and adapt to extreme weather events, by type of affected sectors.

For each of the 11 sectors concerned, (**buildings, transport, energy, water, waste, spatial planning , agriculture and forestry, environment and biodiversity, health, civil protection and emergencies, tourism**) a hierarchy of impacts has been drawn up, taking into account the probability of their occurrence, the expected level, the time frame and the impact indicators, respectively.

VULNERABILITIES FOR BUILDINGS AND SPATIAL PLANNING

For the buildings and spatial planning sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Increasing demand for thermal envelope of buildings	Probable	Moderate	Medium term	Number of blocks with rehabilitation (renovation) requests/year
Increasing demand for indoor cooling	Probable	Moderate	Short term	Number of air conditioners purchased/year
Flooding of building basements as a result of torrential rains	Probable	Moderate	Short term	No. of buildings or companies or persons affected/year
Material damage to buildings and infrastructure as a result of extreme weather events	Probable	Moderate	Short term	Thousand euros/year
Local floods as a result of heavy rains and torrents	Probable	Moderate	Short term	Affected area m2/year No. of affected buildings/year Km of affected roads/year No. of affected bridges/year

Table 7 *- Vulnerabilities for buildings and spatial planning*

Proposed measures to reduce the probability of risk occurrence and/or to mitigate the impact:
Amending and adapting the General Urban Plan of the Municipality of Reșița by introducing norms or rules that take into account the potential impact of climate change, such as:

- Creation of technical construction criteria for green buildings and sustainable buildings (buildings with almost zero energy consumption – nZEB, green roofs, rainwater harvesting, elevation of access to buildings, use of watertight windows in basements, one-way blocking valves in sewerage systems);
- Improving planning and land-use planning procedures;
- Development of drainage and storage systems for excess rainwater (ponds, spaces for other functions)
- Raising citizens' awareness of the importance of taking out insurance for buildings that also covers the damages caused by extreme weather events;
- Adoption of sustainable urban drainage systems;
- Clear criteria for the prohibition of deforestation in the city's protection areas against alluvium;
- Implementation of an emergency intervention and response plan developed specifically for natural disasters and protection against landslides at urban level;
- Implementing a communication and awareness plan for the population to prepare an adequate response in case of disasters;
- Development of local intervention infrastructure in case of natural disasters.

TRANSPORT VULNERABILITIES
For the transport sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Rapid degradation of asphalt or tram lines (expansion/deformation) as a result of high temperatures, increase in the number of freeze/thaw cycles	Probable	Moderate	Currently	km of affected urban network/year
Blocking access roads due to fallen trees during storms or due to flooding of streets or flooding of alluvium	Probable	Reduced	Medium term	Number of blocked roads/year
Hindering/blocking public transport	Probable	Moderate	Currently	Waiting times at stations
Making road traffic more difficult	Probable	Moderate	Currently	Accident number
Falling trees or other bodies caused by storms or other extreme weather events	Probable	Moderate	Currently	Material damage expressed in Ron or victims

Table 8 *- Vulnerabilities for the transport sector*

Proposed measures to reduce the probability of risk occurrence and/or to mitigate the impact:

- Stipulating in the specifications high quality standards regarding the resistance of the asphalt carpet to high temperatures, number of freeze/thaw, wet/dry cycles;
- Implementation of technical measures to keep tram tracks at low temperatures
- Adoption of sustainable urban drainage systems;
- Unclogging/cleaning of sewerage systems, gutters and drains.
- Monitoring and maintenance of green spaces, respectively diagnosing the health status of existing trees and shrubs and grooming them.
- Measures to protect the slopes and the forest environment in the area

ENERGY VULNERABILITIES

For the energy sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Interruptions in the power supply during dry periods or extreme temperatures	Probable	Moderate	Medium term	Number of hours of interruptions/year, No. of affected consumers/year
Increased energy consumption due to temperature extremes	Probable	Moderate	Medium term	Consume the energy/an
Voltage drops or interruptions in supply due to storms and extreme weather phenomena (damaged trafo substations, conductors and poles)	Probable	Moderate	Medium term	Number of hours of interruptions/year, No. of affected consumers/year
Destruction of electrical distribution networks, including transformers	Probable	Elevated	Medium term	Number of hours of interruptions/year, No. of affected consumers/year Thousands of euros intervention and repairs/year

Table 9 *- Vulnerabilities for the energy sector*

Proposed measures to reduce the probability of risk occurrence and/or to mitigate the impact:

- Underground passage of voltage cables in urban areas;
- Adapting the number of rapid intervention teams to remedy damages according to the number of requests caused by extreme weather events;
- Locally produced renewable electricity generation and battery storage
- Transformer protection measures

VULNERABILITIES FOR WATER

For the water sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Deterioration of drinking water quality during periods of prolonged drought or heavy rainfall	Probable	Moderate	Currently	Number of situations exceeding parameters/year
Decrease in water level in the Secu reservoir during periods of prolonged drought	Probable	Moderate	Medium term	Interruption hours/year
Pollution of the waters of the Bârzava River as a result of the discharge of insufficiently treated rainwater	Probable	Moderate	Short term	Number of situations exceeding parameters/year

Table 10 *- Vulnerabilities for the water sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Awareness campaigns on the rational use of drinking water and its use only for domestic and domestic purposes;
- Capturing and reusing rainwater (domestic use, irrigation, watering green spaces, washing streets, etc.);
- Modernization and extension of the water and sewerage network;
- Awareness campaigns for upstream farmers on the excessive and improper use of fertilizers and pesticides, with a direct impact on the quality of water resources
- Implementation of regulatory requirements related to water protection at the level of economic units (productive or non-productive)

VULNERABILITIES FOR WASTE

For the waste sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Increased contamination of water and soil due to improper waste management	Probable	Reduced	Short term	Number of reported events/year
Clogging of the sewerage system and water pollution with waste following floods	Probable	Reduced	Short term	Number of reported events/year
Amplifying the process of decomposition of household waste caused by high temperatures with implications for public health	Probable	Reduced	Short term	Number of complaints reported/year

Table 11 *- Vulnerabilities for the waste sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Public awareness campaigns on proper waste management and the risks of water and soil contamination;
- Adaptation of the waste collection and storage infrastructure to the new climatic context (containers located underground with airtight closure, bins with filling level sensors, etc.)
- Implementation of regulatory requirements related to waste management at the level of economic units (productive or non-productive)

VULNERABILITIES FOR AGRICULTURE AND FORESTRY

For the agriculture and forestry sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Low or compromised agricultural yields due to prolonged soil and hydrological drought and excessive heat waves	Probable	Reduced	Short term	Number of hectares affected/year
Productions compromised due to extreme weather phenomena	Probable	Reduced	Medium term	Number of hectares affected/year
Occurrence of specific pests/diseases	Possibly	Reduced	Short term	Number of hectares affected/year
The occurrence of diseases in animals	Possibly	Medium	Medium term	Number of heads/year
Forest fires due to electrical discharges	Probable	Reduced	Medium term	Number of events/year
Wildfires due to high temperatures and drought	Probable	Reduced	Medium term	Number of events/year

Table 12 *- Vulnerabilities for the agriculture and forestry sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- The use of rainwater for irrigation of agricultural crops and not water from the supply network and the arrangement of retention basins for rainwater storage;
- Recommendations for farmers on crop rotation, respectively the choice of varieties resistant to water stress;
- Expansion of forested areas;
- Anti-hail system.
- Creation of teams specially trained in extinguishing forest/vegetation fires equipped with equipment/machines appropriate to this type of intervention
- Measures to protect the forest fund and toughen penalties for illegal deforestation

VULNERABILITIES FOR THE ENVIRONMENT AND BIODIVERSITY

For the environment and biodiversity sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Breaking or uprooting trees and shrubs during storms and storms	Probable	Elevated	Currently	NR. Arbori/AN
The emergence and expansion of invasive species to the detriment of local or endemic ones	Possibly	Medium	Medium term	% affected area/year
Damage to green spaces due to prolonged drought	Possibly	Medium	Medium term	% affected area/year No. of affected trees/year
Damage to biodiversity and the environment due to wildfires	Possibly	Medium	Short term	% affected area/year

Table 13 *- Vulnerabilities for the environment and biodiversity sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Inventory of all trees and their health status and creation of a GIS of green spaces;
- Maintenance of green spaces and grooming or pruning of dry trees;
- The use of perennial and resistant species for landscape development;
- Combating illegal logging.
- Development of plans to combat and control invasive species

HEALTH VULNERABILITIES

For the health sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Increasing mortality of people with chronic diseases during hot periods	Probable	Elevated	Medium term	No. of deaths in months with high temperatures / 1000 inhabitants
Increasing mortality of people with chronic diseases during periods of extreme cold	Possibly	Reduced	Medium term	No. of deaths in months with low temperatures / 1000 inhabitants
Increase in the number of illnesses due to the quality of drinking water	Possibly	Reduced	Medium term	No. of digestive diseases/1000 inhabitants annually
Increase in the number of illnesses due to insect bites	Possibly	Reduced	Medium term	No. of illnesses /1000 inhabitants annually

Table 14 *- Vulnerabilities for the health sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Identification and mapping of heat islands in the city;
- Ensuring free access to drinking water (street fountains, fountains) in crowded urban areas and parks;
- Arrangement of shaded spaces with a place for rest;
- Warning the population about days with extreme temperatures and recommendations on maintaining a state of relative comfort during those periods or time intervals when city travel should be avoided;
- Adoption of social measures at municipal level to ensure food and basic elements for daily living for vulnerable population segments (non-mobile people, people with reduced mobility or dependents) in case of prolonged periods with extreme temperatures (positive or negative).

VULNERABILITIES FOR CIVIL PROTECTION AND EMERGENCIES

For the civil protection sector and emergency situations, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Increasing the frequency of events requiring ISU intervention	Probable	Medium	Currently	No. of climate-related events/year
Increasing the intensity of events requiring ISU intervention	Probable	Medium	Short term	Thousand Euro material damage/ year Number of injuries+ deaths/year

Table 15 *- Vulnerabilities for the civil protection sector and emergencies*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Campaigns to raise awareness of the population on climate hazards, respectively how to act and intervene in case of extreme weather events;
- Reporting to the competent authorities of situations that can turn into hazard generating events (trees near electric cables, railways, clogging, alluvium);
- Periodic ample exercises to alarm the civilian population in collaboration with the major economic agents in the area and other local public institutions.
- Equipping the territorial inspectorate for emergency situations with the necessary equipment and machinery within the interventions caused by climatic factors and increasing the qualified human workforce.

VULNERABILITIES FOR TOURISM

For the tourism sector, the following impacts have been identified:

Expected impact(s)	Probability of occurrence	Expected level of impact	Time frame	Impact indicators
Reducing the number of tourists during hot periods	Possibly	Reduced	Medium term	No. of tourists July-August/year
Deterioration of some local tourist attractions by extreme weather phenomena	Possibly	Reduced	Medium term	Number of tourists allocated to an objective/year

Table 16 *- Vulnerabilities for the tourism sector*

Proposed measures to reduce the likelihood of risk occurrence and/or mitigate the impact

- Arrangement of green spaces, relaxation and promenade, making the most of the current objectives in the circuit or the development of new tourist objectives in the city perimeter;
- Maintenance and arrangement of new bicycle lanes; the development of Velo circuits that include the main local attractions.

4.4 Conclusions on climate vulnerabilities and risks

Carrying out the assessment of climate risks and vulnerabilities at the level of the municipality of Reșița was an imperative condition for the elaboration of the local action plan for sustainable energy and climate (SECAP). As part of this process, the nature and extent of climate-related risks were identified and assessed, by analysing potential climate hazards and assessing all vulnerabilities that could pose a threat or potential danger to the city's inhabitants, public or private property, the economic environment and the natural environment in general.

The main climatic hazards that have affected the municipality in the recent past have been represented by heat waves with high temperatures, torrential rains, floods, alluvium runoffs and landslides, but also strong storms characterized by wind intensification, hail falls but also frequent electrical discharges.

In the short and medium term, the probability that these climate hazards will increase in intensity and frequency is high, determining a series of risks and vulnerabilities for the 11 sectors targeted in Reșița.

The impacts of these climatic hazards will have direct negative consequences for Reșița as a whole, but also for its ability to provide services regionally, as a county seat.

In conclusion, the identified impacts were quantified as follows:

a) financial losses and material damage caused to public and private buildings, transport and energy infrastructure, local businesses, agriculture and animal husbandry, etc.
b) increasing the consumption of resources (energy, water, people, equipment, consumables, etc.), the number of ISU interventions, mortality and illnesses among vulnerable people
c) limiting access to certain services (administration, health, utilities, supply, etc.)
d) destruction or deterioration of the natural environment (green spaces, trees and shrubs, forest fund, biodiversity)

A series of specific measures have been included within the SECAP Reșița in response to these challenges related to the effects of climate change at the local level.

5 Sustainable Energy and Climate Action Plan (SECAP)

5.1 Purpose of SECAP: Adaptation objectives, Mitigation objectives

The EU Covenant of Mayors for Climate and Energy is an initiative supported by the European Commission that brings together thousands of local governments that want to ensure a better future for their citizens.

This pact requires the municipality to assume a commitment to increase resilience and adaptation capacity to the negative effects caused by climate change, in this regard an analysis of climate risks and vulnerabilities is carried out within the Sustainable Energy and Climate Action Plan of the Municipality of Reșița. In the development stages of the SECAP, the analysis of climate risks and vulnerabilities is a very important preliminary step aimed at determining the type and extent of the associated risks and assessing the vulnerabilities that could pose a threat to the community, property, livelihoods and the environment as a whole. Also, through this analysis, those areas and sectors of activity exposed and less prepared in the face of climate change and extreme weather events were identified in Reșița.

Within this approach, events of recent years that had a negative role and impact at local level, due to several extreme meteorological or other phenomena, were taken into account. Potential climate issues that could lead to imminent risks with negative impacts in the short, medium and long term were also identified.

5.2 SWOT analysis

SWOT ANALYSIS

One of the most common and powerful strategic planning tools is SWOT analysis. The acronym stands for: Strengths, Weaknesses, Opportunities, and Threats. All these elements are essential for improving a holistic knowledge of the territory and for identifying the sectors of intervention.

In the context of the sustainable development and climate action plan of the municipality of Reșița, the SWOT analysis is a strategic method that provides an overview of the strengths, weaknesses, opportunities and threats that characterize the current situation of sustainable development and adaptation to climate change in the municipality of Reșița.

Through the analysis of strengths, existing resources and capacities can be identified that can be harnessed to strengthen a sustainable development plan. Equally important is the identification of weaknesses, which are obstacles that can hinder progress and that require strategic approaches to be overcome. By exploring opportunities, favourable directions for sustainable development initiatives can be identified, while highlighted threats can guide strategies to mitigate and adapt to climate change risks.

The municipality of Reșița, like other urban areas, faces complex challenges, including those related to mobility, pollution, energy efficiency and adaptation to climate change. The role of SWOT analysis is to

have a deeper understanding of the local context and specific needs, thus providing the necessary framework for developing a coherent and sustainable action plan. The implementation of these actions will contribute not only to increasing the municipality's resilience to climate change, but also to improving the quality of life of the inhabitants and promoting harmonious and responsible development.

A. ENERGY

Strengths

- Diversity of energy resources including renewable resources
- The potential of partnerships with innovative energy companies
- Existing infrastructure for energy production and distribution
- Development of projects for the energy efficiency of buildings – thermal rehabilitation of apartment blocks
- Supporting initiatives on alternative energy sources
- The need for thermal renovations and the imposition of rules on the energy efficiency of new buildings.

Weaknesses

- Excessive dependence on traditional energy resources (natural gas)
- Low/delayed development of alternative energy sources in the Municipality of Reșița
- Obsolete energy infrastructure needs modernization
- Low energy efficiency and challenges in energy resource management
- The need for thermal renovations and the imposition of rules on the energy efficiency of new buildings
- Lack of examples of reducing the energy consumption of buildings belonging to the local public administration

Opportunities

- Potential for investment in renewable energy projects
- Cooperation with government organizations to obtain investment funds for innovative projects
- Development and implementation of green technologies (such as photovoltaic panels, biomass for energy production, electric vehicles to reduce dependence on fossil fuels, energy efficiency in buildings, etc.)to reduce the carbon footprint

Threats

- Fluctuations in energy prices on the market
- Legislative changes that can affect the energy industry
- Increasing competition from other energy sources and technologies

B. WASTE

Strengths

- Development of a city-wide waste collection network
- Increasing awareness and recycling practices among the community

Weaknesses

- Inefficient management of waste generated
- Identifying missing links in waste management processes and relatively low involvement of city residents.
- Reliance on traditional waste disposal methods such as landfilling, without sufficiently encouraging recycling.
- Limited citizen involvement in recycling and separate collection

Opportunities

- Funding opportunities at European level through the Green Deal, PNRR and ROP as well as their support measures
- The existence of financing programs managed by the Ministry of Environment and their integration into the projects implemented in the Municipality of Reșița
- Expanding recycling programs to reduce the amount of waste sent to landfill
- Adoption of innovative technologies for waste management and recycling

Threats

- Increasing amounts of waste
- Possibility of stricter waste management regulations

C.CLIMATE RESILIENCE AND SPATIAL PLANNING

Strengths

- Collaboration between local authorities and the community to raise awareness and implement climate resilience measures

Weaknesses

- Dependence on fossil resources for energy
- Vulnerability to extreme events such as flooding due to local topography

Opportunities

- Attracting European funds for climate change adaptation and mitigation projects
- Developing green infrastructure through the creation of green spaces and parks for carbon absorption
- Development of renewable energy sources

- Financial incentives for green roof constructions (e.g. European BAUHAUS)
- Promoting public awareness and education of the population for climate change
- Engaging the private sector in partnerships for sustainable development

Threats

- The need for substantial investment in resilience infrastructure
- Increasing the frequency and intensity of climatic phenomena such as rising temperatures, heavy rainfall, decreased precipitation
- Low support from certain sectors of the community
- The risk of lack of resources for the implementation of planned measures

D. TRANSPORT[2]

Strengths

- The existence of a mobility plan and the implementation of the mobility plan update project allow the sustainable development of the urban transport system and the implementation of solutions that accelerate the development of the Reșița smart city (examples: Tram, traffic management system, electric buses and e-ticketing system, bike-sharing system).
- Implementation of SUMP mobility projects and measuring their impact on the development of the city.
- Public transport is the main way to develop the urban transport system in terms of sustainable mobility (trams, electric buses, e-ticketing system and local public transport management system).
- Non-motorized transport is a well-represented component in the Reșița SUMP both in terms of bicycle infrastructure and bicycle rental stations

Weaknesses

- Partial integration of public and private transport services (urban and interurban) within the urban transport system of the municipality of Reșița.
- Early development of support systems for the Mobility as a Service (mas) system and platform.
- Partial coverage of the functional area of the city with alternative transport infrastructure – corridors and bicycle lanes.
- Partial integration of transport systems for different mobility solutions (in particular e-ticketing solutions, there is the possibility of integration at the level of the payment operator - Netopia).
- Limited approach to mobility management and lack of development of specific mobility management platforms (transition from road traffic management to mobility management).

[2] The SWOT analysis for transport was integrated with that of the Smart City Strategy, p. 83-84

- Lack of an integrated approach to sustainable urban logistics (including freight vehicle access regime and multimodal hubs).
- Excessive dependence on private transport.
- High greenhouse gas emissions associated with heavy use of private transport
- The short distances within the municipality encourage the preferential use of private transport by citizens, affecting the potential for the development of other transport options
- The extensive works on the infrastructure of public transport have generated periods of disruption and, implicitly, a decrease in the number of passengers
- Absence of local bike rental stations
- Notable congestion on the main arteries during rush hours

Opportunities

- The opportunity to benefit from programs or projects at national level to support the purchase of electric vehicles and the development of corresponding charging stations
- Decongestion of traffic by building a city bypass and new access roads
- Continuing infrastructure improvements to optimise transport services;
- Launching campaigns dedicated to young people, with the aim of encouraging them to adopt public transport;
- Stimulating the increase in the number of inhabitants using public transport;
- Expanding the network of bicycle lanes and running lanes to promote mobility alternatives;
- Implementation of awareness projects to highlight the importance of alternative mobility;
- Introducing the e-ticketing system for public transport, increasing efficiency and accessibility;
- Adopting an intelligent traffic management system to optimize vehicle flow and reduce congestion;
- Implementing a bicycle rental system to facilitate eco-friendly travel options;
- Develop a regulation for cycling in the city, ensuring a legal and safe framework for users.
- Inclusion in the directions of action of the programs for financing mobility and decarbonization projects by West RDA (West ROP) as well as the existence of national projects.
- The existence of programs/projects at national level to support the purchase of electric vehicles and charging stations for them.
- The existence of mobility components in the PNRR.
- Modernization of the railway lines Reșița - Timisoara North - Airport, Reșița - Berzovia - Oravița - Anina.
- Opening access to the western highways and Timisoara.

Threats

- Technical incapacity at the level of the local administration, which could prevent the implementation of some financing programs managed by the Ministry of Environment and their integration into the projects carried out in the Municipality of Reșița.
- The lack of interest of the city's inhabitants in the programs/projects carried out at national level to support the purchase of electric vehicles and charging stations for them.
- The lack of collaboration between the central and local public administrations in terms of attracting funds for the implementation of some mobility components of the PNRR.
- Major delays in the development of investment projects in the national transport infrastructure (Railway Lines).
- Major delays in opening access to the western highways and Timisoara

5.3 Stakeholder involvement

In order to ensure the success of the Sustainable Energy and Climate Action Plan (SECAP) Reșița, a number of actors from various fields and institutions were involved, who played a crucial role in providing the necessary data for carrying out the emissions inventory and identifying the status of the actions planned at the level of the SECAP.

The involvement of key actors from various departments of the municipality strengthens efforts to achieve SECAP objectives. Among these representatives are the mayor and the councilors from the Local Council team, representatives from the technical departments, urban planning and territorial development, environment and sustainable development, procurement, heritage, administrative, responsible for energy and local transport.

An essential aspect of stakeholder engagement in SECAP Reșița was the active participation of stakeholders in dedicated working sessions. These sessions, held in July 2023 and October 2023, aimed to identify specific measures and actions, proposed and developed within the SECAP. By directly involving these stakeholders, a comprehensive and relevant approach to the needs of the local community has been ensured.

The active participation of representatives from local autonomous administrations, such as CET, Water and Canal, the Sanitation Company and the Transport Company, brings into discussion a holistic perspective on the problems related to sustainable energy in the context of Reșița. Also, the involvement of representatives of the County Council and local higher education institutions adds value through their contribution to the development of knowledge and expertise.

Collaboration with representatives of the industrial and commercial sector, as well as with local energy suppliers (ENEL and DELGAZ), is essential to develop viable and sustainable solutions in terms of energy

consumption. The involvement of these stakeholders ensures a balanced approach between environmental objectives and economic needs.

Therefore, the involvement and close collaboration of all stakeholders in the development of SECAP Reșița was a fundamental aspect for the success and sustainability of this plan. This integrated approach promises to bring long-term benefits to the community, the environment and sustainable development in the region.

6 Action plan 2024-2030

6.1 SECAP Reșița 2024 – 2030

The Action plan for the period 2024-2030 was made to contribute to achieving the objectives assumed by the Municipality of Reșița through the official commitment to reduce CO2 emissions throughout the municipality, according to the voluntary objectives assumed within the European initiative "Covenant of Mayors for Energy and Climate".

At the same time, the measures are aligned with the Sustainable Development Goals developed by the United Nations, the measures contributing to the achievement of certain specific targets of the SDGs:

- SDG 7. Ensuring access to affordable, reliable, sustainable and modern energy for all
- SDG 9. Building resilient infrastructure, promoting inclusive and sustainable industrialisation and promoting innovation
- SDG 11. Inclusive, safe, resilient and sustainable cities and human settlements
- SDG 12. Ensuring sustainable consumption and production patterns
- SDG 13. Urgent measures to combat climate change and its impacts

The specific targets identified SDG level to which the proposed measures can contribute are:

SDGs 7, 7.1	By 2030, ensure universal access to affordable, reliable and modern energy services
SDGs 7, 7.2	By 2030, substantially increase the share of renewable energy in the global energy mix
SDG 9, 9.1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and cross-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
SDG 11, 11.2	By 2030, provide access to safe, accessible and sustainable transport systems for all, improving road safety, in particular by expanding public transport, with a special focus on the needs of those in vulnerable situations, women, children, people with disabilities and the elderly
SDG 11, 11.4	Strengthening efforts to protect and safeguard the world's cultural and natural heritage
SDG 11, 11.6	By 2030, reduce the negative per capita environmental impact of cities, including by paying particular attention to air quality and municipal and other waste management
SDG 11, 11.7	By 2030, provide universal access to safe, inclusive and accessible green and public spaces, especially for women and children, older people and people with disabilities
SDG 12, 12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
SDG 12, 12.8	By 2030, ensuring that people everywhere have relevant information for sustainable development and lifestyles in harmony with nature
SDG 13, 13.1	Strengthening resilience and capacity to adapt to climate-related hazards and natural disasters in all countries
SDG 13, 13.2	Mainstreaming climate change measures into national policies, strategies and planning
SDG 13, 13.3	Improving education, awareness, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning

The Action plan is structured in two categories, according to the specifications of the Covenant of Mayors methodology, including:

- climate change mitigation measures, through which the municipality aims to reduce the impact on climate change, structured in categories of activity and monitoring of consumer sectors[3] according to the methodology of the Covenant of Mayors,
- climate change adaptation measures, through which the municipality aims to reduce the negative impacts that climate change has on infrastructure, citizens and the community in general in Reșița.

In order to keep a traceable record between the different plans and strategies developed and implemented at the municipal level, activities that have the potential to support climate change mitigation or adaptation have also been taken over within this plan. Thus, some of the measures taken over in the plan are captured in other strategic documents of the municipality of Reșița, and others were taken from the Sustainable Energy Action Plan (only those actions that are still feasible to be implemented and that have not been canceled or postponed indefinitely were taken over).

[3] There are no actions planned in the sector 'Local District Heating/Cooling, CHP' as this category has not been identified as applicable for Reșița

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO2 tons)**	**Estimated costs (EURO)**	**Status**
BUILDINGS, EQUIPMENT/INSTALLATIONS AND INDUSTRIES										
1.	Municipal buildings, equipment/facilities	Modernization and rehabilitation of the Summer Theater		Reșița City Hall	2021-2027				3430630	In progress
2.	Municipal buildings, equipment/facilities	Rehabilitation and modernization of the Reșița Technical College – Building C5 canteen, Building C7 workshop		Reșița City Hall	2021-2027				2450000	In progress
3.	Municipal buildings, equipment/facilities	Rehabilitation and modernization of the Reșița Technical College – Building C2 dormitory no.1, Building C6 laundry		Reșița City Hall	2021-2027				2150000	In progress
4.	Municipal buildings, equipment/facilities	Increasing the energy efficiency of the buildings of the UBB University Center in Reșița (buildings A, B, C, D, E)		Reșița City Hall	2022-2027				16500000	In progress
5.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Sabin Păuța Arts High School		Reșița City Hall	2021-2027				1000000	In progress
6.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the gymnasium of the Sabin Păuța Arts High School		Reșița City Hall	2021-2027				500000	In progress
7.	Municipal buildings, equipment/facilities	Rehabilitation and modernization of the Traian Vuia Theoretical High School Canteen		Reșița City Hall	2021-2027				1000000	In progress
8.	Municipal buildings, equipment/facilities	Rehabilitation and equipment of the canteen of the Economic College of Mountainous Banat		Reșița City Hall	2021-2027				1000000	In progress
9.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of building B - Mircea Eliade National College		Reșița City Hall	2021-2027				5000000	In progress
10.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of building C - Mircea Eliade National College		Reșița City Hall	2021-2027				5000000	In progress
11.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the sports hall Traian Vuia Theoretical High School		Reșița City Hall	2021-2027				500000	In progress

MITIGATION ACTIONS										
Crt. No.	Sector/Scope	Measure	Indicator	Responsible	Implementation period	Economy de energy (MWh)	Renewable energy production (MWh)	Estimated emission reductions (CO_2 tons)	Estimated costs (EURO)	Status
12.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Traian Lalescu National College – primary school building		Reșița City Hall	2021-2027				4000000	In progress
13.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Riki Priki Extended Program Kindergarten		Reșița City Hall	2021-2027				1500000	In progress
14.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Kindergarten with Normal Program No. 5		Reșița City Hall	2021-2027				500000	In progress
15.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Pinocchio Kindergarten with Normal Program		Reșița City Hall	2021-2027				500000	In progress
16.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Prichindelul Normal Program Kindergarten		Reșița City Hall	2021-2027				500000	In progress
17.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Doman Normal Program Kindergarten		Reșița City Hall	2021-2027				300000	In progress
18.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Secu Primary School and Kindergarten		Reșița City Hall	2021-2027				500000	In progress
19.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Primary School and Kindergarten Țerova		Reșița City Hall	2021-2027				500000	In progress
20.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Kindergarten with Normal Program Degețica		Reșița City Hall	2021-2027				150000	In progress
21.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of the Kindergarten with Normal Program Don't Forget Me		Reșița City Hall	2021-2027				500000	In progress

MITIGATION ACTIONS										
Crt. No.	Sector/Scope	Measure	Indicator	Responsible	Implementation period	Economy de energy (MWh)	Renewable energy production (MWh)	Estimated emission reductions (CO_2 tons)	Estimated costs (EURO)	Status
22.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of Mircea Eliade National College (School + Kindergarten Câlnic)		Reșița City Hall	2021-2027				1000000	In progress
23.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of school medical offices within educational units		Reșița City Hall	2021-2027				2000000	In progress
24.	Municipal buildings, equipment/facilities	Rehabilitation and endowment of school dental medical offices within educational units		Reșița City Hall	2021-2027				5000000	In progress
25.	Municipal buildings, equipment/facilities	Rehabilitation and modernization of kindergartens and nurseries in Reșița - Kindergarten with Extended Program "Magic Palace", Reșița		Reșița City Hall	2021-2027				1770000	In progress
26.	Municipal buildings, equipment/facilities	The rehabilitation of the Secondary School no. 7 Reșița		Reșița City Hall	2021-2027				1910000	In progress
27.	Municipal buildings, equipment/facilities	The rehabilitation of the Gymnasium School no. 8 Reșița		Reșița City Hall	2021-2027				1540000	In progress
28.	Municipal buildings, equipment/facilities	Energy and functional rehabilitation of the building of the House of Culture - Reșița Municipality		Reșița City Hall	2024-2030				12000000	
29.	Municipal buildings, equipment/facilities	Energy rehabilitation of the Sabin Păuța Arts High School		Reșița City Hall	2024-2030				80000	
30.	Municipal buildings, equipment/facilities	Energy audits of all administrative buildings and identification of energy saving opportunities		Reșița City Hall	2024-2030				200000	In progress
31.	Municipal buildings, equipment/facilities	Air Quality Improvement and Monitoring Project		Reșița City Hall	2021-2027				200000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
32.	Municipal buildings, equipment/facilities	Landscape plan restoration and tree planting at the Zoo		General Directorate for Education, Culture, Youth, Sport and Religious Affairs	2021-2027				1000000	In progress
33.	Municipal buildings, equipment/facilities	Rehabilitation of the Minda Hall, a multifunctional space dedicated to the creative industries		Reșița City Hall	2024-2026				4000000	New measure
34.	Municipal buildings, equipment/facilities	Dacia Cinema Rehabilitation		Reșița City Hall	2021-2027				2500000	In progress
35.	Municipal buildings, equipment/facilities	Rehabilitation of the administrative building of the Reșița Social Assistance Directorate		Reșița City Hall	2021-2027				3000000	In progress
36.	Municipal buildings, equipment/facilities	Making a connection between the urban nuclei of Govândari and the Civic Center of the Municipality of Reșița Component 1 FUNICULAR + TOURIST POINT/INFO		Reșița City Hall	2021-2027				8000000	In progress
37.	Municipal buildings, equipment/facilities	Integrated front office and back office information system, this system will integrate with the integrated system of the municipality of Reșița and with the online platform where citizens can pay taxes and pick up the necessary documents online	increasing the percentage of local taxes made online to 30% in 2025	Reșița City Hall	2021-2027				900000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO2 tons)**	**Estimated costs (EURO)**	**Status**
38.	Residential buildings	Energy efficiency for the apartment blocks on Republicii Boulevard	Increasing the energy efficiency of at least 800 apartments/private homes	Reșița City Hall	2021-2027	4513248 KWh/year		942,224 tone CO2/an		In progress
39.	Residential buildings	Rehabilitation of Republicii Boulevard, No. 6		Reșița City Hall	2021-2027	2191730 KWh/year		450,019 tone CO2/an	3225074	In progress
40.	Residential buildings	Rehabilitation of Republicii Boulevard, No. 7		Reșița City Hall	2021-2027	1103623 KWh/year		227,523 tone CO2/an	1810000	In progress
41.	Residential buildings	Rehabilitation of the Republicii Boulevard block, No. 8		Reșița City Hall	2021-2027	2746490 KWh/year		564,017 tone CO2/an	3833148	In progress
42.	Residential buildings	Rehabilitation of Republicii Boulevard, No. 18 block		Reșița City Hall	2021-2027	1241996 KWh/year n		255,244 tons CO2/y	1567008	In progress
43.	Residential buildings	Rehabilitation of Republicii Boulevard, No. 19 block		Reșița City Hall	2021-2027	1590882 KWh/year		326,717 tone CO2/an	2617000	In progress
44.	Residential buildings	Increasing energy efficiency for apartment blocks – Republicii Reșița Boulevard, Stage 1, Block Component no. 20 Republicii Boulevard		Reșița City Hall	2021-2027	3302267, 14 KWh/year		578,610 tone CO2/an	1170000	

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
45.	Residential buildings	Rehabilitation of Republicii Boulevard, No. 28 + Vlădeasa 2 Alley & Făgărașului 37		Reșița City Hall	2021-2027	1685534 KWh/year		346,549 tone CO_2/an	2363390	In progress
46.	Residential buildings	Energy efficiency for the apartment blocks on Calea Caransebeșului		Reșița City Hall	2025-2030					New measure
47.	Residential buildings	Energy efficiency for apartment blocks in the Triaj Area		Reșița City Hall	2025-2030					New measure
48.	Residential buildings	Energy efficiency for the apartment blocks in Lunca Pomostului		Reșița City Hall	2025-2030					New measure
49.	Residential buildings	Energy efficiency for the apartment blocks in the Civic Center		Reșița City Hall	2025-2030					New measure
50.	Residential buildings	Sensor network and digital platform for monitoring and managing energy consumption for public buildings		Reșița City Hall	2027					New measure

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
51.	Residential buildings	Development of a platform for calculating the personal carbon footprint, recording health parameters for cycling		Reșița City Hall	2024-2030					New measure
52.	Residential buildings	Development of a campaign to inform citizens about the advantages of alternative energy		Reșița City Hall	2024-2030					New measure
53.	Residential buildings	Developing a seasonal awareness campaign on reducing energy consumption and financing opportunities for green investments		Reșița City Hall	2024-2030					New measure
54.	Residential buildings	Exploring the possibility of a public-private partnership for grants/grants for approved energy efficiency projects		Reșița City Hall	2024-2030					New measure
55.	Tertiary sector	Development of the Telemedicine service (online)		Reșița City Hall	2022-2030					New measure
56.	Tertiary sector	Development of a protocol/guide of good practices for converted industrial buildings - addition of eco-design elements such as green roofs or vertical green walls		Reșița City Hall	2024-2030					New measure
57.	Tertiary sector	Realization of external painting contest (private partnership - academic environment) for students, using innovative methods to promote a cleaner environment (*e.g.: absorbent paint fumes*)		Reșița City Hall	2024-2030					New measure
58.	Municipal public lighting	Completion of the Public Lighting project with remote management system to cover the remaining 10% area at the level of the municipality of Reșița	10% of the public lighting system	Reșița City Hall	2024-2025					In progress
59.	Municipal public lighting	Modernization of public lighting in the municipality of Reșița	1515 LED luminaires	Reșița City Hall	2024-2030	294597 kWh / year		78 tCO_2 / year	1000000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO2 tons)**	**Estimated costs (EURO)**	**Status**
60.	Municipal public lighting	Increasing energy efficiency and intelligent energy management in public lighting infrastructure in Reșița, Constanta county. Caraș-Severin – installation of 350 LED lighting fixtures, 131 poles, extension of the lighting network by 4.0 km	350 LED luminaires, 131 poles, extension of the lighting network by 4.0 km	Reșița City Hall	2024-2030	34604 kWh / year		216 tCO2 / year	1200000	In progress
TRANSPORT										
61.	Public, private and commercial transport	Making a connection between the urban centres of Govândari and the Civic Centre of the Municipality of Reșița - Component 2 PROMENADE AND WALKWAYS	Harmonious development of the central area (New Town) by creating and implementing an urban aesthetics regulation by 2027.	Reșița City Hall	2024-2027				18000000	In progress
62.	Transport public	Renewal of the transport operator's rolling stock fleet, including the implementation *of the Automatic Toll System*, the *Fleet Management System* and the creation *of the Dynamic Passenger Information System* in stations and vehicles		Reșița City Hall	2021-2027			1923.1 tCO2 / year	14850000	In progress
63.	Private and commercial transport	Road connection between DN 58 and Valea Țerovei (industrial area)	Construction of 8 km of bypass	Reșița City Hall	2024-2027				5426380	In progress
64.	Transport public	Modernization of electric public transport and arrangement of non-motorized transport infrastructure in the municipality of Reșița – phase 1	reintroduction of non-motorized public transport by tram, with all the related infrastructure	Reșița City Hall	2021-2027			634,40 tone CO2eq/ an	12200000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO2 tons)**	**Estimated costs (EURO)**	**Status**
65.	Transport public	Modernization of electric public transport and arrangement of non-motorized transport infrastructure in the municipality of Reșița – phase 2	reintroduction of non-motorized public transport by tram, with all the related infrastructure	Reșița City Hall	2021-2027			833,80 tone CO2eq/ an	21950000	In progress
66.	Transportation private	Bicycle parking (covered)		Reșița City Hall	2021-2027					New measure
67.	Transport public	Electric Bicycles (*Cross-border project RO/SE)*		Reșița City Hall	2021-2027				500000	In progress
68.	Public, private and commercial transport	Electric charging stations 5 pieces	Increasing the power station network by another 5 pieces	2024-2025	2024-2025				187351	In progress
69.	Transportation private	Implementation of a car-free day		Reșița City Hall	2024-2030					New measure
70.	Private, commercial, public transport	Modernization of Streets in Terova, Calnic, Doman		Reșița City Hall	2024-2027				3854000	New measure
71.	Private, commercial, public transport	Rehabilitation of streets in Moroasa neighborhood - Reșița Municipality		Reșița City Hall	2024-2027				3919536	New measure
72.	Private, commercial, public transport	Rehabilitate road Cpt. Smaranda Ion		Reșița City Hall	2024-2026				1652734	New measure
73.	Private, commercial, public transport	Rehabilitation of Row II and III streets		Reșița City Hall	2024-2025				1751946	New measure
74.	Private, commercial, public transport	Rehabilitation of Row I, Ciocarliei, Semenicului, Siretului, Avram Iancu and Ceretului streets		Reșița City Hall	2024-2025				727244	New measure
75.	Private, commercial, public transport	Rehabilitation of the road and pedestrian bridge on Fântânilor Street, over the Bârzava River, in the municipality of Reșița		Reșița City Hall	2024-2025				375000	New measure

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
76.	Private, commercial, public transport	Rehabilitation of Mihai Viteazu and Someșului streets		Reșița City Hall	2024-2025				535500	New measure
77.	Private, commercial, public transport	Rehabilitation of Războieni, Călugăreni, Fragilor, Colonia Scânteii and Ponor streets		Reșița City Hall	2024-2026				1526000	New measure
78.	Private, commercial, public transport	Collector road M. Eminescu - Str. Toamnei		Reșița City Hall	2024-2027				1271000	New measure
79.	Transport public	Road connection artery in order to introduce public transport on the route Caminelor Street-Mociur District-Old Universal		Reșița City Hall	2024-2027				3316000	New measure
80.	Transport public	Road connection between the main artery of Reșița and the industrial park and the Mociur urban regeneration area, in order to extend public transport – 2 bridges		Reșița City Hall	2024-2027				3289000	New measure
81.	Private and commercial transport	Reșița Municipality bypass road between DN 58 B and DJ 581		Reșița City Hall	2024-2027				32000	New measure
82.	Private and commercial transport	Construction of the eastern ring road of the municipality - DN 58-DJ582 connection		Reșița City Hall	2025-2030				15000000	New measure
83.	Private and commercial transport	The link road in Microdistrict 1, with the extension of the accesses to Muncii Boulevard and the arrangement of parking lots and green spaces (Topo, Geo, SF and PT)		Reșița City Hall	2024-2026				5290000	New measure
LOCAL ELECTRICITY PRODUCTION										
84.	Photovoltaic	Investigating the feasibility of developing a positive energy neighborhood using the results of the "*Simply Positive*" research project [4] in the Lunca Pomostului area		Reșița City Hall	2025-2030					New measure

[4] The measure can start after the full completion of the *Simply Positive research project* and the publication of the full deliverables and results

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
85.	Photovoltaic	Arrangement of a photovoltaic panel park in the Municipality of Reșița	Construction of an 8.6 MW photovoltaic park, which will cover 100% of the renewable energy needs for public transport (trams, electric buses) & public buildings (schools, kindergartens, cinemas, administrative buildings) & public lighting	Reșița City Hall	2021-2027		8600 kWh / year		7000000	In progress
86.	Photovoltaic	Continuation of the project for the provision of high schools and colleges in Reșița energetically rehabilitated with photovoltaic panel systems to ensure the energy needs.		Reșița City Hall	2024-2030					In progress
87.	Photovoltaic	Renewable energy generation in buildings and public spaces (thermal points, municipal buildings)		Reșița City Hall	2024-2030					New measure
88.	Photovoltaic	Installation of photovoltaic solar poles to supplement the pedestrian lighting system		Reșița City Hall	2024-2030					New measure

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
89.	Photovoltaic	Development of a photovoltaic panel system above covered parking lots		Reșița City Hall	2024-2030					New measure
TERRITORY PLANNING										
90.	Strategic urban planning	Rehabilitation of green areas, parking lots, pedestrian alleys, playgrounds for children in the area between Parâng streets and Nicolae Titulescu street		Reșița City Hall	2021-2027				1933000	Nearing completion
91.	Strategic urban planning	Arrangement of green spaces, parks and recreation places in the Triaj area, Reșița Municipality		Reșița City Hall	2021-2027				3000000	New measure
92.	Strategic urban planning	Arrangement of Parks: Tricolorului, Cărășana, Moroasa and arrangement of green spaces in the Municipality of Reșița		Reșița City Hall	2024-2030 previous: 2015-2016				1521054	Nearing completion
93.	Strategic urban planning	Paved road restoration		Reșița City Hall	2024-2030 previous: 2016-2016				201315	Partially realized
94.	Strategic urban planning	Installation of a street monitoring system in the Municipality of Reșița		Reșița City Hall	2024-2030 previous: 2016-2020				1000000	Nearing completion
95.	Strategic urban planning	Creation of a local urban planning guide with indications regarding the increase of energy performance for buildings		Reșița City Hall	2024-2030					New measure
PUBLIC PROCUREMENT OF PRODUCTS AND SERVICES										

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
96.	Energy efficiency requirements/standards	Implement ISO 50001 certification		Reșița City Hall	2025-2030 previous: 2016-2017					Nearing completion
WORKING WITH CITIZENS AND STAKEHOLDERS										
97.	Local awareness and networking	Improving the quality and time of service provision by the Reșița City Hall		Reșița City Hall	2025-2027 previous: 2016-2016				500000	Nearing completion
98.	Local awareness and networking	Annual organization of the ENERGY DAY. Annual awareness of citizens on energy efficiency at home level.		Reșița City Hall	2025-2030 previous: 2016-2020	22000		6456	15000	Delayed
99.	Local awareness and networking	Organizing events on informing students about the need to reduce energy consumption, energy efficiency, waste management, etc., within the "Different Week" in schools		Reșița City Hall	2024-2030					New measure
100.	Local awareness and networking	Awareness-raising actions for the population in order to promote sustainable transport (e.g. walking, using public transport)		Reșița City Hall	2024-2030					New measure
OTHER SECTORS										
101.	Waste	Development and modernization and completion of integrated municipal waste management systems in the municipality of Reșița by building a number of 100 digitized ecological islands	100 digitized ecological islands	Reșița City Hall	2025-2030				2000000	New measure
102.	Waste	Development, modernization and completion of integrated municipal waste management systems in the Municipality of Reșița by building a number of 77 digitized ecological islands	77 digitized ecological islands	Reșița City Hall	2025-2030				2100000	New measure
103.	Waste	Implementation of the 'pay-as-you-throw' scheme for waste management		Reșița City Hall	2021-2027				500000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
104.	Waste	Construction of underground waste platforms (6 tanks)		Urban Investments and Mobility DepartmentUrban Household Service	2021-2027				2800000	In progress
105.	Waste	Construction of waste collection platforms resulting from construction and recyclable materials		Reșița City Hall	2021-2027				160000	
106.	Waste	Development, modernization and completion of integrated municipal waste management systems in the municipality of Reșița by building 2 collection centers through voluntary contribution	2 waste collection centers through voluntary contribution	Investment and Urban Mobility Department, Urban Household Service	2025-2030				1800000	In progress
107.	Water/Sewerage	Domestic sewerage and wastewater treatment plant in Doman - Reșița Municipality		Reșița City Hall	2025-2030 previous: 2016-2020				1310220	In progress
108.	Water/Sewerage	Water supply in Doman - Reșița Municipality		Reșița City Hall	2025-2030 previous: 2015-2016				1086877	In the process of implementation
109.	Water/Sewerage	Ensuring water supply and sewerage services, as well as non-motorized access in the area of the tourist resort of local interest Secu	a 25% increase in overnight stays in reception structures at the level of	Reșița City Hall	2024-2027				53814000	In progress

MITIGATION ACTIONS										
Crt. No.	**Sector/Scope**	**Measure**	**Indicator**	**Responsible**	**Implementation period**	**Economy de energy (MWh)**	**Renewable energy production (MWh)**	**Estimated emission reductions (CO_2 tons)**	**Estimated costs (EURO)**	**Status**
			functional urban areas by 2027							
110.	Water/Sewerage	Water supply in Secu, Cuptoare and Moniom village - Reșița Municipality		Reșița City Hall	2025-2030 previous: 2015-2016				1406503	Partially realized
111.	Water/Sewerage	Rehabilitation and extension of the water distribution and sewerage network transfer pipes - Reșița Municipality		Reșița City Hall	2025-2030 previous: 2016-2016	552		387	14800000	Nearing completion
112.	Water/Sewerage	Development of a stormwater management system (e.g. Installation of mini buffers at different points in the city to store rainwater)		Reșița City Hall	2024-2030					New measure

ADAPTATION ACTIONS								
Crt. No.	**Domain**	**Measure**	**Responsible**	**Period**	**Risks / vulnerabilities addressed**	**Chanting indicators**	**Estimated budget**	**Status**
1.	Environment and biodiversity	Planning and implementation of green urban infrastructure and nature-based solutions, such as the development of interconnected and multifunctional networks of "blue" and "green" spaces: urban gardens, public parks, green recreational areas, ponds, wetlands, green roofs, green pedestrian areas. Regeneration of some areas, by changing the destination of unused, abandoned or inefficiently exploited land and transforming them into green areas.	Municipal Directorate of Green Spaces Office	2024-2030	Floods, extreme heat	min. 650 m2 arranged with flowers – "Garden Theatre"		In progress
2.	Water	Implementation of sustainable drainage solutions: Rainwater drainage systems with the role of absorbing and reducing the runoff of rainwater to the sewerage network: green roofs, green spaces intended for the absorption of heavy rainfall, replacement of pedestrian areas with concrete surfaces with tile ones, ponds for storing excess rainwater and its subsequent reuse (e.g. washing streets, watering green spaces), increasing the rainwater intake capacity of existing catchment basins	Municipal Directorate of Green Spaces Office, Public Administrator	2024-2030	Flood	regularization of the 15 existing torrents affecting part of the city		In progress
3.	Water	Development of solutions for adapting buildings in flood zones: raising the entrances and floors of buildings, using hydrophobic building materials, watertight cellar windows, return valves on sanitary installations to prevent wastewater from entering buildings.	Municipal Department, Urban Planning Department	2024-2030	Flood			New measure
4.	Water	Rainwater harvesting: Capturing rainwater from the roofs of public institutions and private buildings in buried or above-ground tanks and using it for various purposes instead of mains water.	Municipal Department, Urban Planning Department	2024-2030	Flood			New measure
5.	Water	Water for cooling spaces: Using water from the Bârzava River to cool indoor spaces in public buildings.	Municipal Department, Urban Planning Department	2024-2030	extreme heat			New measure
6.	Water	Stormwater tax: Reduction of the rainwater tax for owners of buildings with green roofs, depending on the	Water Company + Public Administrator	2024-2030	Flood			New measure

ADAPTATION ACTIONS								
Crt. No.	**Domain**	**Measure**	**Responsible**	**Period**	**Risks / vulnerabilities addressed**	**Chanting indicators**	**Estimated budget**	**Status**
		water absorption capacity and slope of the roof; use of this charge for flood risk reduction works.						
7.	Public transport / Arrangement of stations	Equipping all waiting stations for passengers with sufficient resting places, shade and vegetation.	Local transport company	2024-2030	extreme heat			New measure
8.	Spatial Planning / Management Policies	Implementation of early warning systems regarding extreme weather phenomena.	Administrator Public Chief Architect Civil Protection Department	2024-2030	storms, extreme precipitation, flooding, extreme heat			In progress
9.		Carrying out studies and thermal maps to identify vulnerabilities and risks; analysis of citizens' vulnerability to various hazards: heat waves, storms, etc.	Administrator Public Chief Architect Civil Protection Department	2024-2030	storms, extreme precipitation, flooding, extreme heat			New measure
10.		Measures: limiting construction in areas prone to climatic hazards, reforestation or afforestation projects for the preservation and restoration of ecosystems, monitoring and grooming of trees, arrangement of rain gardens, etc.	Administrator Public Chief Architect Civil Protection Department	2024-2030	landslides, floods	Landscape plan restoration and tree planting at the Zoo		New measure
11.		Redevelopment of existing public and private parking lots and those to be built (no. of shaded parking spaces/year) by planting medium-sized trees and shrubs with surface shading potential.	Administrator Public Chief Architect Civil Protection Department	2024-2030	extreme heat, floods	Elaboration and implementation of the Parking Policy - version II		New measure
12.	Development of infrastructure adapted to the current climatic context.	Stipulating in the specifications for road development projects high quality standards regarding the resistance of the asphalt carpet to high temperatures, number of freeze/thaw, wet/dry cycles.	Administrator Public Urbanism compartment	2024-2030	extreme heat, extreme cold			New measure
13.	Planning	Based on studies and thermal maps, the development of a series of personalized measures: green corridors of trees, irrigation of green spaces, arrangement of shaded	Administrator Public	2024-2030	extreme heat			New measure

ADAPTATION ACTIONS								
Crt. No.	**Domain**	**Measure**	**Responsible**	**Period**	**Risks / vulnerabilities addressed**	**Chanting indicators**	**Estimated budget**	**Status**
		and recreational spaces, rest places and fountains, fountains with access to drinking water and for cooling during hot days.	Municipal Directorate Civil Protection Department					
14.	Emergency situations	Purchase of anti-hail system (per ATU)	ISU	2024-2030	hail, extreme rainfall			New measure
15.		Construction of a new fire station to serve the local community and the peri-urban area. Construction of a fire station to serve the local community and the peri-urban area of Reșița in order to considerably reduce the response time to interventions of fire trucks and crews on SMURD ambulances	ISU & Reșița City Hall	2024-2030	fires (including forest and vegetation)			New measure
16.	Social / Landscaping	Setting up spaces dedicated to food markets, with local products, in neighborhoods with vulnerable populations. Particular priority will be given to people with mobility problems	Municipal Directorate Economic Department	2024-2030	-			New measure

6.2 Impact of the Action Plan

The Sustainable Energy and Climate Action Plan of the Municipality of Reșița implements a series of initiatives aimed at reducing greenhouse gas emissions and facilitating adaptation to climate change. This plan was developed in close cooperation with stakeholders and is fully assumed by the municipal administration. In order to ensure the effectiveness of the implementation, a periodic monitoring of the measures will be carried out, with a review every two years, according to a model monitoring form according to the COMO methodology. This process allows for the addition of new measures or the adjustment of existing actions as the situation evolves.

The plan comprises a total of 96 well-defined mitigation measures and 15 measures focused on climate change adaptation. These initiatives aim to achieve the target of reducing CO2 emissions by 40% compared to 2008 levels by 2030, contributing significantly to the sustainable development of the community.

Among the most significant measures is the generation of energy from renewable sources, including an ambitious project for the installation of a photovoltaic park. The plan also aims to reduce energy consumption by promoting the rehabilitation of existing buildings according to high energy efficiency standards.

Urban mobility projects are also an important pillar of the plan, encouraging the use of public transport or clean transport solutions. In parallel, various awareness campaigns will be carried out among the community on energy efficiency and reducing resource consumption.

By implementing these measures, the Municipality of Reșița aims not only to meet the climate goals, but also to strengthen a responsible and sustainable community.

6.3 Communication, monitoring and reporting

The Communication on the Sustainable Energy and Climate Action Plan of the Municipality of Reșița highlights the importance of involving local authorities, the public and private sector, as well as citizens in addressing energy and climate challenges. They must work together to shape a common vision for the future, establishing clear strategies and investing the necessary resources to achieve common goals. The involvement of stakeholders is the starting point for promoting behavioural changes that are essential for the implementation of the technical measures included in this plan. It is vital to identify the benefits of both mitigation and adaptation measures, having a positive impact on the well-being and quality of life of the community and transforming the city into an attractive environment.

The communication of decisions, provisions and documents resulting from the current activity or of public interest is carried out in electronic format, by scanning and posting the documents on the institution's website or by sending them in written or electronic format to all those interested/involved/applicants. Communication with the media is coordinated by the institution's Press Office. Communication with other persons, departments or institutions requires the approval of the superior hierarchical head, who endorses/countersigns the communicated documents. External communication for the purpose of collecting information and conducting surveys is carried out through the institution's website and the Communication Department.

Monitoring and reporting

Monitoring and reporting on progress are key aspects of the SECAP. The Municipality of Reșița is committed to continuously monitoring the progress towards the set objectives and to submit monitoring reports every two years. These reports will include an emissions monitoring inventory, a quantitative analysis of the measures implemented, a qualitative analysis of the implementation process and proposals for corrective measures where necessary. Communication plays a crucial role in engaging citizens and ensuring transparency and fairness at all stages of the process.

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Monitoring plan extract

Centralization of emissions

SECTORS and areas assessed by SEAP monitoring		Energy consumed, MWh/2021	CO2 emissions, tone CO2/2021	Energy consumed, MWh/2022	CO2 Emissions, CO2/2022 tone	Energy consumed, MWh/2023	CO2 Emissions, CO2/2023	Energy consumed, MWh/2024	CO2 Emissions, CO2/2024	Energy consumed, MWh/2025	CO2 Emissions, CO2/2025	Energy consumed, MWh/2026	CO2 emissions, tone CO2/2026	Energy consumed, MWh/2027	CO2 emissions, tone CO2/2027	Energy consumed, MWh/2028	CO2 emissions, CO2/2028	Energy consumed, MWh/2029	CO2 emissions, tone CO2/2029	Energy consumed, MWh/2030	CO2 emissions, CO2/2030
BUILDINGS, EQUIPMENT/INSTALLATIONS AND INDUSTRIES	**Municipal buildings**																				
	Tertiary buildings																				
	Residential buildings																				
	Municipal public lighting																				
	Industries																				
Subtotal SECTOR																					
TRANSPORT	Municipal fleet																				
	Transport public municipal																				
	Private and commercial transport																				
Subtotal SECTOR																					
OTHERS	Waste management																				
	Wastewater management																				
	Agriculture																				
Total																					
Total number of inhabitants																					
Local IMPACT – CO2 emissions, tons of CO2/capita																					

Municipal buildings, equipment/facilities

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								
Biomass								
Natural Gas								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								
Biomass								
Natural Gas								
Total								

Residential buildings

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								
Natural Gas								
Biomass								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								
Natural Gas								
Biomass								
Total								

Tertiary (non municipal) buildings, equipment/facilities

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								
Gas								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								
Gas								
Total								

Public lighting

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								

Industry

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								
Natural Gas								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								
Natural Gas								
Total								

Private and commercial transport

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Diesel								
Gasoline								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Diesel								
Gasoline								
Total								

Public transport

A. Final energy consumption

	2023 MWh	2024 MWh	2025 MWh	2026 MWh	2027 MWh	2028 MWh	2029 MWh	2030 MWh
Electricity								
Diesel								
Total								

C. CO2 emissions

	2023 CO2	2024 CO2	2025 CO2	2026 CO2	2027 CO2	2028 CO2	2029 CO2	2030 CO2
Electricity								
Diesel								
Total								

Others

A. Final consumption

	2023	2024	2025	2026	2027	2028	2029	2030
Waste management								
Wastewater management								
Agriculture, MWh								

C. CO2 emissions

	2023	2024	2025	2026	2027	2028	2029	2030
Waste management								
Wastewater management								
Agriculture								

simply positive