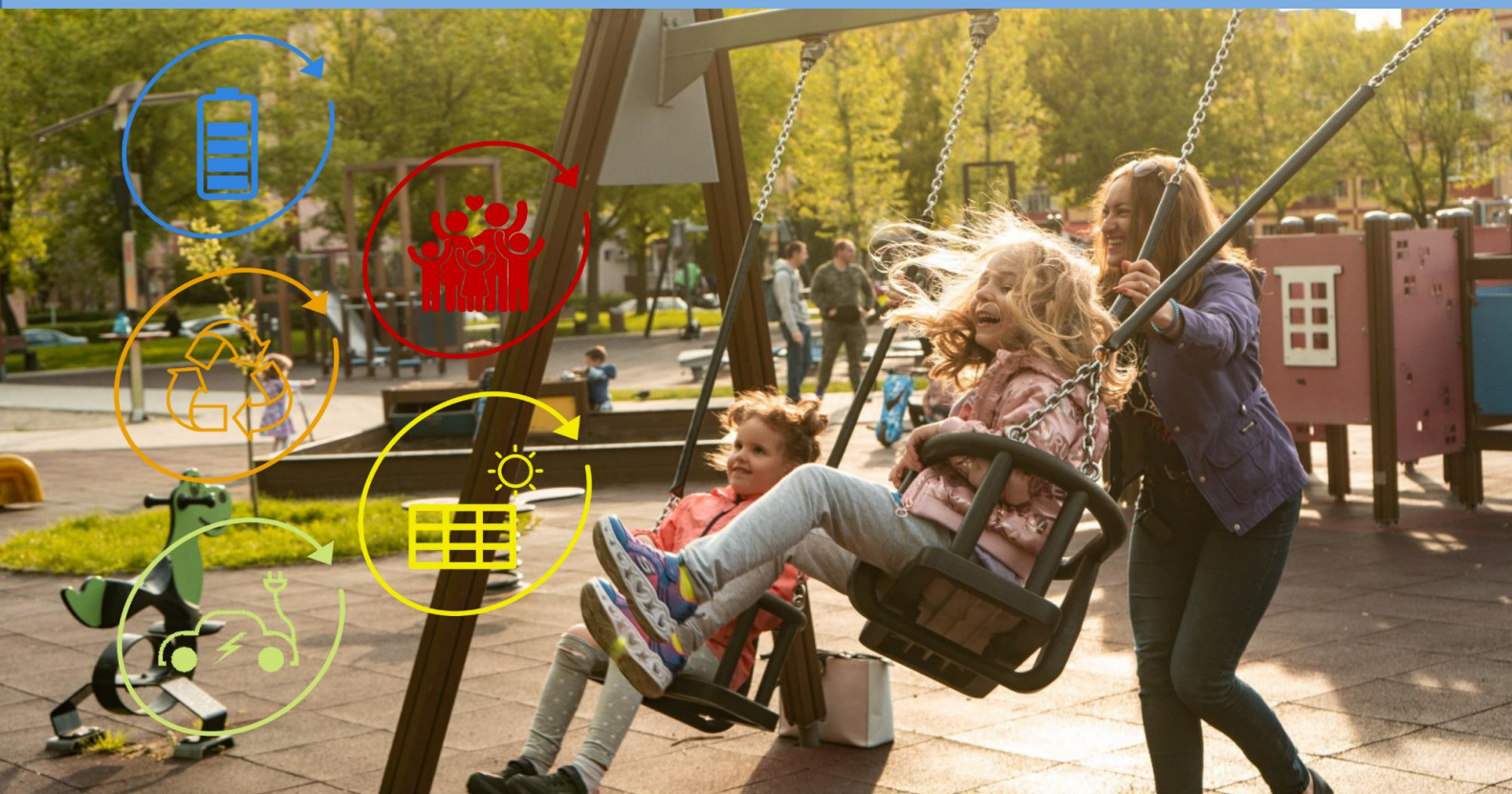




simply positive

D4.5. Integrated SECAP Report for Reșița Municipality

March 2024



**The SECAP document is under consultation and may be subject to revisions or updates*

Leader: denkstatt Romania

Dissemination Level

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Executive Summary

The Sustainable Energy and Climate Action Plan (SECAP) represents the official commitment of the local public administration of Reșița to reduce CO₂ 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 Resita 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 Resita 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 Resita in collaboration with the Resita 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 CO₂ 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 Resita 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 Resita, DEL Gaz. These estimates were carefully interpreted during the evaluation process of the data.

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List of Abbreviations and Acronyms

WP	Work Package
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
GHG	Greenhouse gases
CCAP	Climate Change Adaptation Plan
PED	Positive Energy District
UEFSCDI	The Executive Agency for Higher Education, Research, Development and Innovation Funding
CoM	Covenant of Mayors
EU	European Union
MEI	Monitoring Emission Inventory
BEI	Baseline Emissions Inventory
CO ₂	Carbon Dioxide
EU-ETS	European Union Emission Trading System
LCA	Life Cycle Analysis
RVA	Risks and Vulnerabilities Assessment
SIDU	Integrated Urban Development Strategy
tCO ₂	tones (mass) Carbon dioxide
ADLR	Resita Local Development Agency
CO ₂ e	Carbon dioxide equivalent
JRC	Joint Research Center (of European Union)
UNFCCC	United Nations Framework Convention on Climate Change
SDGs	Sustainable Development Goals
IPCC	Intergovernmental Panel on Climate Change

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1 Introduction

1.1 Purpose of the document

The aim of the Sustainable Energy and Climate Action Plan of the Municipality of Resita is to provide the local public administration with a comprehensive planning tool that sets the direction for the development of Resita until 2030 and to become a neutral city by 2050. This plan was carefully crafted with detailed strategies tailored to Resita's needs. However, the Sustainable Energy and Climate Action isn't just a roadmap for Resita's development and might be used as a useful tool for other districts facing similar challenges.

The plan offers concrete steps and strategies that can be easily adapted and applied elsewhere. It provides a clear vision for creating more sustainable cities and includes practical measures to achieve it.

The Sustainable Energy and Climate Action Plan contains a set of ambitious initiatives to support Reșița's transition to a green city, characterized by low CO₂ emissions and able to cope with climate change. This plan is also a valuable operational tool as:

- It allows to obtain funds (European, national, regional and local) to meet European targets for reducing fossil energy consumption and adapting to climate change;
- It facilitates municipalities' access to a European network, allowing the exchange of experiences between different administrative units and the possibility to constantly improve the proposed actions;
- It allows the systematization and monitoring of the progress of the various proposed actions and the preparation of corrective actions through regular monitoring of actions;
- Creates employment opportunities in the local economy in the areas of the proposed projects;
- Raise awareness and motivate stakeholders to get involved in achieving the proposed targets.

In conclusion, the development of an energy and climate action plan for the municipality of Resita is crucial in order to respond to current climate challenges and to contribute to building a more energy efficient and sustainable future. This initiative is more than a local initiative. It demonstrates how collaboration and innovation can address global challenges like climate change. Its influence goes beyond Resita, offering practical solutions for communities across Europe striving for a greener future.

1.2 Structure of the document

The document is structured into several key sections. First is the introduction, which includes context, climate change - adaptation and mitigation for a sustainable Resita, international agreements, plans, programs, strategies, vision, objectives, targets for 2030. This is followed by an overview of the context specific to the Municipality of Resita, which comprises the

natural environment, socio-demographic profile, and economic profile. The document proceeds with a detailed report on the Sustainable Energy Action Plan, outlining the emission monitoring inventory and measures implemented between 2016 and 2020 across various sectors. Additionally, it includes a section on climate risk and vulnerability assessment, which covers methodology, local diagnosis, climate resilience, and conclusions regarding climate vulnerabilities and risks. The Sustainable Energy and Climate Action Plan is elaborated upon, presenting the purpose of the new SECAP, SWOT analysis, and stakeholder involvement. The final chapter presents an action plan by 2030 starting with 2024 – the year when the report is elaborated, impact of the plan, communication, monitoring, and reporting strategies.

1.3 Climate change - adaptation and mitigation for a Sustainable City

The recent report of the Intergovernmental Panel on Climate Change (IPCC, n.d.) warns that without drastic measures to reduce CO₂ emissions and cut energy consumption, the goal of limiting the global average temperature increase 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 made its way into both companies' business strategies and authorities' development plans. As it stands, today's communities are generating CO₂ and contributing massively to environmental pollution. As a result of burning fossil fuels, conventional energy sources are responsible for a considerable amount of harmful chemicals and particles released into the atmosphere, so the creation of Positive Energy Districts (PEDs) has become a necessity.

The EU's role in reducing emissions

The EU is ready to step up global emission reductions to a much greater extent. Following 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 impacts of climate change.

Adaptation and mitigation for a sustainable Resita

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

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

Thus, the Sustainable Energy and Climate Action Plan of the Municipality of Reșița includes adaptation actions, which aim to make the city resilient 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 vulnerability study of the territory regarding the effects of climate change that was conducted for the territory of the Municipality of Resita. 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 Resita to the Covenant of Mayors in 2009 and the reconfirmation of its commitment in 2016 for the extended form of the Covenant, then in 2023 on new initiatives and adaptation to climate change means, obviously, the concretization in the energy and climate field, of the assumed decision of sustainable development at the local level, translating into action the need to transform the Municipality of Resita into a modern European city.

1.4 International agreements, plans, programs, strategies

Climate change has been a topic of global debate for many decades. In 1992, the United Nations agreed the Framework Convention on Climate Change (UNFCCC) and adopted Agenda 21. This was followed by the Kyoto Protocol 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, countries adopted the 2030 Agenda for Sustainable Development, which includes the 17 Sustainable Development Goals (SDG). This agenda rests on three pillars: social equity, economic growth and environmental protection.

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 121/2014 on energy efficiency).

In 2001, Romania signed the Kyoto Protocol, and in 2013, by Government Decision no. 529/2013, it adopted the National Climate Change Strategy for the period 2013-2020. Later, this document was revised through the National Strategy on Climate Change and Low Emission Economic Growth and 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 focus on reducing greenhouse gas emissions in line with the targets set at EU level and adapting to the impact of climate change. In 2020, Romania submitted to the European Commission the National Integrated Energy and Climate Change Plan for 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 action paths for the implementation of the 2030 Agenda. The 17 objectives of this strategy include three central pillars: economic development, social justice and environmental protection. These goals are closely interlinked and mutually dependent, for example Goal 13 - Action against climate change. SDG 13 aims to initiate immediate action to tackle climate change.

Integration of the SECAP with existing plans and strategies

The updated Sustainable Energy and Climate Action Plan is integrated in the strategic perspectives established mainly by " **Local Development Strategy of the Municipality of Resita 2015 - 2025 (SDL)**", "**Integrated Urban Development Strategy of the Municipality of Resita 2022 - 2030**" (SIDU)" and through the "**Smart City Strategy for the Municipality of Resita Horizon 2027** (Smart City 2027)".

According to the "Local Development Strategy of the Municipality of Resita 2015-2025 (SDL 2015-2025)", the vision for the future of the Municipality of Reșița focuses on the idea of "**REȘIȚA – A city of people**". This vision implies an economic transformation by attracting new investors that 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.



(SDL 2015-2025, p. 29)

Figure 1 – Resita. Local vision 2015-2025

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

1. Urban development and revitalization pole

- Sustainable urban development and regeneration of neglected areas.
- Ensure adequate technical infrastructure for water, sewerage and sanitation.
- Ensuring easy access of citizens to urban utilities.

2. Sustainable Urban Mobility

- Modernization of local transport infrastructure.
- Improving public transport to make it efficient and attractive for citizens.
- Develop an efficient network of cycle paths and parking spaces.

3. Economy and Sustainable Tourism

- Promoting innovation and attractiveness to investors.
- Developing investment in sustainable production, services and 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 citizens' safety.
- 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. Effective and democratic integrated management

- Ensuring effective local governance through institutional collaboration.
- Promote a participatory approach to local problem solving.

In this direction, Reșița aims to be a responsible city towards the needs of its citizens, ensuring optimal living conditions and providing high quality public services. A 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 revitalized environment.

1.5 Vision. Objectives. Targets 2030

Reșița aligns with the shared vision of the Covenant of Mayors that by 2050 to live in decarbonized and resilient cities, with access to secure, sustainable and affordable energy.

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

- (1) Reduce greenhouse gas emissions in the municipality
- (2) Increase resilience and prepare for the adverse impacts of climate change
- (3) Challenge fuel poverty as a key action to ensure a just transition

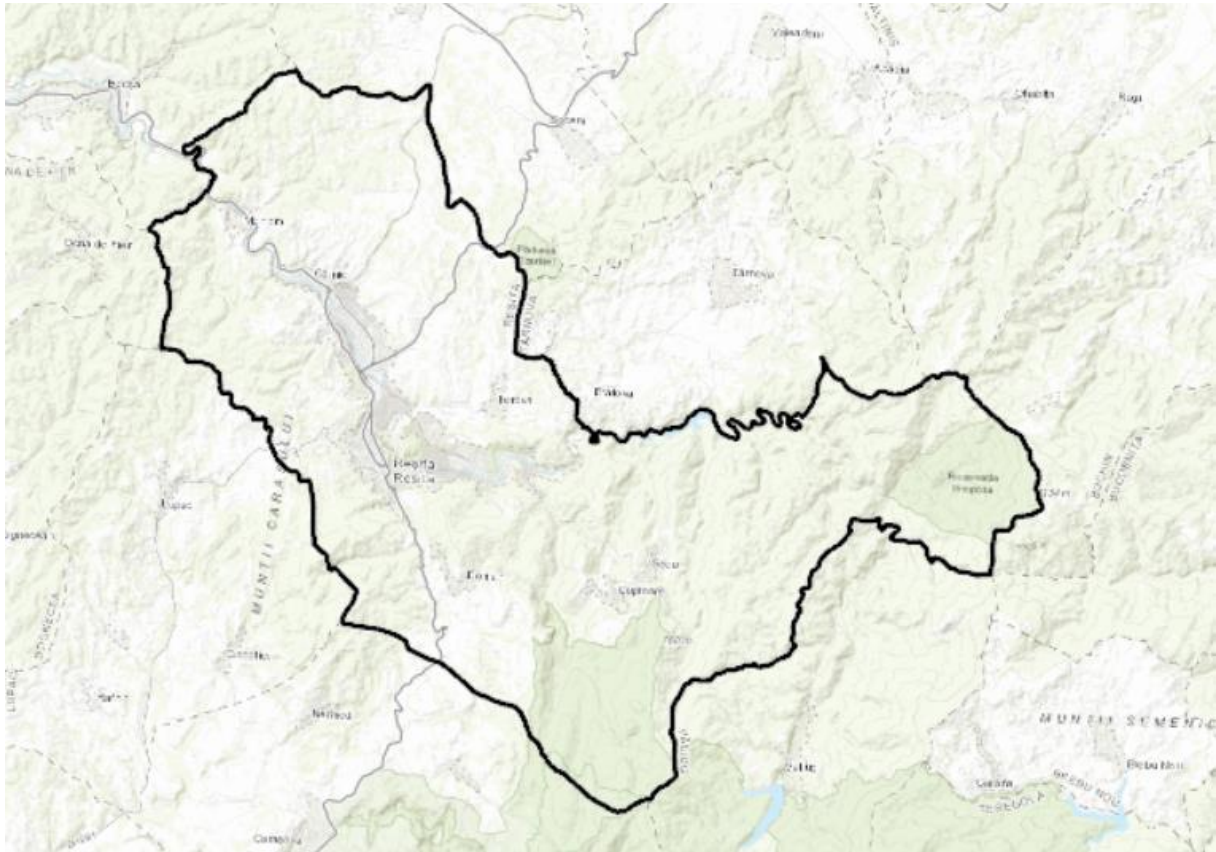
The Covenant of Mayors of Europe is first and foremost a movement of Mayors committed to promoting local solutions and inspiring each other towards this vision. Thus, together with the other Mayors of the Convention, Reșița is committed to the following actions:

1. **COMMITMENT** to set medium and long-term objectives in line with those set at European level and at least as ambitious as national targets. The aim being 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. **INVOLVE** citizens, business and administrations at all levels in implementing this vision and transforming our social and economic systems. Develop a local climate pact with all stakeholders that could help achieve these goals.
3. **ACTION** to stay on schedule and accelerate the necessary transition. Implement and report on time, an action plan to achieve targets. The plans will include provisions on how climate change can be mitigated and how we can adapt to it while remaining inclusive.
4. **ESTABLISHING RELATIONSHIPS** with other mayors and leaders in Europe and beyond for mutual inspiration. ENCOURAGE them to join the World Mayors Convention, wherever they are in the world, and to adopt the goals and vision outlined in the Convention.

2 Context of Reșița Municipality

2.1 Natural environment

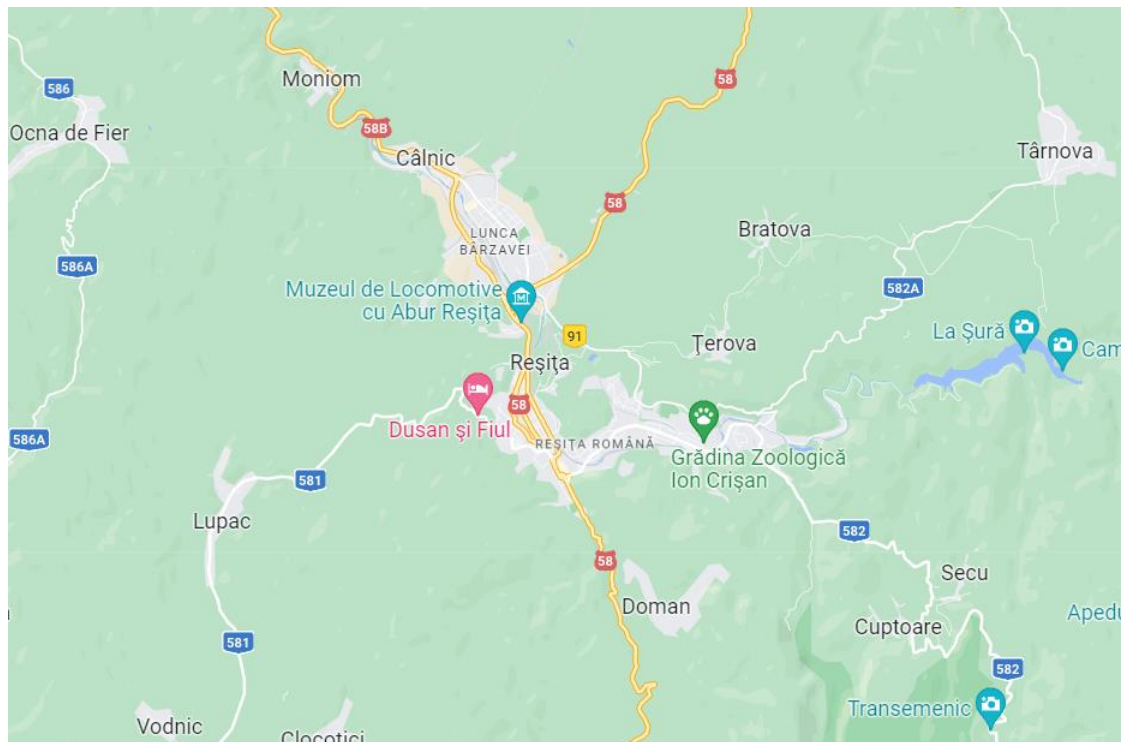
Reșița is a city located in the south-west of Romania, part of the historical province of Banat Montan. The city is located at an altitude of about 208-245 meters, on the upper course of the Bârzava River, at the intersection of 45°18'00" north latitude and 21°53'25" east longitude. (România Geografică)



Source: (gis.primariaresita.ro)

Figure 2 - GIS Map UAT Reșița

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



(Source: Google Maps)

Figure 3 - Reșița, neighboring towns and districts

The climate that characterizes the municipality of Reșița and the county of Caras-Severin is temperate-continental moderate, with Mediterranean nuances. Average annual temperatures are around 11.7° C and average rainfall amounts to 701 l/m². In this geographical area can be found various species of coniferous and deciduous trees, arable land, pastures and meadows, orchards and nurseries. Approximately 2% of the total forested area is degraded forest or deforested areas. The Bârzava River, which flows through the city in a north-west-south-east direction, together with its tributaries, forms the hydrographic network of the municipality of Reșița. Coal deposits and minerals are the region's main natural resources (Strategia de dezvoltare locală a Grupului de Acțiune Local Reșița, 2019).

The locality, called Rechyoka and Rechyca, is mentioned in the 15th century, so that at the beginning of the 17th century it was given the name of Reszinitza, paying taxes to the Paschalate of Timișoara at that time. In its current site the Romanian village called Reșița Română (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, a rich history and an industrial tradition of over 245 years.

The municipality is structured into three main districts as follows:

- **New Town** with the areas of Micro (district) I, Micro (district) II, Micro (district) III, Micro (district) IV and Calea Timișoarai;

- **City center** with zones: Center, Valea Domanului, **Lunca Pomostului, Moroasa I and II**, Reșița Română, Colonia Poiana Golului and Mociur;
- **The old town** with its 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 18th century, the first mentions of the population living in Reșița appear, around 300 people, so that at the beginning of the 20th century, the town counted more than 10,000 inhabitants. The population grew spectacularly to 17,384 inhabitants (1910), following the rapid development of local industry, Reșița being at that time an important steel and machinery production center of the country. In 1925, Reșița was granted the status of a city and in 1941 the population reached over 25,000 inhabitants.

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

The evolution of Reșița's population is similar to that of the national level, decreasing by 9.1% between 2002 and 2016 (NSI). If we refer to the distribution of the population by age categories, we can observe a clear trend of ageing, with a decrease of the young population (under 15 years) to the detriment of the elderly population (over 65 years).

Migration is another determining factor that has contributed and continues to contribute to the reduction of population in the municipality. According to the Social Barometer commissioned by the municipality and carried out by Eftimie Murgu University in 2016, 8.5% of the people living 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 Reșița's residents have left the country, and 13% expressed their intention to leave the country in the next three years. (Strategia de dezvoltare locală a Grupului de Acțiune Local Reșița)

The results of the last Population and Housing Census (2022) show that in the period since the previous census (2011), Reșița has lost almost 15,000 inhabitants, the resident population of the county town reaching 58,393 people (National Institute of Statistics). Although this demographic decline is attributed to a change in the census methodology compared to the previous census, this abrupt decrease in the resident population is a warning signal about the future economic and social development of the city.

2.3 Economic profile

The economic profile of the area is predominantly industrial-agricultural, the urban environment being attributed to activities of an industrial nature, trade and services and the rural environment to activities specific to the agricultural sector (crop and livestock farming).

Reșița developed as a strong industrial economic center with the construction and expansion works on the present site of the factories, the colonization of specialized labor force from Bohemia, Tyrol, Slovakia, Italy and France and last but not least, the replacement of the steelworks in Bocșa. Rich forests, wood resources, coal deposits, the local water network were just some of the development opportunities that this relocation offered.

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

Nowadays, the main fields of activity in the municipality of Resita can be grouped into several industries: food industry, clothing industry, metal industry, manufacture of machinery and equipment, and retail trade. In 2008, there were about 11,500 employees in the industry, a number that began to fall sharply the following year, when fewer than 10,000 people worked in the sector.

The industrial decline in recent years has been due to economic problems and social migration, which have led to high unemployment in the municipality and low incomes for those remaining in the major branches of local industry.

2.3.1 Local economy structure

According to the document "Integrated urban development strategy of the municipality of Resita for the period 2022-2030", the local economy is mainly focused on activities specific to traditional manufacturing industry.

The highest number of firms are active in the service sector (less trade) where about a quarter of the local private sector employees work, with services generating the largest share of company profits. This is due to economic developments but also to the decline of some large manufacturing activities, which are making losses. The commercial sector ranks third in the local economy, with a significant number of active firms.

Industrial transition processes have brought about notable changes in the structure of the local economy (e.g. deindustrialization). These included the tumultuous and unstable period of the 1990s, which led to a drop in the community's standard of living and significant migration, and then the economic crisis of 2008-2012, another difficult time that led to macro-structural economic and financial problems.

Adopting an economy that meets today's needs, such as a digitized and highly automated one, offers various opportunities and benefits. Communities that have a well-trained workforce and know how to harness resources in smart and innovative ways are the ones that will benefit from the industrial transition.

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

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

The developments of the traditional local historical companies, which have concentrated most of the industrial activity in the region, have been closely linked to changes during the industrial transition process. Therefore, after the privatization of the largest industrial platform in Romania (UCM Reșița and Combinatul Siderurgic) industrial activities experienced an accelerated decline.

2.3.2 Local economy development

While the number of local companies has been relatively constant in recent years, the number of employees has been steadily decreasing since 2014.

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

In 2019, Forbes Romania magazine ranked Reșița on the 12th position among the best cities for business in Romania, thanks to the industrial tradition it enjoys.

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

- in the northern part of the city - an industrial hub 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 urban conversion and regeneration process, one of the most ambitious projects of its kind in Romania;
- Valea Țerovei industrial area - where there is a surplus of available buildings and spaces;
- the old industrial area - with a tradition of over 250 years, occupying an important area of the Old Town (Smart City 2027)

While the number of employees continues to fall in the manufacturing sector, company turnover and profits are rising. Due to the modest economic performance of the main local incumbents, the share of this sector in the total profits of the local economy is low.

Local industry is concentrated in a few traditional industries, such as the manufacture of medium-tech machinery and equipment and steelmaking activities using 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 1990s to the present, and the postponement of structural and functional conversion processes, have led to the emergence in the city of brownfield areas, made up of former buildings, land or abandoned or poorly used facilities, often associated with the presence of pollutants resulting from past activities.

In recent years, local authorities have paid particular attention to this issue, realizing the negative impact on the development of the city as a whole. Here we can mention those marginalized, underdeveloped 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.)

2.3.3 Urban regeneration spectrum

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

The **Integrated Urban Regeneration** projects in the pipeline will incorporate a number of smart-city components and functions such as: automated irrigation and sprinkler systems for green spaces; systems for harnessing rainwater and using it to irrigate green spaces; implementation of multi-modular and multi-purpose residential car parks by lowering cars underground, thus freeing up space that can be used dynamically for other functionalities (green spaces, children's playgrounds, parks, sports fields, community activity spaces, etc.); digital smart-parking platforms that will also integrate automated green bins (buried platforms for selective collection) and smart bicycle parking.

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

According to the urban development approach promoted by the European Commission, the smart-city strategy of the city of Reșița integrates six development axes that intertwine and have the citizen at the center: Smart-People, Smart-Governance, Smart-Living, Smart-Environment, Smart-Economy and Smart-Mobility. (Plan de mobilitate urbana durabila PMUD).



Source: (Smart City 2027)

Figure 4 - Reșița Smart City Strategy

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

3 Report on the Sustainable Energy Action Plan

In 2009, the Municipality of Reșița signed a commitment to join the Covenant of Mayors with a firm determination to transform the municipality into a sustainable city by reducing carbon dioxide (CO₂) emissions by at least 20% by 2020. This initiative was supported due to its environmental, social, and economic benefits.

In this context, a Sustainable Energy Action Plan for the Municipality of Resita was developed and approved in 2016. This plan included a total of 58 well-defined actions with the aim of reducing CO₂ emissions by approximately 44,192 tones compared to the baseline year of 2008.

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

3.1 Monitoring Emission Inventory (MEI)

3.1.1 Emission inventory and monitoring methodology

The Sustainable Energy and Climate Action Plan is based on two key elements, the Baseline Emission Inventory (BEI) and the Monitoring Emission Inventory (MEI). These serve as a key starting point in defining the specific targets and measures needed to achieve the commitments.

The Baseline Emissions Inventory (BEI) was developed for 2008 with the aim of setting a target of a 20% reduction in carbon emissions by 2020. This BEI is a crucial reference for guiding and monitoring progress towards emission reduction targets.

By signing the new commitment within the Covenant of Mayors, the Municipality of Resita has undertaken to develop a new Sustainable Energy and Climate Action Plan (SEACP) and to carry out inventories to monitor emissions between 2015 and 2020.

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

Developing an emissions inventory involved a number of resources to gather, review and interpret the necessary data. This process was an essential step in ensuring that the report was properly developed to meet the specific challenges that exist in the Municipality of Reșița.

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

3.1.2 Energy consumption in the main municipal sectors

3.1.2.1 Scope and sectors considered in the emission inventory

The geographical boundaries of the emission inventories represent the boundaries of the Administrative Territorial Unit (ATU). These CO₂ emission inventories are based on the final energy consumption of the main sectors of the municipality resulting from the social and economic activities carried out. Quantitative data were collected on the different consumptions by activity sectors defined in the COMO methodology. Based on these consumptions, the related CO₂ emissions were quantified using IPCC emission factors, LCA and emission coefficients from the electricity label.

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

The necessary data collection on energy consumption at local level was carried out from energy distributors and suppliers: electricity consumption was provided by E-distribution Banat, natural gas consumption was provided by DEL GAZ, and biomass consumption was provided by the responsible departments of the municipality. The data provided were analyzed and interpreted, being the central object in the calculation of the carbon footprint of the Municipality of Reșița.

The assessment of emissions from transport sector consumption was carried out using data provided by the City of Resita and the Resita Urban Transport Company (TUR).

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

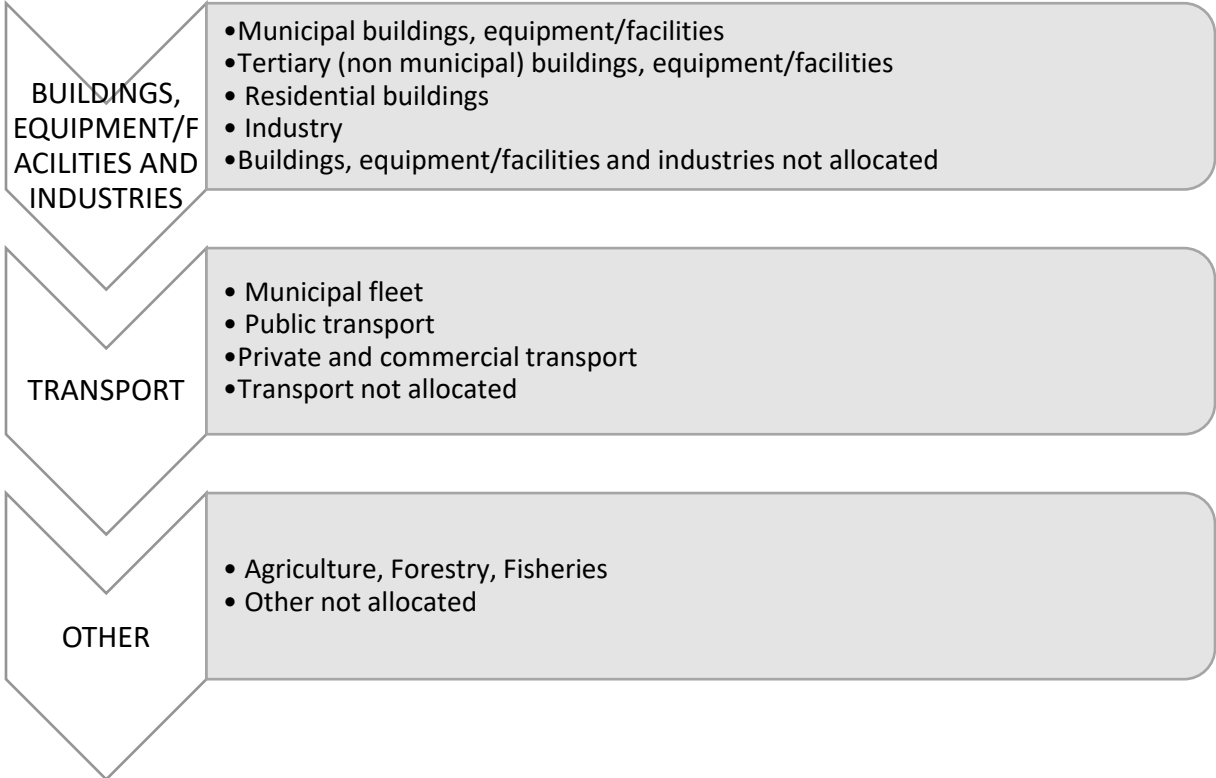
Plant waste is subject to the recovery process. Using an industrial shredder, they are palletized and turned into compost, entering an efficient cycle of reuse. This practice can be applied in the field of weighing, contributing to sustainable management of vegetable waste and encouraging a greener environment in the municipality.

- **Direct** (locally generated) emissions are released within the administrative-territorial unit (ATU) and are the result of fuel combustion for the production of heat or electricity, including emissions from internal combustion engines (in the transport sector).
- **Indirect** (external) **emissions** for the TAU (which local decision-makers cannot directly control the production of) are released in other Administrative-Territorial Units (TAUs) and are associated with the production of electricity or thermal agent (if there is a district heating system between TAUs) that is consumed in the analyzed TAU.

**During the monitoring period there was no local production of thermal/air conditioning agent in the municipality, therefore for the emission inventory only direct emissions were considered.*

At the local level, CO2 emissions accounting was performed using the method of multiplying the amount of energy consumed in each municipal sector (expressed in MWh) by the corresponding emission factors (Table 1).

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



3.1.2.2 Emission factors

The methodology of the Mayor's Convention allows for two approaches in developing inventories of emissions.

The "standard" emission factors, in accordance with IPCC principles, cover all carbon dioxide emissions generated as a result of energy consumption within the local authority's jurisdiction, whether they are direct or indirect emissions. These standard emission factors are based on the carbon content of each fuel, similar to what is used in national greenhouse gas inventories developed under the Kyoto Protocol. CO2 emissions are considered the most significant, and there is no need to calculate methane (CH4) and nitrous oxide (N2O) emissions.

The LCA (Life Cycle Analysis) emission factors take into account not only the emissions generated from the final burning of fossil fuels but also the emissions produced throughout

the entire supply chain, including those generated in the extraction, transportation, and processing processes.

CO₂ emissions generated from recorded consumptions have been quantified using the conversion coefficients recommended by the IPCC, and for municipal waste, the LCA factor has also been considered, as presented in the table below.

Table 1 - Conversion factor used in CO₂ quantification

Energy	Emission factor (tons CO ₂ /MWh)							SOURCE
	2008	2015	2016	2017	2018	2019	2020	
Electricity	0.701	0.465	0.444	0.47	0.452	0.457	0.379	IPCC
Natural gas	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

According to the Covenant of Mayors methodology, it is suggested that the emission factors used initially in the Baseline Emission Inventory should be the same as those used in the subsequent Monitoring Emissions Inventories, in line with the monitoring schedule established by the Covenant at the local level. This aspect encourages local authorities to implement the measures outlined in the Sustainable Energy and Climate Action Plan (SECAP) to achieve the carbon dioxide emission reduction objectives within the Covenant of Mayors.

During the monitoring of electricity-generated emissions, we considered the national factor according to the IPCC report for the year 2016, the year in which the Sustainable Energy Action Plan (SEAP) for Reșița was developed, ensuring coherence in the monitoring process. These factors were later updated, and for emissions monitoring, we integrated the most recent national data retrieved from the website <https://data.jrc.ec.europa.eu/collection/id-00172>.

As a result of monitoring emissions from the analyzed sectors in 2020, we recorded a reduction of **7% in energy consumption (MWh)** and a reduction of **7.35% in CO₂ emissions** compared to the 2008 level. Therefore, the objective was not achieved using the same emission factors.

It is essential to highlight that, if the local factor for monitoring consumption had been taken into consideration, a 20% reduction in emissions across all sectors would have been achieved in 2018. This achievement would have meant reaching the target set in the Sustainable Energy Action Plan.

Therefore, the selection of the emission factor in the calculation process is crucial, as it can lead to significantly different results. This analysis underscores the potential and impact that local decisions and adaptation to the specific context can have on achieving the objectives set in the field of energy and the environment.

3.1.3 Energy consumption in the main municipal sectors

- The final energy consumption in baseline year of 2008 totaled **779,384 MWh/year**.
- The final energy consumption per capita in 2008 stood **8.24 MWh/capita/year**.

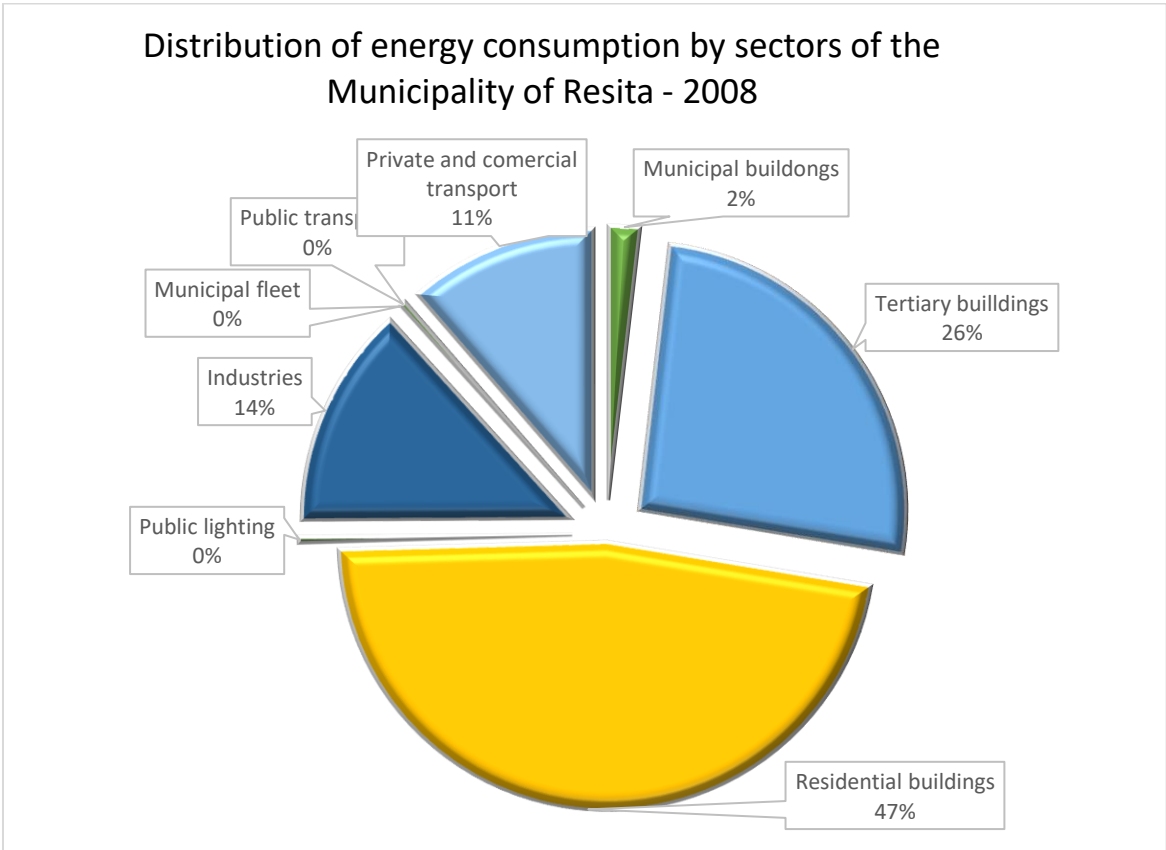


Chart 1 - Distribution of energy consumption by sectors, Municipality of Resita - 2008

Analyzing 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** account for the largest share, at 47%. This sector should be a priority as there is potential for significant improvements in energy efficiency in housing.
- **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 and to promote renewable energy and efficient technologies.

- **The industrial sector accounts for** a significant share of around 14% of total energy consumption. This sector can benefit from investments in energy efficiency technologies, process optimization 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 make a significant contribution to reducing this consumption.

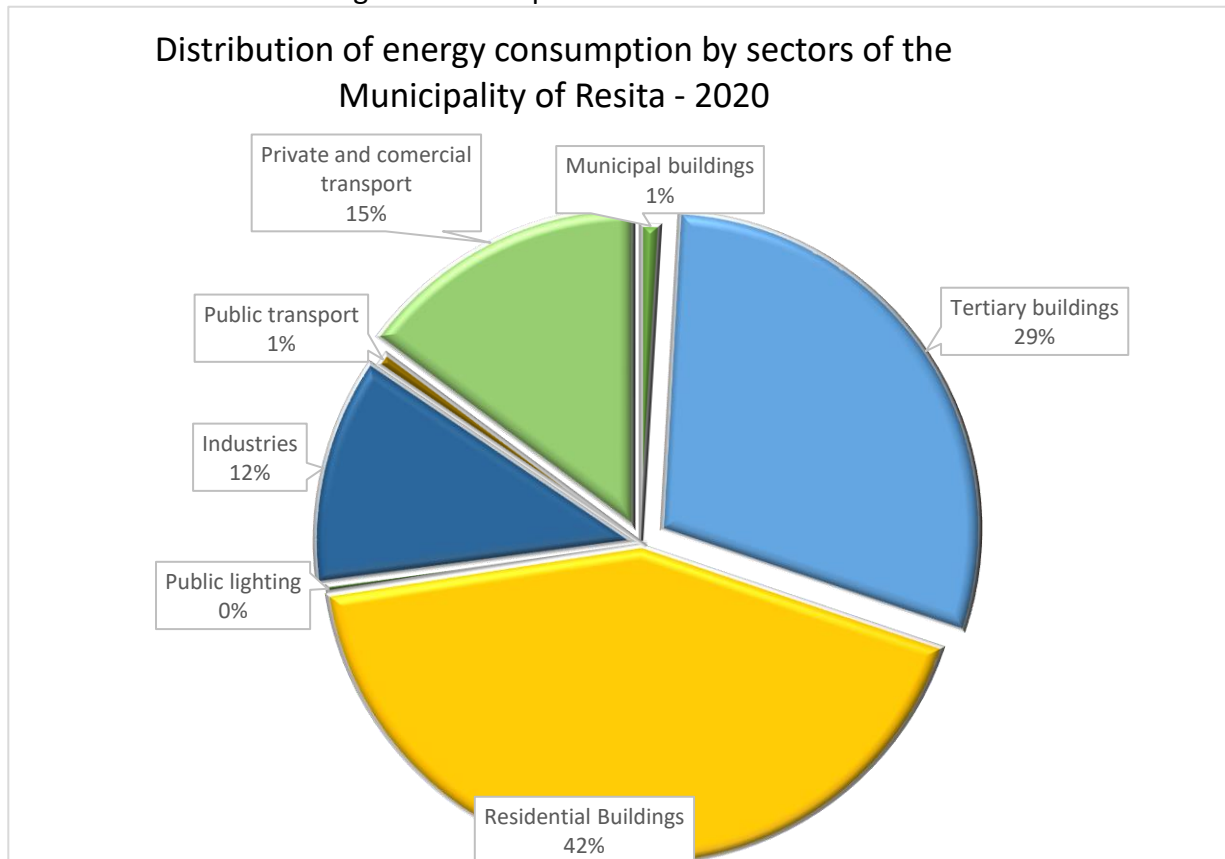


Chart 2 - Distribution of energy consumption by sectors, Municipality of Resita - year 2020

The analysis of energy consumption in the Municipality of Reșița for the year 2020 shows a diversified landscape of energy use 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 street lighting makes a marginal contribution, indicating possible opportunities for implementing energy efficient lighting technologies. The industrial sector accounts for 12% of total energy consumption in Resita.

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

In municipal (1%) and tertiary (29%) buildings, we identify opportunities for implementing energy efficient solutions in public and commercial buildings.

This analysis formed the basis for the development of a framework for developing energy efficiency strategies tailored to the specific 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 baseline year of 2008, indicating that some sectors have maintained a constant energy use. This is essential in order to identify areas for intervention and develop tailored sustainability strategies aimed at maximizing energy efficiency in areas with the greatest potential for improvement.

Table 2 - Electricity consumption for 2020 and 2022 compared to baseline year 2008

Sector	2008 MWh/year	2020 MWh/year	2022 MWh/year
Municipal	561	6.419	6.764
Tertiary	18.828	135.659	140.091
Residential	40.134	38.381	37.232
Street lighting	2.725	2.541	2.327
Public transport	1.949	1.286	8.726
Commercial Transport	N/A	N/A	N/A
Industry	N/A	4.228	8.726
Agriculture	N/A ¹	234	239
Total	64.197	231.358	204.105

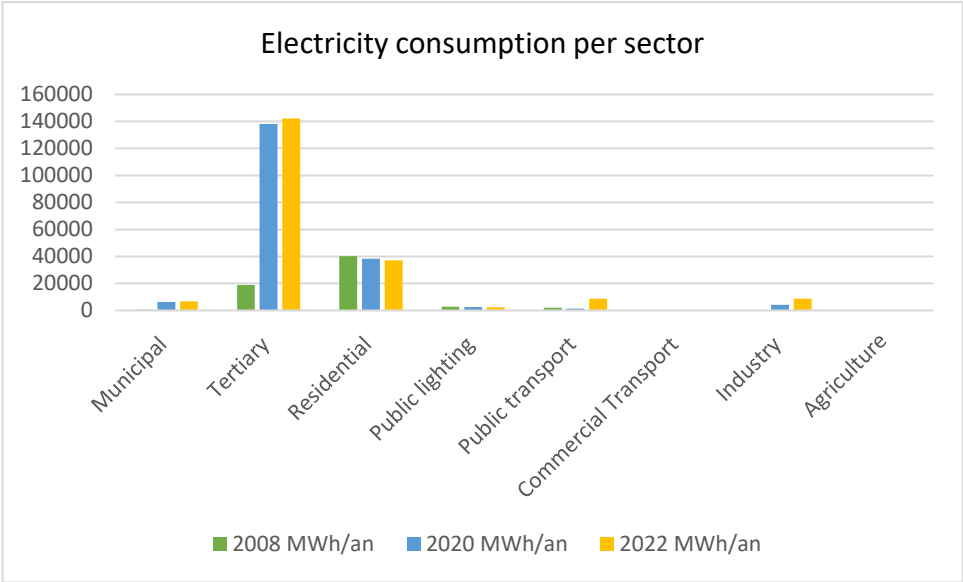


Chart 3 - Electricity consumption per sector

¹ N/A – no data available for the industrial and agricultural sector for the year 2008

The data presented shows the evolution of energy consumption in different sectors between 2008 and 2020. During this period, the municipal sector has seen a significant increase from 561 MWh/year in 2008 to 6,419 MWh/year in 2020.

The tertiary sector saw a significant increase, rising from 18,828 MWh/year to 135,659 MWh/year over the same period, largely attributed to the emergence and development of new commercial facilities in the city, such as a Kaufland store, an Altex and two Lidl. These new commercial locations brought with them an increase in energy demand for lighting, air conditioning, equipment and other needs, thus explaining the significant increase in energy consumption in the tertiary sector over the period.

However, the residential sector saw a slight decrease from 40,134 MWh/year in 2008 to 38,381 MWh/year in 2020. Energy consumption for street lighting and public transport decreased, while data for commercial transport is not available. Overall, total energy consumption increased significantly from 64 197 MWh/year in 2008 to 184 286 MWh/year in 2020, indicating the need to take measures for energy efficiency and sustainable management of energy resources in these sectors

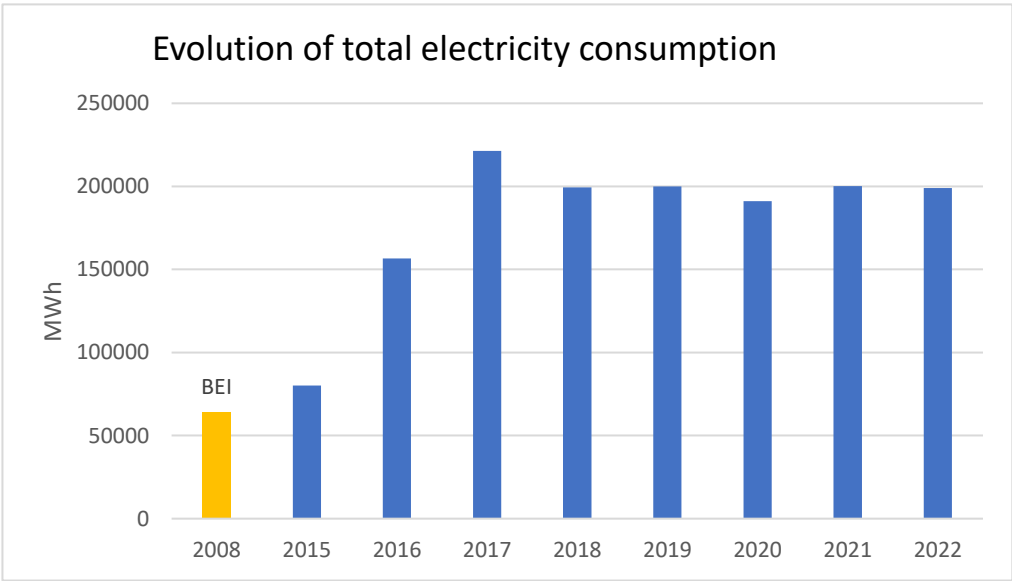


Chart 4 - Evolution of total electricity consumption by sector for the period 2015 - 2022, compared to baseline year 2008

Chart 4 shows the evolution of total electricity consumption by sector for the period 2015 - 2022, compared to the base year 2008. Analyzing this data, a significant increase in electricity consumption can be observed over the period analyzed.

- Between 2008 and 2015, electricity consumption increased considerably from 64,197 MWh in 2008 to 77,179 MWh in 2015.
- The increase in consumption continued in subsequent years, reaching its highest value in 2017, when consumption reached 218,813 MWh. This significant increase was influenced by the economic expansion and changes in the municipality's energy sector.

- In 2018, there was a slight decrease in electricity consumption to 196,986 MWh, but the values remained high compared to 2008.
- Over the period 2019-2022, electricity consumption remained relatively stable or fluctuated slightly, with no significant increase.

In summary, these data reflect an increase in electricity demand between 2008 and 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.

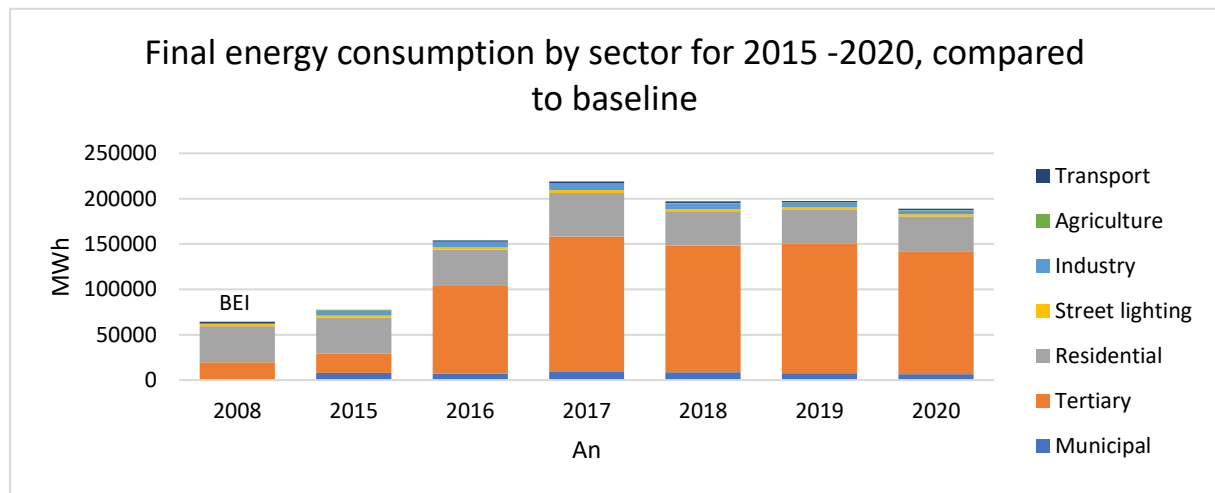


Chart 5 - Final energy consumption by sector for the period 2015 -2020, compared to baseline, 2008

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

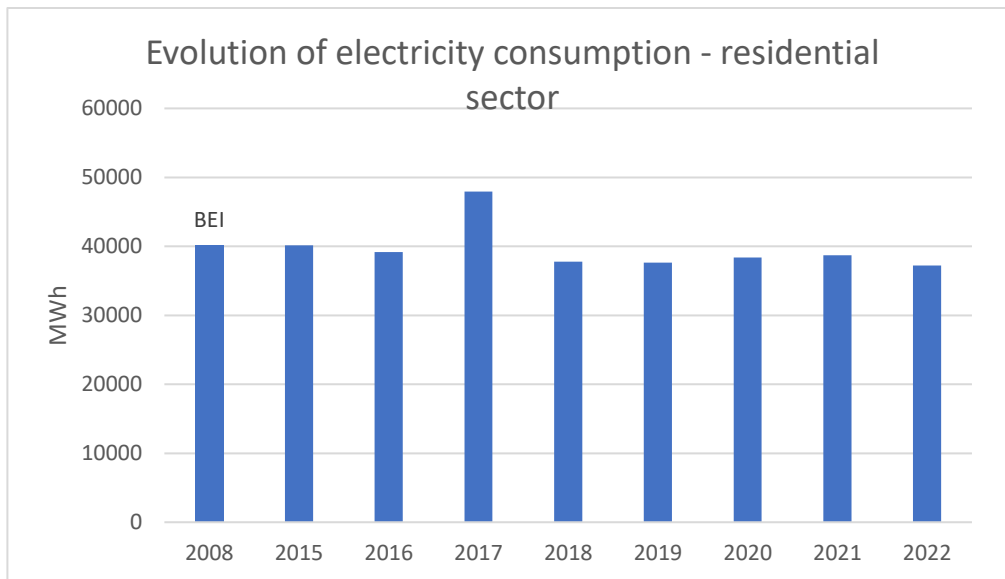


Chart 6 - Evolution of electricity consumption for the residential sector 2015 – 2022, compared to baseline, 2008

In terms of the evolution of final electricity consumption for the residential sector in the period 2015-2022, compared to the 2008 level (40,134 MWh/year), we observe significant trends:

In 2015, electricity consumption (40,147 MWh/year) was similar to 2008 levels, with a slight increase. In 2016 and 2017, consumption increased significantly, peaking at 47,948 MWh/year in 2017, which is a significant increase from 2008. From 2018 to 2021, electricity consumption was relatively stable, with values close to the 2008 level. However, in 2022, there was a significant decrease in consumption to 37,232 MWh/year, indicating a significant change from previous trends.

These figures suggest that after a period of growth and stabilization in residential electricity consumption between 2015 and 2021, a significant reduction has emerged in 2022.

3.1.3.1 Biomass consumption

During the monitoring years, the consumption of wood biomass in the residential sector has slightly increased, while in the municipal sector it has decreased. This development can be associated with adjustments in population dynamics and changes in energy source preferences. The municipal sector also showed a significant transition to alternative sources such as natural gas. In conclusion, the evolution of wood biomass consumption in the municipal and tertiary sector may be due to local policy adjustments and consumer preferences.

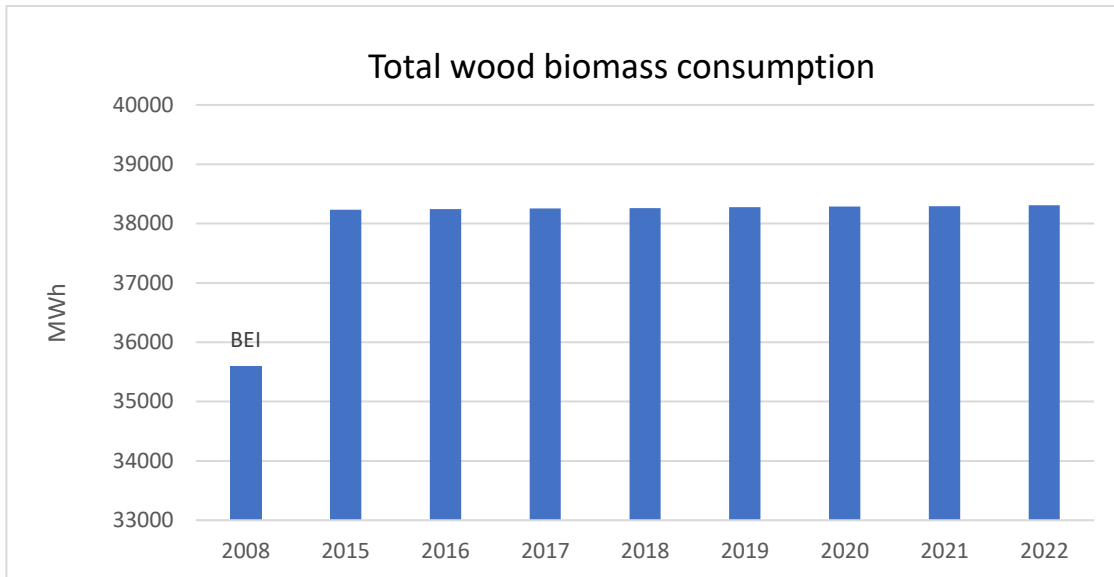


Chart 7 - Evolution of final consumption of woody biomass 2015-2022 compared to base year 2008

3.1.3.2 Distribution of energy consumption by fuel type

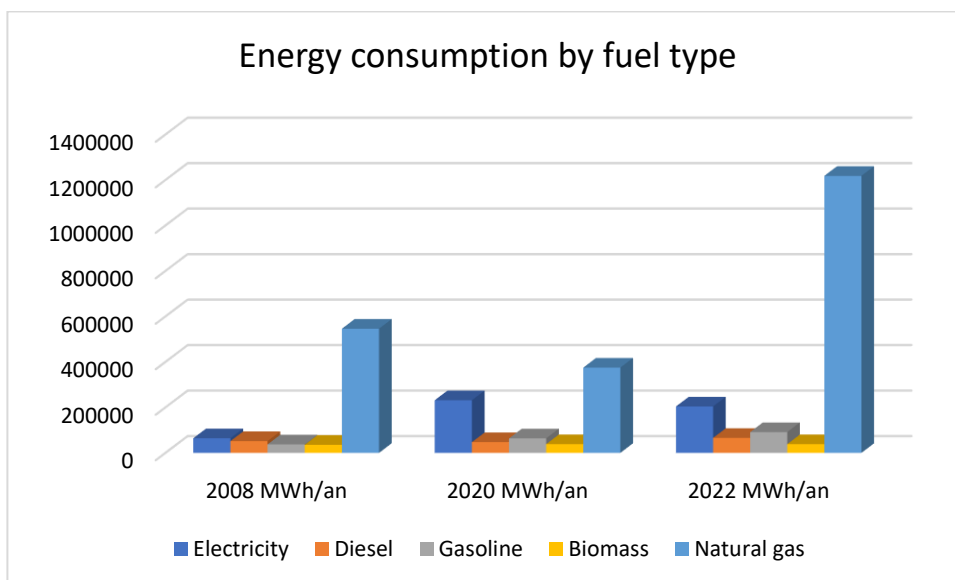


Chart 8 - Distribution of energy consumption by fuel type

Over the period 2008-2022, the electricity sector has seen significant growth, peaking in 2020 and then declining slightly in 2022. Diesel consumption has decreased over the years, with a significant increase between 2008 and 2022. Gasoline consumption has shown steady growth, peaking in 2022. The use of woody biomass has remained relatively constant over the period analyzed.

It is important to mention that during the monitoring period, the thermal power plant (CET) Reșița did not produce any thermal agent and the main heating source became gas. This is a significant change that explains the increase in gas consumption in recent years. Natural gas consumption has fluctuated significantly, peaking in 2008, then falling in 2020 and returning to an extremely high level in 2022. Total energy consumption increased between 2008 and 2022, reflecting changes in electricity and natural gas consumption, with a focus on the increase in gas consumption as the main source of heating changed.

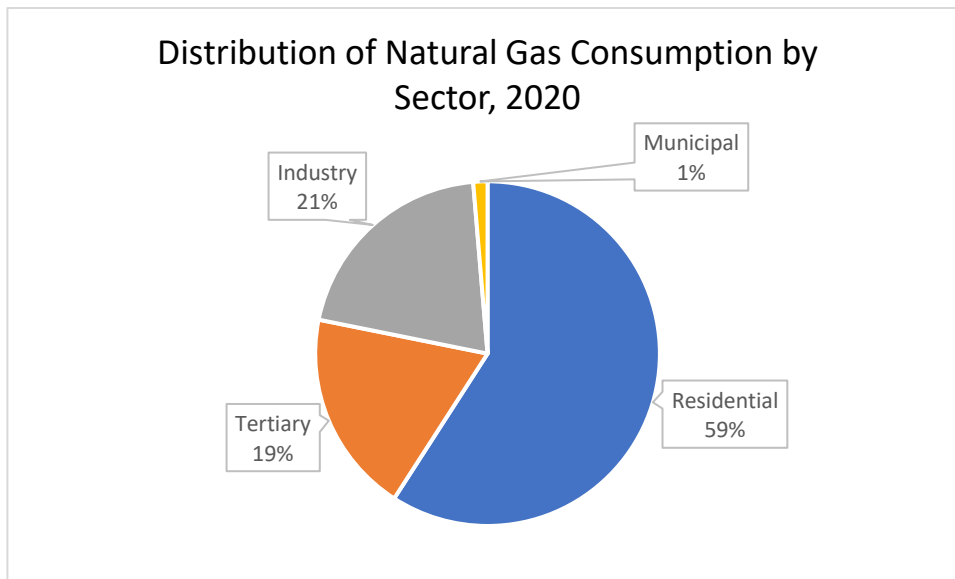


Chart 9 - Distribution of Natural Gas Consumption by Sector, 2020

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

The residential sector dominates consumption, contributing 59% of the total. This underlines the need to encourage energy-efficient technologies in housing to reduce dependence on natural gas.

The tertiary and industrial sectors, with shares of 19% and 21%, show 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 shows a low consumption of 1%.

These data therefore present an important starting point for developing the plan with sector-specific adaptation and mitigation actions. Promoting energy efficiency and the adoption of renewable energy sources are key opportunities for moving towards a sustainable community in Resita.

3.1.3.3 Local renewable energy production

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 High School, Traian Lalescu National College and Diaconovici Tietz College. This investment has generated a local electricity production of approximately 33,301 MWh over the period 2020-2023.

This gradual transition of the municipality to renewable energy sources will not only contribute to reducing its carbon footprint, but is a significant step towards sustainability, and a step towards reducing dependence on traditional electricity sources.

3.1.4 Local CO₂ inventory

Local CO₂ emission reduction targets have been carefully monitored and quantified, including the measures taken to achieve them. In order to ensure a correct trajectory towards meeting these targets, the status of implementation of planned actions has been monitored. The comparison of CO₂ emissions at local level between 2008 (baseline year) and 2020 (monitoring year) reflects the environmental impacts associated with energy consumption in the different sectors of activity and their evolution after the implementation of the EDSP and corresponding measures.

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

Results in figures:

- **200,849 tons CO₂** total CO₂ emissions in 2020
- **2.38 tons CO₂ /year** emissions per capita in 2020

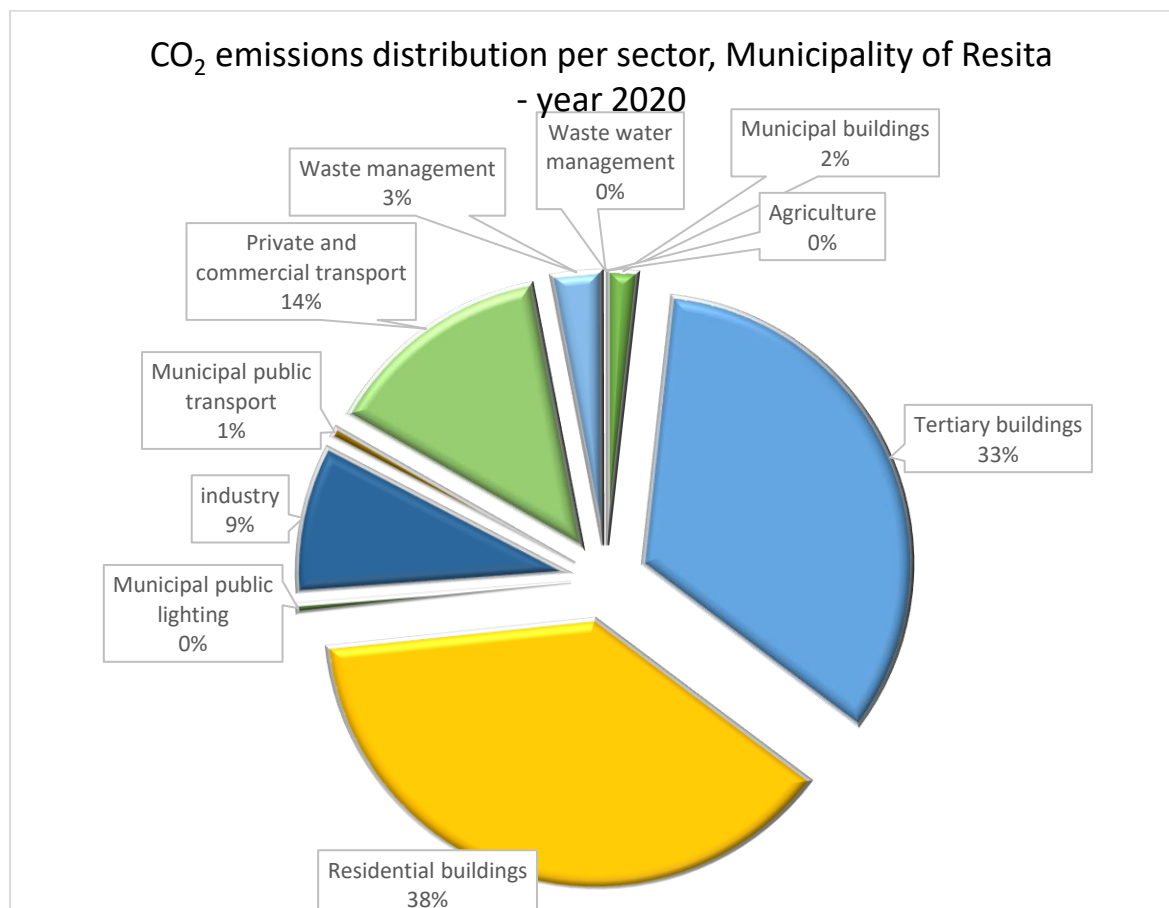


Chart 10 - Distribution of CO₂ consumption by sectors in 2020 - Municipality of Resita

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

Residential buildings contribute 38% of CO₂ emissions. Municipal street lighting also does not generate significant CO₂ emissions, indicating the adoption of more energy-efficient lighting sources, such as replacing light bulbs with LEDs.

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 point to the need for a sustainable approach in these areas, with a focus on recycling and resource efficiency.

Municipal and tertiary buildings 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 view of the sources of CO₂ emissions in the municipality, providing clear directions for the development of sustainable and energy-efficient strategies needed to achieve the carbon footprint reduction targets in the Municipality of Reșița.

Table 3 - Centralized energy consumption and CO₂ emissions at sectoral level²

SECTORS and areas assessed in the monitoring of the SECAP		CO ₂ emissions, tonsCO ₂ /2008	CO ₂ emissions, tonsCO ₂ /2020
BUILDINGS, EQUIPMENT/INSTALLATIONS AND INDUSTRIES	Municipal buildings	3309	3494
	Tertiary buildings	49972	67304
	Residential buildings	90725	76495
	Municipal street lighting	1910	963
	Industries	21056	17742
Subtotal SECTOR		166973	165998
TRANSPORT	Municipal Park	27	N/A
	Municipal public transport	1553	1222

² N/A data were not available or not required for the purpose of quantifying CO₂ emissions

	Private and commercial transport	22728	27560
Subtotal SECTOR		24308	28782
Others	Waste management	25497	6006
	Waste water management	4	13
	Agriculture	N/A	50
Total		216783	200849
Total number of inhabitants		94594	84567
LOCAL IMPACT - CO2 emissions, tons CO2/capita		2.29	2.38

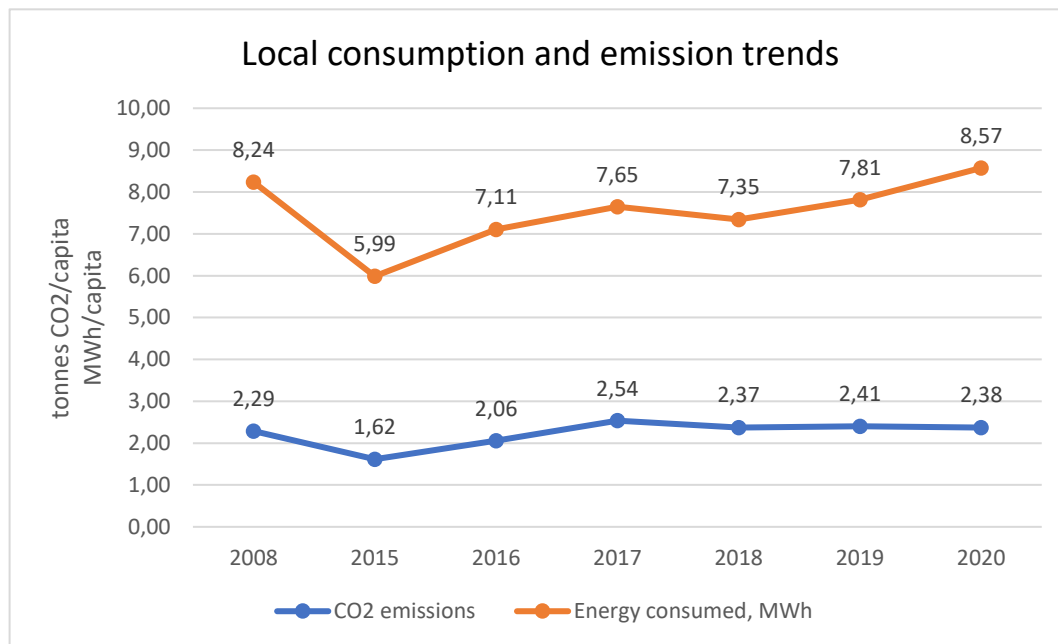


Chart 11 - Greenhouse gas (GHG) emissions and final energy consumption per capita for the period 2015-2020 compared to base year 2008

The impact of energy consumption on the local carbon footprint in the Municipality of Resita is shown by emissions expressed in tones of CO₂ /year/capita. In general, a decreasing trend of CO₂ emissions at local level is observed in 2015, followed by a relative increase in the following years. By implementing measures at the community level, the per capita carbon footprint in 2020 was 2.38 tones CO₂ /year. These developments underline the need for a thorough analysis of the factors influencing the observed changes in order to identify possible measures and policies that could contribute to reducing CO₂ emissions and optimizing energy consumption in the future.

No.	Sector	Action	Responsible	Start-end date	Estimated costs EUR	Status	Implementation share (%)	Observation
1	<i>Municipal buildings, equipment/facilities</i>	Reconstruction, restoration, refurbishment, refurbishment of representative buildings of historical, memorial and environmental value	City Hall of Resita	2016-2020	5000000	Partially	50%	Only the Pittner School is being completed
2	<i>Municipal buildings, equipment/facilities</i>	Rehabilitation, modernisation and extension of existing housing stock (including social housing)	City Hall of Resita	2016-2020	2800000	Partially	90%	Estimated energy savings: 400 MWh Emission reductions: 81 tonnes CO2
3	<i>Municipal buildings, equipment/facilities</i>	Roof with attic at the sports hall - Economic College of Banat Montan	City Hall of Resita	2015-2016	545963	Completed	100%	Estimated energy savings: 165 MWh Emission reductions: 33 tonnes CO2
4	<i>Municipal buildings, equipment/facilities</i>	External thermal insulation on the facades of the Gf+3E of the Traian Lalescu National College - primary school	City Hall of Resita	2015-2016	117812	Completed	100%	Estimated energy savings: 165 MWh Emission reductions: 33 tonnes CO2
5	<i>Municipal buildings, equipment/facilities</i>	Thermal rehabilitation of the facade of the high school and secondary school Traian Lalescu National College	City Hall of Resita	2016-2016	133333	Completed	100%	

6	<i>Municipal buildings, equipment/facilities</i>	Thermo-energetic rehabilitation at the Technical College	City Hall of Resita	2016-2020	800000	Partially	90%	Estimated energy savings: 200 MWh Emission reductions: 40 tonnes CO2
7	<i>Municipal buildings, equipment/facilities</i>	Thermo-energetic rehabilitation at the Technical College of Cărașan	City Hall of Resita	2016-2020	800000	Cancelled		The college was abolished
8	<i>Municipal buildings, equipment/facilities</i>	Thermal rehabilitation of the attic floor of Sabin Păuța Art High School in Reșița	City Hall of Resita	2016-2020	159764	Postponed		Postponed - GRP 2021-2027 Estimated energy savings: 261 MWh Emission reductions: 53 tonnes CO2
9	<i>Municipal buildings, equipment/facilities</i>	Modernization and equipping of the building in Govândari district (former PSI shed/former laundry near Gloria stadium) in order to create an Intervention Center for the Voluntary Emergency Service	City Hall of Resita	2016-2018	1893662	Postponed		Lack of funds
10	<i>Municipal buildings, equipment/facilities</i>	Energy Efficiency - A prerequisite for a better environment in the Romania-Serbia cross-border area. Installation of solar panels for water heating at the Olympic swimming pool	City Hall of Resita	2016-2018	1288731	Completed	100%	Estimated energy savings: 500 MWh Emission reductions: 101 tonnes CO2

11	<i>Municipal buildings, equipment/facilities</i>	Modernization and equipping of the cultural home in Călnic for the establishment of a cultural center for the preservation and promotion of traditions in Reșița	City Hall of Resita	2017-2018	828313	Postponed		Lack of funds
12	<i>Municipal buildings, equipment/facilities</i>	Rehabilitation and modernization of the Didactic Swimming Pool B-dul Revoluția din Decembrie	City Hall of Resita	2016-2018	2126372	Partially	90%	Being finalised - new measures
13	<i>Municipal buildings, equipment/facilities</i>	Fitting out of a medical space for hydrokinetic therapy rehabilitation	City Hall of Resita	2016-2020	186.001	Postponed		Lack of funds
14	<i>Municipal buildings, equipment/facilities</i>	Rehabilitating and equipping medical practices	City Hall of Resita	2016-2020	28889	Partially	90%	Being finalised - new measures
15	<i>Municipal buildings, equipment/facilities</i>	Modernization of the football stadium "Mircea Chivu"	City Hall of Resita	2016-2020	7587090	Postponed		Lack of funds
16	<i>Municipal buildings, equipment/facilities</i>	Rehabilitation of school infrastructure Municipality of Resita, kindergartens (Palatul Fermeat, Pinochio, Riki-Priki, PN3, Floarea Soarelui, Dumbrava Minunată) and Mihai Peia Secondary School.	City Hall of Resita	2016-2020	5800000	Partially	80%	
17	<i>Municipal buildings, equipment/facilities</i>	Energy audits of all administrative buildings and identification of energy saving opportunities	City Hall of Resita	2016-2018	20000	Partially	50%	

18	<i>Residential buildings</i>	Increasing the energy efficiency of tower blocks in the Municipality of Resita - 2000 apartments (included in Annex 1)	City Hall of Resita	2016-2020	10000000	Partially	90%	Estimated energy savings: 4300 MWh Emission reductions: 869 tonnes CO2
19	<i>Residential buildings</i>	Supporting Investments in energy efficiency of housing blocks, I.L. Caragiale Street No. 18, 19, 20 - 120 apartments	City Hall of Resita	2015-2016	420402	Completed	100%	Estimated energy savings: 345 MWh Emission reductions: 70 tonnes CO2
20	<i>Residential and institutional buildings</i>	Increase the energy efficiency of approx. 80% of all residential blocks in the Municipality, and institutional buildings. Raising citizens' awareness, supporting the process and creating incentives for the process	City Hall of Resita	2016-2020		Partially	90%	Estimated energy savings: 87500 MWh Emission reductions: 17675 tonnes CO2

21	<i>Municipal street lighting</i>	Modernization and extension of the public lighting system in the Municipality of Resita. Introduction of the architectural lighting system of buildings and objects of heritage and public forum in the Municipality of Resita - 1590 lighting devices	City Hall of Resita	2016-2020	984280	Partially	90%	
22	<i>Municipal street lighting</i>	Expansion and modernisation of the public lighting system by replacing existing lamps with LED ones - road - 1512 street lighting fixtures	City Hall of Resita	2016-2020	1.82503	Partially	90%	Estimated energy savings: 414 MWh Emission reductions: 290 tonnes CO2
23	<i>Municipal street lighting</i>	Pedestrian lighting - installation of poles equipped with LED lighting fixtures - 414 pedestrian lighting fixtures	City Hall of Resita	2016-2020		Partially	90%	Estimated energy savings: 116 MWh Emission reductions: 81 tonnes CO2
24	<i>Public transport</i>	Modernization of streets - roads of local interest - in the districts of Resita - Doman, Cilnic, Ţerova, Secu, Ovens and Moniom village	City Hall of Resita	2016-2020	3604320	Partially	50%	Partial (Secu)
25	<i>Public transport</i>	Street upgrading Municipality of Resita	City Hall of Resita	2016-2020	10000000	Partially	60%	Partial - local budget approx.50%- 60% Estimated energy savings: 12549 MWh Emission reductions: 3304 tonnes CO2

26	Public transport	Upgrading roads and public transport with cycle paths, pavements, green alignments, street furniture.	City Hall of Resita	2016-2020	25000000	Partially	90%	Estimated energy savings: 6136 MWh Emission reductions: 1573 tonnes CO2
27	Public transport	The creation of bicycle lanes between the Lunca Bârzavei district and the Old Center.	City Hall of Resita	2016-2020	947676	Completed	100%	
28	Public transport	Bypass to divert heavy traffic from the city	CNADR	2016-2030	17471610	Postponed		Lack of funds Estimated energy savings: 3200 MWh Emission reductions: 854 tonnes CO2
29	Public transport	Rehabilitation of roads of local interest to the tourist area Secu (administrative boundary of Reșița municipality)	City Hall of Resita	2016-2018	3465646	Postponed		Lack of funds
30	Public transport	Road link between Calea Timisorii and Military Unit in the Municipality of Resita	City Hall of Resita	2016-2018	657380	Completed	100%	
31	Public transport	Rehabilitation of paved road, bridges and retaining walls damaged by calamities in Butovăț street	City Hall of Resita	2015-2016	145257	Completed	100%	
32	Public transport	Agricultural road improvement in Resita Municipality	City Hall of Resita	2016-2020	1179812	Postponed		Lack of funds

33	<i>Photovoltaic</i>	Installation of domestic hot water production facilities using solar panels or hybrid panels at sports facilities with large changing rooms	City Hall of Resita	2016-2018	250000	Postponed		Lack of funds Estimated energy savings: 100 MWh Emission reductions: 20 tonnes CO ₂
34	<i>Local heat production</i>	Installation of individual thermal power plants in each education unit, in order to solve punctual thermal energy supply	City Hall of Resita	2016-2016	756181	Completed	100%	Estimated energy savings: 1352 MWh Emission reductions: 273 tonnes CO ₂
35	<i>Strategic urban planning</i>	Parks Development: Tricolorului, Cărășana, Moroasa and landscaping of green spaces in the Municipality of Reșița	City Hall of Resita	2015-2016	1521054	Partially	90%	
36	<i>Strategic urban planning</i>	Leisure area (according to the Picnic Law 54/2012) in Reșița Municipality	City Hall of Resita	2016-2020	1000000	Postponed		Lack of funds
37	<i>Strategic urban planning</i>	Rehabilitation of the Dacia Cinema	City Hall of Resita	2016-2018	4017310	Partially	90%	Estimated energy savings: 200 MWh Emission reductions: 40 tonnes CO ₂
38	<i>Strategic urban planning</i>	Resurfacing roads with paving	City Hall of Resita	2016-2016	201315	Partially	50%	Completed - Furnace Street
39	<i>Strategic urban planning</i>	Sustainable Urban Mobility Plan for the Municipality of Resita	City Hall of Resita	2016-2016	28523	Completed	100%	Estimated energy savings: 9174 MWh Emission reductions: 991 tonnes CO ₂

40	<i>Strategic urban planning</i>	Learning outdoors and protecting the environment!	Euroland Banat Association	2016-2016	2516	Completed	100%	
		Landscaping 200 m2	Parents Association					
		planting 22 trees	The Palatul Fermecat extended day kindergarten in Resita					
41	<i>Strategic urban planning</i>	Ecoschoolchildren TLNC, 630 sqm green space and planting of 204 trees	Traian Lalescu High School Parents' Association	2015-2016	2273	Completed	100%	
			Traian Lalescu National College					
			Municipality of Resita					
42	<i>Strategic urban planning</i>	Theatre in the Garden	Association of Parents' Committee RICKI-PRICHI Kindergarten	2015-2016	2673	Completed	100%	
		650 m2 with flowers	RICKI-PRICHI Extended Day Nursery School Resita					
			Municipality of Resita					
43	<i>Strategic urban planning</i>	Installation of street monitoring system in the Municipality of Resita	City Hall of Resita	2016-2020	1000000	Partially	90%	
44	<i>Energy efficiency requirements/standards</i>	Implementation of ISO 50001 certification	City Hall of Resita	2016-2017		Partially	90%	

45	<i>Green procurement</i>	Develop criteria for green procurement at local level. Introduce them in the specifications for the procurement of products and services	City Hall of Resita	2016-2017		Completed	100%	
46	<i>Local awareness raising and networking</i>	Promotion of joint tourism initiatives	City Hall of Resita	2016-2018	688353	Completed	100%	
47	<i>Local awareness raising and networking</i>	Improving the quality and time of service delivery by the City of Resita	City Hall of Resita	2016-2016	500000	Partially	90%	
48	<i>Local awareness raising and networking</i>	Annual organisation of ENERGY DAY. Raise awareness of energy efficiency in homes annually.	City Hall of Resita	2016-2020	15000	Postponed		Lack of funds Estimated energy savings: 22000 MWh Emission reductions: 6456 tonnes CO2
49	<i>Local awareness raising and networking</i>	Promoting employment and strengthening basic services for inclusive growth, social and cultural inclusion	City Hall of Resita	2016-2018		Postponed		Lack of funds
50	<i>Local awareness raising and networking</i>	Sustainable firewood supply. Promote this concept and strengthen control of uncontrolled deforestation	Forestry	2016-2018	3500	Postponed		Lack of funds Emission reductions: 3575 tonnes CO2

51	<i>Local awareness raising and networking</i>	Awareness of the third sector on energy efficiency. Create a best practice guide and distribute it locally	City Hall of Resita	2016-2018	15000	Completed	100%	Estimated energy savings: 6799 MWh Emission reductions: 2782 tonnes CO2
52	<i>Waste</i>	Extension of the integrated waste management system in the municipality of Reșița.	County Council	2015-2016	1000000	Partially	90%	Emission reductions: 3824 tonnes CO2
53	<i>Waste</i>	Develop a simple guide to raise awareness of the separate collection process and the tools offered to the citizen	City Hall of Resita	2016-2017	6000	Completed	100%	Emission reductions: 785 tonnes CO2
54	<i>Water/Sewerage</i>	Sewerage and wastewater treatment plant in Doman - Reșița Municipality	City Hall of Resita	2016-2020	1310220	Postponed		Lack of funds
55	<i>Water/Sewerage</i>	Sewerage and wastewater treatment plant in Secu, Ovens and Moniom village - Municipiul Reșița	City Hall of Resita	2016-2020	2409030	Partially	90%	Finished (Secu)
56	<i>Water/Sewerage</i>	Water supply in Doman - Municipiul Reșița	City Hall of Resita	2015-2016	1086877	Postponed		Lack of funds
57	<i>Water/Sewerage</i>	Water supply in Secu, Ovens and Moniom village - Municipiul Reșița	City Hall of Resita	2015-2016	1406503	Partially	90%	Finished (Secu)
58	<i>Water/Sewerage</i>	Rehabilitation and extension of the water and sewerage network transfer pipes - Municipiul Reșița	City Hall of Resita	2016-2016	14800000	Partially	90%	Estimated energy savings: 552 MWh Emission reductions: 387 tonnes CO2

4 Risk and Vulnerability Assessment (RVA)

4.1 Methodology

As part of the analysis of climate risks and vulnerabilities, carried out according to the specific methodology of the SECAP (Center, 2018), those risks and vulnerabilities that may endanger the municipality of Reșița were identified, following the next steps:



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

The analysis and assessment of climate hazards in the municipality of Resita 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 "Semenic" Emergency Situations Inspectorate of Caras-Severin County, regarding the interventions in the area of Resita TAU related to meteorological phenomena. Other related information concerning certain trends and forecasts of climatic factors in the short, medium and long term was 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, in the analysis and assessment of climate hazards in the municipality of Resita, a number of existing reports on the risks and impacts of climate change in the area of interest or carried out at national level were taken into account. The following documents were consulted and analyzed:

- National Strategy - Adaptation to Climate Change 2022-2030 with 2050 Perspective (SNASC), Plan for the implementation of the National Strategy on Adaptation to Climate Change (PNASC) published in 2022;
- Romania's National Strategy for Sustainable Development 2030, developed by the Romanian Government and published in 2018;
- Risk analysis and coverage plan of Caras-Severin County, published in 2021;
- Flood Risk Management Plan - Banat Water Basin Administration, updated;

4.2 Local diagnosis

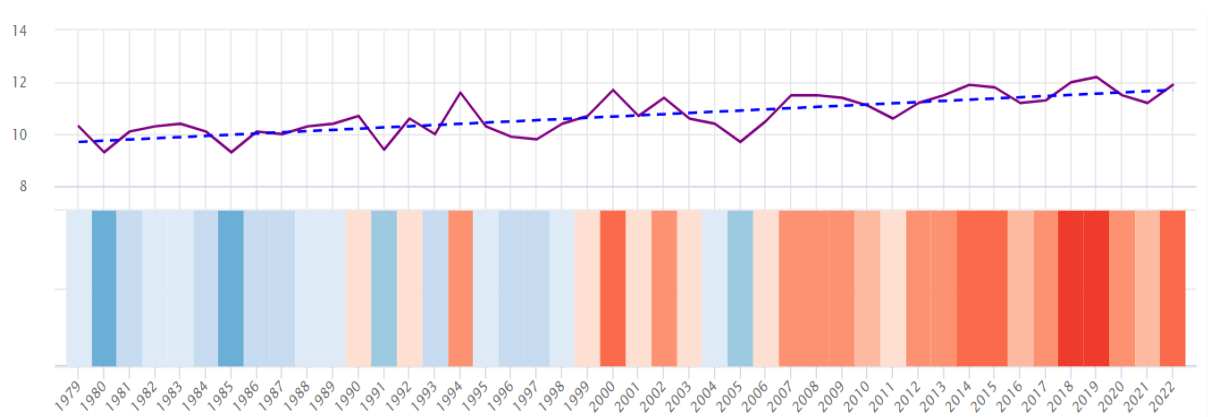
The recent past has shown us that climate change and its associated extreme weather events have come to negatively affect more and more aspects of daily life and the notion of climate resilience has begun to play an important role in this context. How we respond to these changes and impacts caused by climate change is closely linked to how we adapt management models, process development, decision-making, undertaking action plans, developing population-friendly infrastructure and protecting people from impacts that lead to health or even cohabitation in the city.

The analysis of the evolution of climate parameters was based on two approaches. The first one considered an analysis of the evolution of climatic parameters at the level of the region of which the city of Reșița is part and is based on a series of **estimated meteorological data** provided by website www.meteoblue.com. The data source used by [meteoblue.com](http://www.meteoblue.com) is ERA5, the fifth generation of the ECMWF Global Climate Atmospheric Reanalysis, **covering the time interval 1979-2022**, with a **spatial resolution of 30 km**. The diagrams below highlight how climate change has already affected the **Reșița region** over the last 40 years. At the same time, we note that temperatures in Resita will often be higher than shown in the graphs and precipitation may vary locally, depending on topography.

4.2.1 Air temperature analysis

Annual variation in air temperature, °C (1979-2022)

Avg. Temp. C°



Source: meteoblue.com

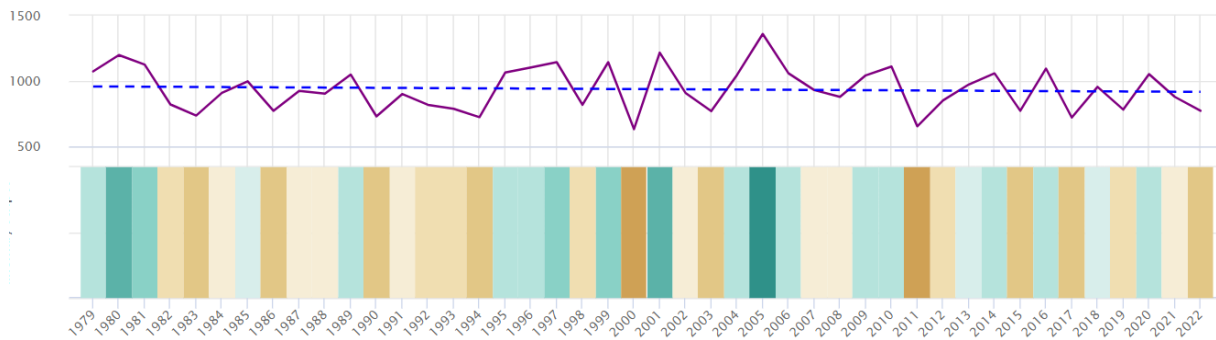
Chart 12 - Annual variation in air temperature (1979-2022)

The graph above captures an estimate of the evolution of the annual mean air temperature over the last 43 years for the region in which Resita is located, with the blue dotted line rising from left to right showing a clear upward trend in temperature 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 cooler years and shades of red to warmer years. The bands in deeper shades of red are increasingly common after 2000, indicating a warming of the local annual mean air temperature.

4.2.2 Trend analysis of annual rainfall

Annual change in average precipitation (mm) (1979-2022)

Precipitation (mm)



Source: meteoblue.com

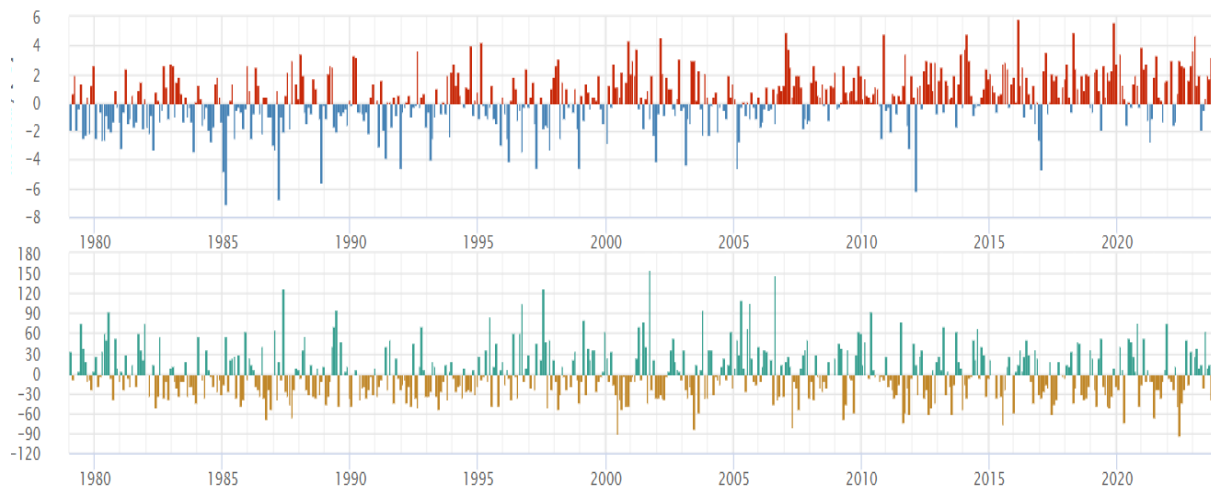
Chart 13 - Annual change in average precipitation

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

4.2.3 Analysis of monthly temperature and precipitation anomalies

Monthly temperature and precipitation anomalies (1979-2022) - Climate Change Resita

Anomaly - Temp. °C



Source: meteoblue.com

Chart 14 - Monthly temperature and precipitation anomalies (1979-2022) - Climate change Resita,

Temperature anomalies for each month from 1979 to 2022 are shown at the top of the graph, indicating how many degrees Celsius warmer or cooler the estimated temperature was relative to the 30-year climate average from 1980-2010. The red vertical lines represent months that

were warmer and the blue lines represent months that were colder than normal. An increase in warmer-than-average months over the last 20 years is quite evident, reflecting warming associated with climate change. At the bottom of the graph, you can see the anomalies in rainfall amounts for each month from 1979 to the present, relative to the 30-year climate average from 1980-2010. Thus, the green vertical lines represent months with higher-than-average precipitation and the brown vertical lines represent months with drier than normal precipitation. The relationship between the two variables is relatively balanced, 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 analyzed were the mean annual air temperature, the number of tropical days and nights, the total annual and 24-hour rainfall and the mean wind speed, and are grouped in the table below as follows:

ANALYSIS OF CLIMATE PARAMETERS EVOLUTION - REȘIȚA (2000-2022)

AN	Average annual air temperature C°	Number of tropical days	Number of tropical nights	Total precipitation mm	Average rainfall 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

On the basis of these primary data, several summary diagrams were generated to capture, as suggestively as possible, the evolution and trends observed at local level of the main climatic parameters analyzed.

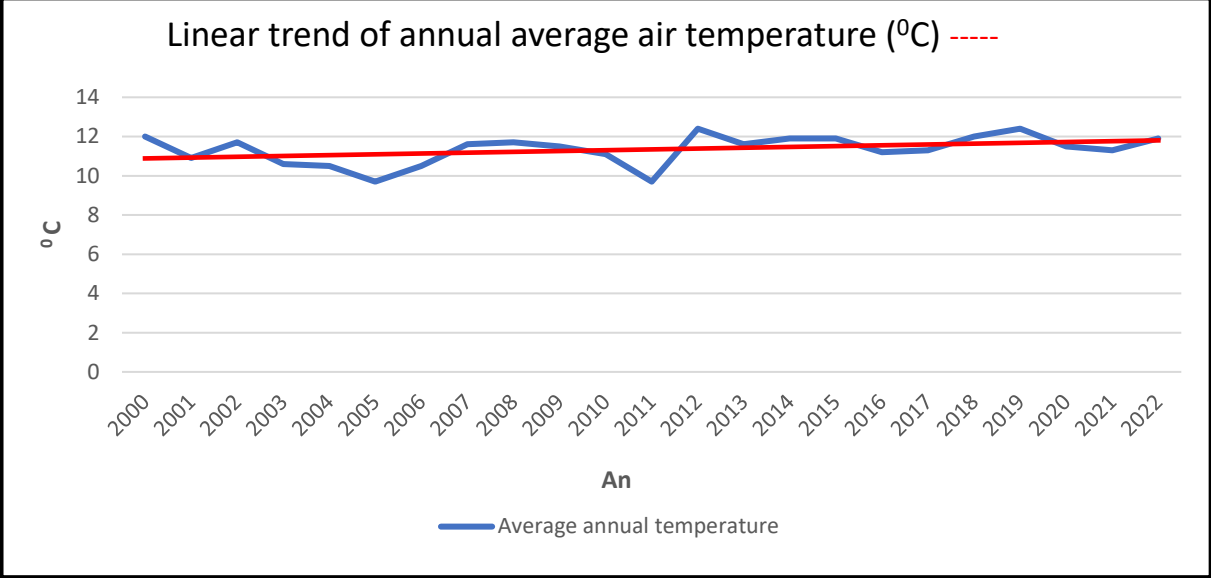


Chart 15 - Linear trend of annual average air temperature

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

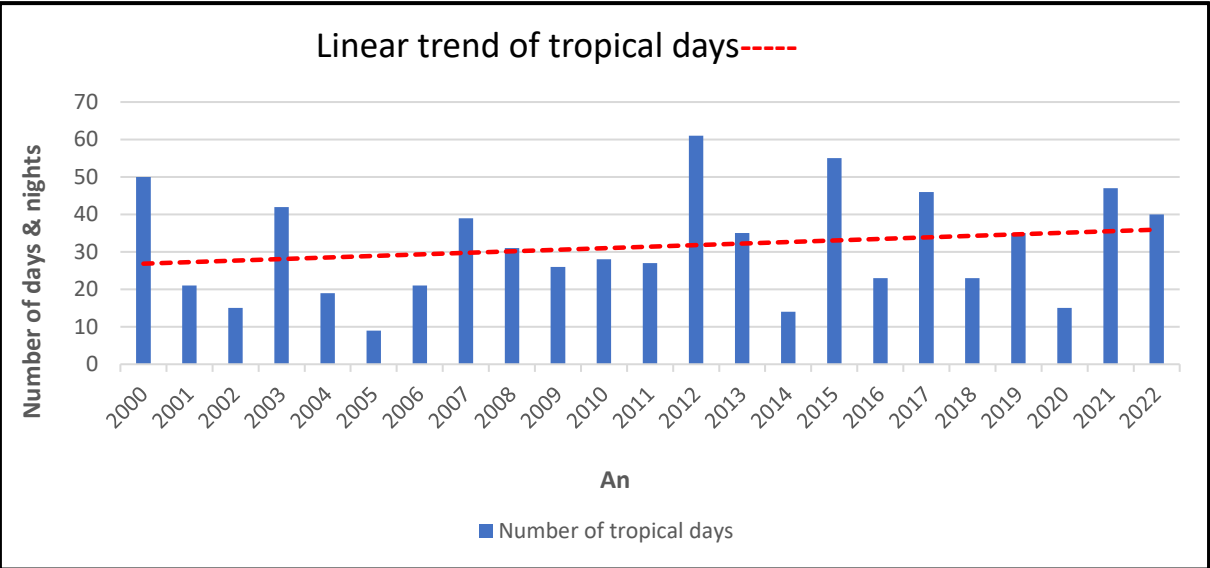


Chart 16 - Monthly temperature and precipitation anomalies (1979-2022) - Climate change Resita

The graph on the linear evolution of tropical days (days with air temperatures above 30⁰ C) also shows an increase in their number locally, with a direct impact on the local climate.

In cities, air temperatures are often higher than in adjacent areas, a phenomenon known as the 'urban heat island'. This phenomenon occurs in all seasons of the year, but the strongest negative effects are felt most during the summer season. Temperature differences between urban and rural areas can exceptionally exceed 10⁰ C, but most of the time, cities are 1-5⁰ C warmer at night and 0.5 -2⁰ C warmer during the day, a situation which also applies to Reșița. While in the cold season the phenomenon is rather beneficial, reducing the cost of heating buildings, in summer the heat island amplifies the effect of heat waves and causes marked thermal discomfort, with major health risks for the resident population. The increase in temperature is mainly caused by the type of materials used and structures found in urban areas, but also by human activities. The strongest effect is experienced during dry periods, when the movement of air currents is reduced, the weather is calm and skies are clear. Green spaces, areas with trees and shrubs, and water features play a protective role and help cool the air, while concrete and asphalt, for example, store more heat during the day than natural surfaces, gradually releasing it to the environment at night.

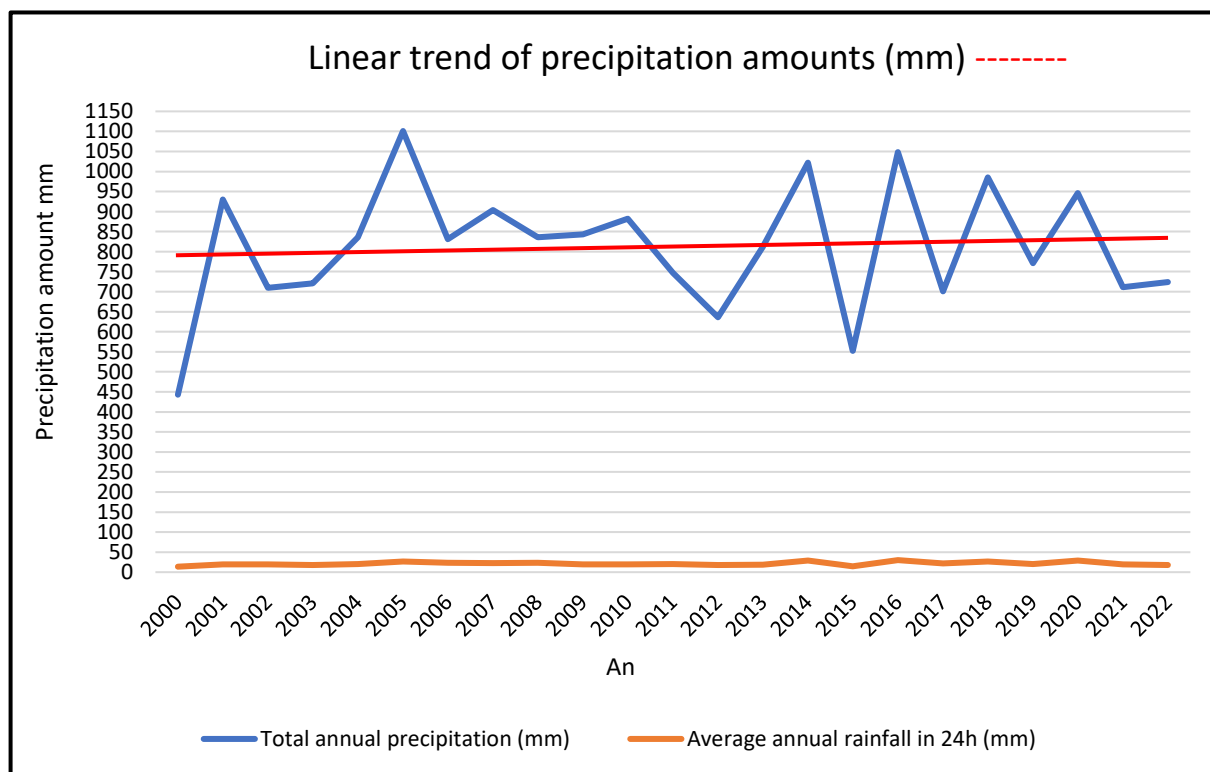


Chart 17 - Monthly temperature and precipitation anomalies (1979-2022) - Climate change Resita

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

Meteorological data on annual precipitation amounts in Resita as well as local 24-hour average annual precipitation amounts were processed in the above graph. It can be observed a slightly increasing trend of the annual precipitation input on the one hand and a larger fluctuation of the 24-hour rainfall amounts on the other hand. Although the water resources from precipitation, upstream rivers and lakes cover the water requirement of the municipality without any problems, the fluctuation and amounts of rainfall in a 24-hour period often exceed the stormwater carrying capacity of the local water system, green areas and the city's drainage and sewerage system, resulting in flooding, landslides, siltation, etc.

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

A. NATURAL HAZARDS

This category includes:

- **Hazardous weather events:** storms (accompanied by strong winds, heavy rainfall, hail); floods (overflowing water, runoff from slopes, dam failure); tornadoes, drought, frost (ice bridges and dams on the water, heavy snowfall, frost, ice).
- **fires:** forest fires, dry vegetation fires, or fires of cereal crops.
- avalanches
- destructive phenomena of geological origin: landslides, rock falls and earthquake

B. TECHNOLOGICAL RISKS

They are grouped into:

- **accidents, breakdowns, explosions and fires** in industry (including landslides caused by mining or other technological activities; land, air and sea transport, tunnelling and cable transport), transport and storage of products, transport, nuclear
- **water pollution** due to discharges from production units, commercial establishments or households
- collapse of buildings, installations or fittings
- **failure of public utilities:** major radio, television, telephone, communications, electricity, gas, heating, water supply, sewerage and storm water treatment networks.
- falling objects from the atmosphere or cosmos
- unexploded ordnance

C. BIOLOGICAL RISKS:

- **epidemics**
- **epizootics/zoonoses**
- **accidental pollution**

D. SOCIAL RISKS

According to the latest risk analysis and coverage plan of Caras-Severin County published in 2021, a series of natural risks generating emergency situations have been identified in the municipality of Resita and have been assimilated to dangerous weather phenomena. (Consiliul Jedetean Caras-Severin):

E. FLOODS

Floods resulting from heavy torrential rainfall in short periods of time, which may be accompanied by wind intensities with a gale-like appearance;

At the level of the municipality, on the Bârzava River, the flooded areas of the watercourse cover 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 flooding; in July 2020, heavy rain flooded several streets, blocking car and public transport traffic; this year (2023) in May, Reșița was affected by serious flooding, a special situation being recorded on Mihail Kogălniceanu street where the downpours coming from the slopes carried away alluvium which blocked the sewer system so that the whole street was swept away by a real flood, about 20 cars being taken away by water.

F. DROUGHT EVENTS

The phenomena of severe drought (hydrological and pedological) have also left their mark on the locality, here we can mention the prolonged hydrological drought in winter 2011-2012, when it was necessary to take measures to optimize the water supply of the Rhesita.

G. LANDSLIDES

Another destructive phenomenon, of geological origin, which has repeatedly affected the municipality of Resita, are **landslides**, the area (Tarnova-Carasova-Grasina-Resita-Valiug) being classified in the area with high probability of occurrence of these phenomena. Here we can recall the landslides that occurred in 2005 between March-April-May, on Dealul Ciorii (Dealul Lupacului) that affected houses on 24 January Street, a street at the end of Moroasa district, or the landslides at a privately owned building on Murelor Street; in 2015 two houses on Aviatorilor Street were endangered after the hill behind them went downhill; in 2018 on Canal Street, a landslide affected two households.

From the report prepared by the "Semenic" Emergency Situations Inspectorate of Caras-Severin County, regarding the interventions in the area of the Municipality of Reșița 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 life. Droughts and heavy snowfalls have also affected the municipality every few years. In terms of material damage, the year 2023 is a reference year, with reported total damage of over 1,000,000,000 lei and one person killed in a storm.

Year	Type of emergency	Intervention ISU CS		Value of damage from the summary reports of the CJSU	Victims
		Number	Damage value (RON)	Damage value (RON)	
2005	Drought	2			
	Flooding	31	334	21.199.900	0
2006	Flooding	7	0	128.018.000	0
2007	Storms	5			
	Flooding	13	1000	0	0
2008	Storms	4			
	Flooding	9	0	0	0
2009	Flooding	18	0	0	0
	Heavy snowfall	12	0	0	0
2010	Storms	2	0	0	0
	Drought	5	0	0	
2011	Flooding	28	0	0	2 (caught in the flood)
	Storms	5	0	0	
2012	Flooding	22	0	0	0
	Drought	6	0	0	0
2013	Flooding	3	0	0	0
	Drought	7	0	0	0
2014	Flooding	3	0	0	0
	Drought	43	0	0	0
2015	Storms	7	0	78.621.000	0
	Drought	4	0	0	0
2016	Heavy snowfall	11	0	0	0
	Flooding	2	0	0	0
2017	Drought	2	0	0	0
	Flooding	74	0	0	0
2018	Storms	3	0	449.291.000	0
	Drought	2	0	0	0
2019	Drought	6	0	0	0
	Flooding	11	0	60.713.000	0
2020	Storms	20	0	0	0
	Flooding	41	0	0	0
2021	Storms	30	0	131.677.000	0
	Heavy snowfall	32	0	0	0
2022	Flooding	19	0	150.317.000	0
	Storms	13	0	0	0
2023	Flooding	14	0	0	0
	Storms	17	0	0	0
2024	Storms	11	1	171	0
	Flooding	8			0
2025	Storms	1	0	34.863.000	0
	Flooding	2	0	0	0
2026	Storms	111	660	1.154.252.000	1
	Flooding	105			0

(Source: ISU Semenic)

Table 1 - Situation of floods and damages caused by them on the territory of Resita municipality in the period 2005 - 2023

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

By 2050, depending on the scenario of global increase in greenhouse gas concentration, compared to the reference period 1971-2000, the main climate parameters in Caras-Severin County could evolve as follows:

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

under a more severe scenario with a strong global increase in greenhouse gas concentrations (**RCP 8.5, IPCC**), the increase in mean annual temperature could reach values of **up to 1.5°C**; the increase in the mean annual number of days with temperatures above 35°C and the mean annual number of days with daily precipitation amounts **above 20 l/m²** are more pronounced; Annual precipitation amounts estimated for the county will experience changes in the sum of annual precipitation amounts ranging from **-1% to 2%**, depending on the scenario analyzed (**RCP 4.5 and RCP 8.5**); also, the amounts of varine 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 horizon	Risk indicators
Extreme heat	High	Growth	Growth	Short term	Number of tropical days/years; Frequency and duration of heat waves/year;
Extreme cold	Low	Growth	No change	Short term	Number of frost days
Extreme precipitation	High	Growth	Growth	Short term	Precipitation amount m ² /24 h; Amount of silt m3 /24 h;
Flooding	High	Growth	Growth	Short term	No. of events, area affected, amount of damage
Drought	Moderate	Growth	Growth	Short term	Number of events, amount of damage
Storms	High	Growth	Growth	Short term	Number of events, amount of damage
Heavy snowfall	Low	Growth	Growth	Short term	Number of events, amount of damage

Forest fires, vegetation fires	Low	Growth	Growth	Medium term	Number of events, amount of damage
landslides	Moderate	Growth	Growth	Short term	Number of events, amount of damage
Biological hazards	Low	Not known	Growth	Long term	Number of illnesses; Value of crop damage;

Table 4 - The risks of climatic hazards with specific relevance for the Municipality of Reşita

Type of climate hazard	Risk level	Expected change in intensity	Expected change in frequency	Time interval
Extreme heat	!!!	↑	↑	▶
Extreme cold	!	↑	↔	▶
Extreme precipitation	!!!	↑	↑	▶
Flooding	!!!	↑	↑	▶
Drought	!!	↑	↑	▶
Storms	!!!	↑	↑	▶
Heavy snowfall	!	↑	↑	▶
Forest fires, vegetation fires	!	↑	↑	▶▶
Landslides	!!	↑	↑	▶
Biological hazards	!	[?]	↑	▶▶▶

Table 5 - Risk assessment matrix

!: Low	↑: Growth	: Currently
!!: Moderate	↓: Decrease	▶: Short term (0-5 years)
!!!: Ridiculous	↔: No change	▶▶: Medium term (5-15 years)
[?]: Unknown	[?]: Unknown	▶▶▶: Long term (over 15 years)
		[?]: Unknown

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

Table 6 – Socio-economic and environmental vulnerabilities

Type of vulnerability	Description of vulnerability		Vulnerability indicators
	Vulnerability	Impact	
Socio - economic	Increasing temperatures and periods of extreme temperatures	Substantial increases in energy consumption for cooling buildings	Annual energy consumption kWh/institutional or residential buildings
	Falling temperatures and increasing intensity of extreme temperature periods	Substantial increases in energy consumption for heating buildings	Annual energy consumption kWh/institutional or residential buildings
	Heavy rain, with large amounts of water falling in short intervals	Flooding of areas of land, streets, basements of buildings, etc.	Annual precipitation (mm)/year
			Maximum precipitation (mm)/year
	Strong gale-like winds	Material damage and human casualties: uprooted or broken trees, uncovered buildings, broken cables, fallen poles, etc.	Number of events/year
			Number of victims/year
	Excessive heat waves, severe thermal discomfort	Illnesses, worsening of diseases	Number of illnesses/1000 inhabitants
			Number of deaths/ 1000 inhabitants
			Increased mortality of older people
	Periods of prolonged drought or heavy rainfall	Decreased drinking water quality (increased turbidity, nitrates, nitrites, microbiology, etc.)	Hours of drinking water interruption due to drinking water quality/year
	Freezing rain and heavy snowfall	Material losses due to broken electrical cables, damage to agricultural/pomicultural crops, collapse of roofs of buildings and industrial halls, car accidents	Material damage: RON/year
	Diseases or pests (insects)	Damage to agricultural/farming crops and forests	No. ha affected/year
	Diseases (animal)	Animal diseases	No. of heads slaughtered/year
Extreme weather events, soil drought	Damage to agricultural/farming crops and forests	No. ha affected/year	

Physical and environmental	Increasing temperatures and periods of extreme temperatures, hydrological drought	Decreasing water resources	No. of interruptions/year
	Extreme weather events	Degradation of green spaces	No. m ² affected/year
		Landslides - damage to buildings, utility infrastructure, roads and bridges	No. of buildings affected/year
			Km of road affected/year
			No. of bridges affected/year

Episodes of heavy rainfall recorded in short intervals and blizzards will increase in intensity and frequency and will negatively affect the municipality causing flooding, run-off 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 rainfall and stabilizing soils. In addition to the material damage caused by these phenomena, the increased risk of loss of life is also worth noting. As regards the increased frequency of hydrological and soil droughts, this will have an impact on the availability of water resources (both for human consumption and for agriculture (irrigation), livestock farming, industry, etc.), with a consequent reduction in 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, as well as the productivity of the work performed by employees and thus the profitability of companies. Air quality will also suffer and the demand for energy to cool and heat homes, administrative, commercial and industrial premises will increase.

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

Areas characterized by poverty, economic marginalization, 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, let alone preventing future damage.

4.3 Climate resilience

After assessing historical, current and projected future climate vulnerabilities and 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 ranking of impacts has been prepared, taking into account the likelihood of occurrence, expected level, timeframe and impact indicators respectively.

4.3.1 Vulnerabilities for buildings and land use

The following impacts have been identified for the buildings and land use sector:

Table 7 - Vulnerabilities for buildings and land use

Expected impact(s)	The probability of occurrence	Expected level of impact	Time horizon	Impact indicators
Increased demand for thermal building envelope	Probably	Moderate	Medium term	Number of blocks with requests for rehabilitation (renovation)/year
Increased demand for indoor cooling	Probably	Moderate	Short term	Number of air conditioners purchased/year
Flooding of building basements due to heavy rainfall	Probably	Moderate	Short term	No. of buildings or companies or persons affected/year
Property damage to buildings and infrastructure due to extreme weather events	Probably	Moderate	Short term	Thousands euro/year
Local flooding due to heavy rain and torrential downpours	Probably	Moderate	Short term	Area affected m ² /year
				No. of buildings affected/year
				Km roads affected/year
				No. of bridges affected/year

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

Modification and adaptation of the General Urban Plan of the Municipality of Resita by introducing rules or regulations that take into account the potential impact of climate change, such as:

- Create technical construction criteria for green buildings and sustainable buildings (near-zero energy buildings-nZEB, green roofs, rainwater harvesting, elevated building access, use of sealed basement glazing, one-way block valves in sewage systems);
- Improving land use planning and planning procedures;
- Development of systems for drainage and storage of excess rainwater (ponds, areas for other functions)

- Raise awareness of the importance of taking out property insurance to cover damage caused by extreme weather events;
- Adopt sustainable urban drainage systems;
- Clear criteria to prohibit deforestation in flood protection zones;
- Implementation of an emergency response and intervention plan developed specifically for natural disasters and urban flood protection;
- Implement a communication and public awareness plan to prepare an adequate response in case of disasters;
- Development of local disaster response infrastructure.

4.3.2 Vulnerabilities in the transport sector

The following impacts have been identified for the transport sector:

Table 8 - Vulnerabilities for the transport sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time interval	Impact indicators
Rapid degradation of asphalt pavement or tram tracks (expansion/deformation) due to high temperatures, increased freeze/thaw cycles	Probably	Moderate	Currently	km urban network affected/year
Blocking of access roads due to fallen trees during a windstorm or due to flooding of streets or flooding of floodwaters	Probably	Low	Medium term	No. of blocked roads/year
Public transport congestion/blocking	Probably	Moderate	Currently	Waiting times at stations
Road traffic calming	Probably	Moderate	Currently	No. accidents/year
Falling trees or other bodies caused by windstorms or other extreme weather events	Probably	Moderate	Currently	Property damage expressed in Ron or casualties

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

- Stipulation in the specifications of higher quality standards for asphalt pavement resistance to high temperatures, number of freeze/thaw, wet/dry cycles;
- Implementation of technical measures to maintain low tram track temperatures
- Adopt sustainable urban drainage systems;
- Decluttering/cleaning of sewage systems, gutters and drains.
- Monitoring and maintenance of green spaces, i.e. diagnosis of the health of existing trees and shrubs and their grooming.
- Measures to protect the slopes and the forest environment in the area

4.3.3 Vulnerabilities in the energy sector

The following impacts have been identified for the energy sector:

Table 9 - Vulnerabilities for the energy sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time horizon	Impact indicators
Interruptions in electricity supply during periods of drought or extreme temperatures	Probably	Moderate	Medium term	No. of hours of interruptions/year; No. of consumers affected/year;
Increased energy consumption due to temperature extremes	Probably	Moderate	Medium term	Energy consumption/year
Power failures or supply interruptions due to storms and extreme weather events (damaged transformer substations, conductors and poles)	Probably	Moderate	Medium term	No. of hours of interruptions/year; No. of consumers affected/year;
Destruction of electricity distribution networks including transformers	Probably	Picked up	Medium term	No. of hours of interruptions/year; No. of consumers affected/year; Thousands of euros intervention and repairs/year;

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

- Undergrounding of power cables in urban areas;
- Adapting the number of rapid response teams to repair damage according to the number of requests caused by extreme weather events;
- Locally produced renewable electricity generation and storage in batteries
- Protection measures for transformers

4.3.4 Vulnerabilities for the water

The following impacts have been identified for the water sector:

Table 10 - Vulnerabilities for the water sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time horizon	Impact indicators
Deterioration of drinking water quality during periods of prolonged drought or heavy rainfall	Probably	Moderate	Currently	Number of exceedances/year;
Low water levels in Secu reservoir during periods of prolonged drought	Probably	Moderate	Medium term	Hours of interruptions/year;
Pollution of the Bârzava river water due to insufficiently treated rainwater discharge	Probably	Moderate	Short term	Number of exceedances/year;

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

- Awareness campaigns on the rational use of drinking water and its use only for domestic and household purposes;
- Rainwater harvesting and reuse (for domestic purposes, irrigation, watering green spaces, street washing, etc.);
- Upgrading and extension of the water and sewerage network;
- Awareness campaigns for upstream farmers on the excessive and inappropriate use of fertilizers and pesticides, with 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)

4.3.5 Vulnerabilities for waste

The following impacts have been identified for the waste sector:

Table 11 - Vulnerabilities for the waste sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time horizon	Impact indicators
Increased water and soil contamination due to improper waste management	Probably	Low	Short term	Number of events reported/year;
Sewage system clogging and waste water pollution following floods	Probably	Low	Short term	Number of events reported/year;
Increased decomposition of household waste due to higher temperatures with implications for public health	Probably	Low	Short term	Number of complaints reported/year;

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

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

4.3.6 Vulnerabilities for agriculture and forestry

The following impacts have been identified for the agriculture and forestry sector:

Table 12 - Vulnerabilities for agriculture and forestry

Expected impact(s)	The probability of occurrence	Expected level of impact	Time horizon	Impact indicators
Low or compromised agricultural yields due to prolonged soil and water drought and excessive heat waves	Probably	Low	Short term	Number ha affected/year
Production compromised due to extreme weather	Probably	Low	Medium term	Number ha affected/year
Occurrence of specific pests/diseases	Possibly	Low	Short term	Number ha affected/year
Occurrence of diseases in animals	Possibly	Medium	Medium term	Number of heads/year
Forest fires due to lightning strikes	Probably	Low	Medium term	Number of events/year
Vegetation fires due to high temperatures and drought	Probably	Low	Medium term	Number of events/year

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

- Use of rainwater to irrigate agricultural crops and not water from the mains supply and the installation of retention basins to store rainwater;
- Recommendations for farmers on crop rotation, i.e. the choice of varieties resistant to water stress;
- Expansion of wooded areas;
- Hail protection system.
- Creation of specially trained forest/vegetation fire-fighting teams equipped with appropriate equipment/machinery for this type of intervention
- Forest protection measures and tougher penalties for illegal deforestation

4.3.7 Vulnerabilities for the environment and biodiversity

The following impacts have been identified for the environment and biodiversity sector:

Table 13 - Vulnerabilities for the environment and biodiversity sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time interval	Impact indicators
Breaking or uprooting of trees and shrubs during storms and windstorms	Probably	Picked up	Currently	No. of trees/year
The emergence and spread of invasive species at the expense of local or endemic species	Possibly	Medium	Medium term	% area affected/year
	Possibly	Medium		% area affected/year

Damage to green spaces due to prolonged drought			Medium term	No. trees affected/year
Biodiversity and environmental damage from vegetation and forest fires	Possibly	Medium	Short term	% area affected/year

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

- Inventory all trees and their health status and create a GIS of green spaces;
- Maintenance of green spaces and the trimming or pruning of dead trees;
- Use of perennial and hardy species for landscape development;
- Combating illegal logging.
- Development of plans to combat and control invasive species

4.3.8 Health Vulnerabilities

The following impacts have been identified for the health sector:

Table 14 - Vulnerabilities for the health sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time interval	Impact indicators
Increased mortality of people with chronic diseases in hot periods	Probably	Picked up	Medium term	No. of deaths in months with high temperatures /1000 inhabitants
Increased mortality of people with chronic diseases in periods of extreme cold	Possibly	Low	Medium term	No. of deaths in months with low temperatures /1000 inhabitants
Increasing number of illnesses due to drinking water quality	Possibly	Low	Medium term	No. of digestive diseases/1000 inhabitants per year
Increase in the number of illnesses caused by insect bites	Possibly	Low	Medium term	No. of illnesses /1000 inhabitants per year

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

- Identify and map heat islands in the city;
- Provide free access to drinking water (street wells, cisterns) in congested urban areas and parks;
- Shaded areas with resting places;
- Warn people about days with extreme temperatures and advise them to stay relatively comfortable during these periods or when they should avoid going out;
- Adoption of social measures at municipal level to provide food and daily living essentials for vulnerable segments of the population (non-disabled people, people with reduced mobility or dependent people) in case of prolonged periods of extreme temperatures (positive or negative).

4.3.9 Vulnerabilities for civil protection and emergencies

The following impacts have been identified for the civil protection and emergency sector:

Table 15 - Vulnerabilities for the civil protection and emergency sector

Expected impact(s)	The probability of occurrence	Expected level of impact	Time interval	Impact indicators
Increased frequency of events requiring ISU intervention	Probably	Environment	Currently	No. of climate-related events/year
Increased intensity of events requiring ISU intervention	Probably	Environment	Short term	Thousands of euros material damage/year
				Number of injuries + deaths/year

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

- Public awareness campaigns on climate hazards and how to act and respond to extreme weather events;
- Reporting to the competent authorities of situations that may turn into hazard-generating events (trees near power lines, railways, silting, flooding);
- Regular large-scale exercises to alert the civilian population in collaboration with the major economic agents in the area and other local public institutions.
- Equipping the territorial emergency inspectorate with the necessary equipment and machinery for interventions caused by climatic factors and increasing the number of qualified staff.

4.3.10 Vulnerabilities for tourism

The following impacts have been identified for the tourism sector:

Table 16 - Vulnerabilities for tourism

Expected impact(s)	The probability of occurrence	Expected level of impact	Time interval	Impact indicators
Reducing the number of tourists in hot periods	Possibly	Low	Medium term	No. of tourists July-August/year
Damage to local tourist attractions by extreme weather events	Possibly	Low	Medium term	No. of tourists allocated to an objective/year

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

- The development of green spaces, relaxation and promenade areas, making the most of the current attractions on the circuit or developing new tourist attractions on the perimeter of the city;
- Maintain and develop new cycle paths; develop cycle routes including the main local attractions.

4.4 Conclusion on climate vulnerabilities and risk

The assessment of climate risks and vulnerabilities in the municipality of Reșița was a prerequisite for the elaboration of the local action plan for sustainable energy and climate (SECAP). In this process, the nature and extent of climate-related risks were identified and assessed by analyzing 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 heat waves with high temperatures, heavy rainfall, flooding, mudslides and landslides as well as severe storms characterized by strong winds, hail and frequent thunderstorms.

In the short and medium term, the likelihood that these climate hazards will increase in intensity and frequency is high, leading to a series of risks and vulnerabilities for the 11 sectors concerned in Resita.

The impacts of these climatic hazards will have direct negative consequences for Resita as a whole, but also for its ability to provide services at regional level, as the county seat.

In conclusion, the identified impacts have been quantified as follows:

- a) financial losses and material damage to public and private buildings, transport and energy infrastructure, local businesses, agriculture and livestock, etc.
- b) increased resource consumption (energy, water, human, equipment, consumables, etc.), number of ISU interventions, mortality and illness among vulnerable people
- c) limiting access to certain services (administration, health, utilities, supply, etc.)
- d) destruction or damage to the natural environment (green spaces, trees and shrubs, forestry, biodiversity)

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

5 Sustainable energy and climate action plan (SECAP)

5.1 SECAP Purpose, Adaptation and Mitigation objectives

The EU Covenant of Mayors for Climate and Energy is a European Commission-backed initiative that brings together thousands of local governments who want to secure a better future for their citizens.

This pact requires a commitment by the municipality to increase resilience and adaptive capacity to the negative impacts of climate change, and to this end a climate risk and vulnerability analysis has been carried out as part of the Sustainable Energy and Climate Action Plan of the Municipality of Reșița. In the development stages of the SECAP, climate risk and vulnerability analysis are a very important preliminary step to determine the type and extent of associated risks and to assess vulnerabilities that could pose a threat to the community, property, livelihoods and the environment as a whole. The analysis also identified areas and sectors of activity in Resita that are exposed to and less prepared for climate change and extreme weather events.

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

5.2 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 of these are essential for improving a holistic understanding of the territory and identifying areas for action.

In the context of the action plan for sustainable development and climate of the municipality of Resita, 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 of the municipality of Resita.

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

Reșița, like other urban areas, faces complex challenges, including those related to mobility, pollution, energy efficiency and adaptation to climate change. The role of the SWOT analysis is to gain a deeper understanding of the local context and specific needs, thus providing the necessary framework for the development of a coherent and sustainable action plan. The implementation of these actions will not only contribute to increasing the municipality's

resilience to climate change, but also to improving the quality of life of its residents and promoting harmonious and responsible development.

A. ENERGY

Strengths

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

Weaknesses

- Overdependence on traditional energy resources (natural gas)
- Slow/delayed development of alternative energy sources in the Municipality of Resita
- Outdated energy infrastructure needs upgrading
- Low energy efficiency and challenges in energy resource management
- The need for thermal renovations and energy efficiency rules for new buildings
- Lack of examples of energy savings in local government buildings

Opportunities

- Potential for investment in renewable energy projects
- Working with government organizations to obtain investment funds for innovative projects
- Developing and implementing 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 carbon footprint

Threats

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

B. WASTE

Strengths

- Developing a city-wide waste collection network
- Increase awareness and recycling practices among the community

Weaknesses

- Inefficient management of waste generated
- Identification of missing links in waste management processes and relatively low involvement of city residents.
- Reliance on traditional methods of waste disposal such as landfill without sufficient encouragement for recycling.
- Limited citizen involvement in recycling and separate collection

Opportunities

- European funding opportunities through the Green Deal, NRDP and ROP and their supporting measures
- The existence of funding programs managed by the Ministry of Environment and their integration in the projects implemented in the Municipality of Resita
- Expanding recycling programs to reduce landfill waste
- Adoption of innovative technologies for waste management and recycling

Threats

- Increasing quantities of waste
- The 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 funding for climate change adaptation and mitigation projects

- Developing green infrastructure by creating green spaces and parks for carbon sequestration
- Development of renewable energy sources
- Incentives for green roof constructions (e.g. European BAUHAUS)
- Promoting public awareness and education on climate change
- Engaging the private sector in partnerships for sustainable development

Threats

- The need for substantial investment in resilience infrastructure
- Increased frequency and intensity of climatic events such as rising temperatures, heavy rainfall, decreasing rainfall
- Low support from certain sectors of the community
- Risk of lack of resources to implement planned measures

D. TRANSPORT³

Strengths

- The existence of a mobility plan and the implementation of the project to update the mobility plan allow the sustainable development of the urban transport system and the implementation of solutions to accelerate the development of the smart city of Reșița (examples: tramway, traffic management system, electric buses and e-ticketing system, bike-sharing system).
- Implementation of mobility projects in the PMUD 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 (tram, electric buses, e-ticketing system and local public transport management system).
- Non-motorized transport is a well-represented component in the Reșița PMUD both on the part 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 Reșița municipality.

³ The swot analysis for transport was taken over from the Smart City Strategy, p. 83-84

- Early development of systems supporting the Mobility as a Service (mas) system and platform.
- Partial coverage of the city's functional area with alternative transport infrastructure - corridors and bike lanes.
- Partial integration of transport systems for different mobility solutions (in particular e-ticketing solutions, there is a possibility of integration at payment operator level - Netopia).
- Limited approach to mobility management and lack of development of specific mobility management platforms (shift from road traffic management to mobility management).
- Lack of an integrated approach to sustainable urban logistics (including freight vehicle access regime and multimodal hubs).
- Over-reliance on private transport.
- High greenhouse gas emissions associated with heavy use of private transport
- Short distances within the municipality encourage preferential use of private transport by citizens, affecting the potential development of other transport options
- Extensive work on public transport infrastructure has led to periods of disruption and therefore a drop in passenger numbers
- Absence of local bike rental stations
- Notable congestion on main arteries at peak times

Opportunities

- The opportunity to benefit from national programs or projects to support the purchase of electric vehicles and the development of appropriate charging stations
- Decongesting traffic by building a city bypass and new access roads
- Continue infrastructure improvements to optimize transport services;
- Launch youth campaigns to encourage young people to take public transport;
- Stimulate an increase in the number of inhabitants using public transport;
- Extend the network of cycle and running paths to promote mobility alternatives;
- Implement awareness projects to highlight the importance of alternative mobility;
- Introduction of e-ticketing for public transport, increasing efficiency and accessibility;
- Adopt an intelligent traffic management system to optimize vehicle flow and reduce congestion;
- Implement a bike rental system to facilitate green travel options;
- Develop a regulation for cycling in the city, ensuring a legal and safe framework for users.

- Inclusion in the action lines of the West RDA's funding programs for mobility and decarbonization projects (POR West) and the existence of national projects.
- Existence of national programs/projects to support the purchase of electric vehicles and their charging stations.
- Existence of mobility components in the NRDP.
- Modernization of the railway lines Resita - Timisoara North - Airport, Resita - Berzovia - Oravita - Anina.
- Open access to the western motorways and Timisoara.

Threats

- Technical incapacity at the local administration level, which could prevent the implementation of some funding programs managed by the Ministry of Environment and their integration into the projects carried out in the Municipality of Resita.
- Lack of interest of city residents in national programs/projects to support the purchase of electric vehicles and their charging stations.
- Lack of collaboration between central and local public administration in attracting funds for the implementation of some of the mobility components of the NRRP.
- Major delays in the development of investment projects in national transport infrastructure (railway lines).
- Major delays in opening access to the western motorways and Timisoara
-

5.3 Stakeholder involvement

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

The involvement of key actors from different departments of the municipality strengthens efforts to achieve the objectives of the EPDAP. These representatives include the Mayor and Councillors from the City Council team, representatives from the technical, urban and spatial planning, environment and sustainable development, procurement, heritage, administrative, energy and local transport departments.

A key aspect of stakeholder involvement in the Resita SECAP has been the active participation of stakeholders in dedicated working sessions. These sessions, held in July 2023 and October 2023, aimed at identifying specific measures and actions proposed and developed within the SECAP. By directly involving these stakeholders, a comprehensive and relevant approach to local community needs was ensured.

The active participation of representatives from local autonomous companies, such as CET, Water and Canal, Sanitation Company and Transport Company, brings a holistic perspective on

sustainable energy issues in the context of Resita. 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 for energy consumption. Involving these stakeholders ensures a balanced approach between environmental objectives and economic needs.

Therefore, the close involvement and collaboration of all stakeholders in the development of the Resita EPCDP has been 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 to 2024-2030

6.1 SECAP REȘIȚA 2024-2030

No.	Sector/Area of action	Measure	Responsible	Implementation period	Energy savings (MWh)	Renewable energy	Estimated emission reductions (tCO ₂ e)	Estimated costs (EUR)	Status	Comments
MITIGATION ACTIONS⁴										
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES										
1	Municipal buildings, equipment/facilities	Reconstruction, restoration, refurbishment of representative buildings of historical, memorial and environmental value	City Hall of Resita	2016-2020				5,000,000	Partially achieved	Only the Pittner school is finalized
2	Municipal buildings, equipment/facilities	Rehabilitation, modernisation and extension of existing housing stock (including social housing)	City Hall of Resita	2016-2020	400		81	2,800,000	In progress	
3	Municipal buildings, equipment/facilities	Thermo-energetic rehabilitation at the Technical College	City Hall of Resita	2016-2020	200		40	800,000	In progress	
4	Municipal buildings, equipment/facilities	Thermo-energetic rehabilitation at the Technical College of Cărașan	City Hall of Resita	2016-2020				800000	College abolished	
5	Municipal buildings, equipment/facilities	Thermal rehabilitation of the attic floor of Sabin Păuța Art High School in Reșița	City Hall of Resita	2016-2020	261		53	159,764	Postponed	Postponed - GRP 2021-2027

⁴ No actions planned in the sector "Local district heating/cooling, CHP"

6	Municipal buildings, equipment/facilities	Modernization and equipping of the building in Govândari district (former PSI shed/former laundry near Gloria stadium) in order to create an Intervention Center for the Voluntary Emergency Service	City Hall of Resita	2016-2018				1,893,662	Postponed	Lack of funds
7	Municipal buildings, equipment/facilities	Modernization and equipping of the cultural home in Călnic for the establishment of a cultural center for the preservation and promotion of traditions in Reșița	City Hall of Resita	2017-2018				828,313	Postponed	Lack of funds
8	Municipal buildings, equipment/facilities	Rehabilitation and modernization of the Didactic Swimming Pool B-dul Revoluția din Decembrie	City Hall of Resita	2016-2018				2,126,372	In progress	Finalized - new measures
9	Municipal buildings, equipment/facilities	Fitting out of a medical space for hydrokinetic therapy rehabilitation	City Hall of Resita	2016-2020				186,000	Postponed	Lack of funds
10	Municipal buildings, equipment/facilities	Rehabilitating and equipping medical practices	City Hall of Resita	2016-2020				28,889	In progress	Finalized - new measures
11	Municipal buildings, equipment/facilities	Modernization of the football stadium "Mircea Chivu"	City Hall of Resita	2016-2020				7,587,090	Postponed	Lack of funds
12	Municipal buildings, equipment/facilities	Rehabilitation of school infrastructure Municipality of Resita, kindergartens (Palatul Fermecat, Pinocchio, Riki-Priki, PN3, Floarea Soarelui, Dumbrava Minunată) and Mihai Peia Secondary School.	City Hall of Resita	2016-2020				5,800,000	In implementation	
13	Municipal buildings, equipment/facilities	Energy audits of all administrative buildings and identification of energy saving opportunities	City Hall of Resita	2016-2018				20,000	Partially achieved	

14	Municipal buildings, equipment/facilities	Air quality improvement and monitoring project	City Hall of Resita	2021-2027						New measure	Action integrated in SIDU
15	Municipal buildings, equipment/facilities	Rehabilitation of green areas, parking lots, pedestrian paths, playgrounds for children in the area between Parâng Street and Block 35 B-dul Revoluția din Decembrie 1918	City Hall of Resita	2021-2027						New measure	Action integrated in SIDU
16	Municipal buildings, equipment/facilities	Landscaping and tree planting at the Zoo	Directorate-General for Education, Culture, Youth, Sport and Religious Affairs	2021-2027						New measure	Action integrated in SIDU
17	Municipal buildings, equipment/facilities	Development of green spaces - parks and recreation areas	City Hall of Resita	2021-2027						New measure	Action integrated in SIDU
18	Municipal buildings, equipment/facilities	Smart buildings (active)	2021-2027	2021-2027						New measure	Action integrated in SIDU
19	Municipal buildings, equipment/facilities	Conduct a feasibility study for the installation of pressurized solar panels for summer use for at least 20 buildings	City Hall of Resita	2024-2030						New measure	
20	Municipal buildings, equipment/facilities	Reconversion of a former industrial building (through the European BAUHAUS project) by integrating sustainable solutions in the renovation process and promoting the implementation of BAUHAUS values in all aspects of the project	City Hall of Resita	2024-2030						New measure	
21	Municipal buildings, equipment/facilities	Construction of multi-purpose above-ground car parks integrated with solar panels to capture energy and provide shade	City Hall of Resita	2024-2030						New measure	New measure suggested in WK2

22	Municipal buildings, equipment/facilities	Expansion of underfloor heating system	City Hall of Resita	2024-2030					New measure	Suggested new measure in WK2
23	Residential buildings	Increasing the energy efficiency of tower blocks in the Municipality of Resita - 2000 apartments (included in Annex 1)	City Hall of Resita	2016-2020	4300	869	10000000		In progress	
24	Residential and institutional buildings	Increase the energy efficiency of approx. 80% of all residential blocks in the Municipality (Annex no. 3), and institutional buildings. Raising citizens' awareness, supporting the process and creating incentives for the process (institutional buildings included in Annex 2)	City Hall of Resita	2016-2020	87500	17675			In progress	
25	Residential buildings	Energy efficiency for housing blocks on Republicii Avenue, housing blocks on Calea Caransebeşului, housing blocks in Triaj Area, housing blocks on Alexandru Ioan Cuza Avenue, housing blocks in Centru Civic	City Hall of Resita	2022-2030					New measure	Actions integrated in the SIDU (ref: crt.nr.98-102, p.436)
26	Residential buildings	Connecting all city districts to the natural gas network	Private (SC EON DISTRIBUȚIE SRL)	2015-2025					In the works	Integrated action in SDL 2015-2025
27	Residential buildings	Sensor network and digital energy monitoring and management platform for public buildings	City Hall of Resita	2027					New measure	Action integrated in SSC 2027 (ref: SN 2 - Energy efficiency, p.120)
28	Residential buildings	Development of a platform for calculating personal carbon footprint, recording health-parameters for cycling (connected to the above mentioned platform)	City Hall of Resita	2024-2030					New measure	

29	Residential buildings	Developing a campaign to inform citizens about the benefits of alternative energy	City Hall of Resita	2024-2030						New measure	
30	Residential buildings	Develop a seasonal awareness campaign on reducing energy consumption and funding opportunities for green investments	City Hall of Resita	2024-2030						New measure	
31	Residential buildings	Exploring the possibility of a public-private partnership to provide subsidies / grants for proven energy efficiency projects (e.g. Cyprus)	City Hall of Resita	2024-2030						New measure	
32	Tertiary sector	Energy and functional rehabilitation of the House of Culture building - Reșița Municipality	City Hall of Resita	2022-2030						New measure	Integrated action in SIDU
33	Tertiary sector	Development of the Telemedicine service (online)	City Hall of Resita	2022-2030						New measure	Integrated action in SIDU (Ref: No.crt.129, Page 441)
34	Tertiary sector	Development of a protocol / best practice guide for converted industrial buildings - adding eco-design elements such as green roofs or vertical green walls	City Hall of Resita							New measure	
35	Tertiary sector	External painting competition (private-academic partnership) for students - use of Airlite absorbent paint	City Hall of Resita							New measure	

36	Municipal street lighting	Modernization and extension of the public lighting system in the Municipality of Resita. Introduction of the architectural lighting system of the buildings and objects of heritage and public forum in the Municipality of Resita - 1590 luminaires	City Hall of Resita	2016-2020				984280	In progress	
37	Municipal street lighting	Expansion and modernisation of the public lighting system by replacing existing lamps with LED ones - road - 1512 street lighting fixtures	City Hall of Resita	2016-2020	414		290	1.82503	In progress	
38	Municipal street lighting	Pedestrian lighting - installation of poles equipped with LED lighting fixtures - 414 pedestrian lighting fixtures	City Hall of Resita	2016-2020	116		81		In progress	
39	Municipal street lighting	Increasing energy efficiency and intelligent energy management in the public lighting infrastructure in the Municipality of Resita; Continuing the modernization of the public lighting system for parks and main streets	City Hall of Resita	2024-2030	116 3		620		New measure	
40	Municipal street lighting	Extending LED Street lighting to the surrounding neighbourhoods to increase energy efficiency	City Hall of Resita	2024-2030					New measure	New measure suggested by G1, WK2
TRANSPORT:										
41	Public transport	Modernization of streets - roads of local interest - in the districts of Resita - Doman, Cîlnic, Ţerova, Secu, Ovens and Moniom village	City Hall of Resita	2016-2020				3,604,320	Partially achieved	Partial (Secu)

42	Public transport	Street upgrading Municipality of Resita	City Hall of Resita	2016-2020	125 49	3304	10,000,000	Partially achieved	Partial - local budget
43	Public transport	Upgrading roads and public transport with cycle paths, pavements, green alignments, street furniture.	City Hall of Resita	2016-2020	613 6	1573	25000000	In progress	
44	Public transport	Bypass to divert heavy traffic from the city	CNADR	2016-2030	320 0	854	17,471,610	Postponed	Lack of funds
45	Public transport	Rehabilitation of roads of local interest to the tourist area Secu (administrative boundary of Reșița municipality)	City Hall of Resita	2016-2018			3,465,646	Postponed	Lack of funds
46	Public transport	Agricultural road improvement in Resita Municipality	City Hall of Resita	2016-2020			1,179,812	Postponed	Lack of funds
47	Public transport	Resita bypass road between DN58 and DN58B - Phase I, Resita bypass road between DN58B and DJ581 - Phase II	City Hall of Resita	2021-2027				Programmed	Action taken from MUD 2021 - 2027
48	Public transport	Development of new access routes of interest	City Hall of Resita	2021-2027				New measure	Action taken from MUD 2021 - 2027
49	Public transport	Defining pedestrian corridors with ITS (Intelligent Transport Systems) solutions to support walking	City Hall of Resita	2021-2027				New measure	Action taken from MUD 2021 - 2027
50	Public transport	Development of promenades and bicycle paths on both banks of the river Bârzava, in the Municipality of Reșița	City Hall of Resita	2021-2027	338	82		New measure	Action taken from MUD 2021 - 2027

51	Public transport	Bicycle infrastructure expansion (new: including parking, interactive route system, and integration of health-indicators monitoring and CF staff)	City Hall of Resita	2021-2027					New measure	Action taken from MUD 2021 - 2027
52	Public transport	Purchase of electric buses for expansion of public transport system, including expansion of e-ticketing system	City Hall of Resita	2021-2027					New measure	Action taken from MUD 2021 - 2027
53	Public transport	Modernization of public transport stations - covering all tram and bus stops and inserting customizable digital messages	City Hall of Resita	2021-2027					Programmed	Action taken from MUD 2021 - 2027
54	Public transport	Drone-based transport system	City Hall of Resita	2021-2027					New measure	Action taken from MUD 2021 - 2027
55	Public transport	Installation of street monitoring system to ensure traffic safety and reduce carbon emissions. Measures to improve traffic safety and transport security	City Hall of Resita	2015-2025					New measure	Action taken from SDL 2015-2025
56	Public transport	Integrated front office and back-office IT system, this system will be integrated with the integrated system of the municipality of Resita and with the online platform where citizens can pay taxes and pick up necessary documents online.	City Hall of Resita	2022-2030					New measure	Action taken from SIDU
57	Public transport	Extension of the electric vehicle charging station network	City Hall of Resita	2022-2030					Programmed	Action taken from SIDU
58	Public transport	Optimization of the public transport management system, including e-ticket system, route optimization, etc.	City Hall of Resita	2024-2030					New measure	

59	Public transport	Operation of an expanded fleet of trams with energy efficient models (e.g. Arad)	City Hall of Resita	2024-2030						New measure	
60	Public transport	Implementing a full transition to electric public transport	City Hall of Resita	2024						New measure	
61	Public transport	Implementation of Intermodal Transport Systems	City Hall of Resita	2024-2030						New measure	New measure suggested in WK2
62	Public transport	Integrated actions to create transport hubs	City Hall of Resita	2024-2030						New measure	Suggested new measure in WK2
63	Public transport	Modernisation of the Resita-Timisoara railway line	City Hall of Resita	2024-2030						New measure	Action planned in the coming years through the NRRP
64	Public transport	Implementing a car-free day	City Hall of Resita	2024-2030						New measure	-
LOCAL ELECTRICITY GENERATION:											
65	Photovoltaic	Installation of domestic hot water production facilities using solar panels or hybrid panels at sports facilities with large changing rooms	City Hall of Resita	2016-2018	100	20	250,000			Postponed	Action postponed due to lack of funds
66	Photovoltaic	Construction of a 21 MW photovoltaic panel park in Resita Municipality	Directorate for Investment and Urban Mobility, Directorate for Property Management, Directorate for Local and Institutional Development	2022-2030						New measure	Action taken from SIDU
67	Photovoltaic	Renewable energy generation on public buildings and spaces (thermal points, municipal buildings)	City Hall of Resita	2024-2030						New measure	Suggested action in workshop session 2

68	Photovoltaic	Installation of photovoltaic solar poles (there are already some poles)	City Hall of Resita	2024-2030						New measure	New measure suggested in WK2
69	Photovoltaic	Development of a photovoltaic panel system above covered car parks	City Hall of Resita	2024-2030						New measure	
SPATIAL PLANNING:											
70	Strategic urban planning	Parks Development: Tricolorului, Cărășana, Moroasa and landscaping of green spaces in the Municipality of Reșița	City Hall of Resita	2015-2016					1521054	In progress	
71	Strategic urban planning	Leisure area (according to the Picnic Law 54/2012) in Reșița Municipality	City Hall of Resita	2016-2020					1,000,000	Postponed	Action postponed due to lack of funds
72	Strategic urban planning	Rehabilitation of the Dacia Cinema	City Hall of Resita	2016-2018	200		40		4,017,310	In progress	
73	Strategic urban planning	Resurfacing roads with paving	City Hall of Resita	2016-2016					201,315	Partially achieved	completed - Furnalelor street
74	Strategic urban planning	Installation of a street monitoring system in Resita Municipality	City Hall of Resita	2016-2020					1,000,000	In progress	
75	Strategic urban planning	Develop a reward framework for reducing consumption or an energy efficiency project on the model of the "Most Beautiful Garden".	City Hall of Resita	2024-2030						New measure	G2 suggested new measure, WK2

76	Strategic urban planning	Integrating green solutions into the authorisation of new buildings by implementing a programme to provide tax incentives for projects that include green solutions, thus contributing to sustainable development and combating climate change	City Hall of Resita	2024-2030						New measure	G2 suggested new measure, WK2
77	Strategic urban planning	Production of a local planning guide	City Hall of Resita	2024-2030						New measure	G2 suggested new measure, WK2
PUBLIC PROCUREMENT OF GOODS AND SERVICES											
78	Energy efficiency requirements/standards	Implementation of ISO 50001 certification	City Hall of Resita	2016-2017						In progress	
EDUCATION WITH CITIZENS AND STAKEHOLDERS:											
79	Local awareness raising and networking	Improving the quality and time of service delivery by the City of Resita	City Hall of Resita	2016-2016				500000		In progress	
80	Local awareness raising and networking	Annual organization of ENERGY DAY. Annual awareness raising of citizens on energy efficiency in housing.	City Hall of Resita	2016-2020	22000	6456		15,000			
81	Local awareness raising and networking	Promoting employment and strengthening basic services for inclusive growth, social and cultural inclusion	City Hall of Resita	2016-2018							
82	Local awareness raising and networking	Sustainable firewood supply. Promote this concept and strengthen control of uncontrolled deforestation	Forestry	2016-2018		3575		3,500			
83	Local awareness raising and networking	Organize events on informing students about the need to reduce energy consumption, energy efficiency, waste management, etc., as part of "Saptamana altfel" in schools	City Hall of Resita	2024-2030						New measure	

84	Local awareness raising and networking	Awareness raising actions for the population to promote sustainable transport (e.g. walking, using public transport)	City Hall of Resita	2024-2030						New measure	
OTHER SECTORS											
85	Waste	Extension of the integrated waste management system in Resita municipality.	County Council	2015-2016			3824		1000000	In progress	
86	Waste	Construction of underground waste platforms (6 tanks)	Urban Investment and Mobility Directorate Urban Management Service	2022-2030						New measure	Action taken from SIDU
87	Waste	Construction of collection platforms for construction waste and recyclable materials	Urban Investment and Mobility Directorate Urban Management Service	2022-2030						New measure	Action taken from SIDU
88	Waste	Implementation of the 'pay-as-you-throw' scheme for waste management	City Hall of Resita	2022-2030						New measure	Action taken from SIDU
89	Waste	Development of a digital waste monitoring platform in the municipality of Resita	City Hall of Resita	2021-2027						New measure	Action taken from MUD 2021 - 2027
90	Water/Sewerage	Sewerage and wastewater treatment plant in Doman - Reșița Municipality	City Hall of Resita	2016-2020					1,310,220		
91	Water/Sewerage	Sewerage and wastewater treatment plant in Secu, Ovens and Moniom village - Municipiul Reșița	City Hall of Resita	2016-2020					2,409,030	Partially achieved	Completed (Secu)
92	Water/Sewerage	Water supply in Doman - Municipiul Reșița	City Hall of Resita	2015-2016					1,086,877		
93	Water/Sewerage	Water supply in Secu, Ovens and Moniom village - Municipiul Reșița	City Hall of Resita	2015-2016					1,406,503	Partially achieved	Completed (Secu)

94	Water/Sewerage	Rehabilitation and extension of the water and sewerage network transfer pipes - Municipiul Reșița	City Hall of Resita	2016-2016	552	387	14,800,000	In progress	
95	Water/Sewerage	Construction of a temporary dam on the Barzava in collaboration with Apele Române	City Hall of Resita	2024-2030				New measure	
96	Water/Sewerage	Development of a stormwater management system (e.g. installation of mini-buffers at various points in the city to store stormwater)	City Hall of Resita	2024-2030				New measure	New measure suggested in WK2
ADAPTATION ACTIONS									
	Environment and biodiversity	<p>Planning and implementation of green urban infrastructure and nature-based solutions:</p> <p>Developing interconnected and multifunctional networks of "blue" and "green" spaces: urban gardens, public parks, green recreational areas, ponds, wetlands, green roofs, green pedestrian areas, etc.</p> <p>Regenerating areas by changing the use of unused, abandoned or inefficiently exploited land into green areas.</p>	Directorate of Construction Green Spaces Office	2024-2030					SDL 2015-2025 Theatre in the Garden Landscaping 650 m2 with flowers.
	Water	Implementation of sustainable drainage solutions:	Directorate of Building Green	2024-2030					SDL 2015-2025 Carrying out a Feasibility Study for

Public transport	Fitting out the stations	Provide all passenger waiting stations with sufficient resting places, shade and vegetation.	Local transport company	2024-2030						New measure	
Spatial planning	Integration of climate risk management policies into urban planning policies and planning requirements (specific criteria in CU) and infrastructure development	Implementation of early warning systems for extreme weather events.	Public Administrator Chief Architect Civil Protection Department	2024-2030							SDL 2015-2025 EMERGENCY SITUATIONS - ONE PROBLEM, MULTIPLE SOLUTIONS IN PREPAREDNESS FOR NATURAL DISASTERS IN THE CROSS-BORDER AREA, IN REȘIȚA, PANCEVO, POZAREVAC AND SMEDEREVO
		Conduct studies and heat maps to identify vulnerabilities and risks; analyses the vulnerability of citizens to various hazards: heat waves, storms, etc.	Public Administrator Chief Architect Civil Protection Department	2024-2030						New measure	
		Measures: limit building in areas prone to climate hazards, reforestation or afforestation projects (ha/year) to preserve and restore ecosystems, monitoring and grooming of trees, rain gardens, etc.	Public Administrator Chief Architect Civil Protection Department	2024-2030						New measure	SIDU 2022-2030 Landscaping and tree planting at the Zoo
		Redevelopment of existing and new public and private parking lots (no. of shaded parking spaces/year) by planting medium-sized trees and shrubs with shading potential.	Public Administrator Chief Architect Civil Protection Department	2024-2030							PMUD 2021 - 2027 Development and implementation of the Parking Policy - version II

Infrastructure	Infrastructure development adapted to the current climate context.	Stipulation in the specifications for road development projects of higher quality standards for asphalt pavement resistance to high temperatures, number of freeze/thaw, wet/dry cycles.	Public Administrator Town planning department	2024-2030						New measure
Public health	Mitigating urban heat islands	On the basis of the studies and thermal maps, a series of customised measures will be developed: green corridors of trees, irrigation of green spaces, shaded and recreational areas, resting places and fountains, drinking and cooling water cisterns during hot days.	Public Administrator Directorate of Building Civil Protection Department	2024-2030						New measure
Emergency situations	Anti-hail device	Purchase of anti-hail system (per TAU)	ISU	2024-2030						New measure
Emergency situations	Intervention Center for the Voluntary Emergency Service	Creation of an Intervention Center for the Voluntary Emergency Service.	ISU	2024-2030						Postponed
		Modernization and equipping of the building in Govândari district (former PSI shed/former laundry near Gloria stadium) in order to create an Intervention Center for the Voluntary Emergency Service - project postponed								
	Modernization of the SU system in Reșița	Construction of a new fire station to serve the local community and peri-urban area.	ISU & City Hall Resita	2024-2030						?

		Construction of a fire station to serve the local community and the Reșița peri-urban area in order to considerably reduce the response time of fire engines and SMURD ambulance crews - Smart City Strategy (6.6 Smart way of living / SL1 Health services - quality of life of the city's inhabitants)							
Social	Neighbourhood fly markets	Setting up dedicated spaces for mobile food markets with local products in neighbourhoods with vulnerable populations. Special priority will be given to people with mobility problems	Directorate for Construction Economic department	2024-2030					New measure

6.2 Impact of the Action Plan

Reșița's Sustainable Energy and Climate Action Plan implements a series of initiatives aimed at reducing greenhouse gas emissions and facilitating adaptation to climate change. This plan has been developed in close collaboration with stakeholders and is fully owned by the municipal administration. To ensure effective implementation, regular monitoring of the measures will be carried out, with a review every two years, following a model monitoring form according to the COMO methodology. This process allows new measures to be added or existing actions to be adjusted as the situation evolves.

The plan includes a total of 96 well-defined mitigation-oriented measures and 15 measures focusing on adaptation to climate change. These initiatives aim to achieve the target of reducing CO₂ emissions by 40% below 2008 levels by 2030, making a significant contribution to the sustainable development of the community.

Among the most significant measures are renewable energy generation, including an ambitious project to install a photovoltaic park. The plan also aims to reduce energy consumption by promoting the retrofitting of existing buildings 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-raising campaigns will be carried out among the community on energy efficiency and resource reduction.

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

6.3 Communication, monitoring and reporting

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 and citizens in addressing energy and climate challenges. They need to work together to shape a shared vision for the future, setting clear strategies and investing the resources needed to achieve common goals. Stakeholder involvement is the starting point for promoting the behavioral changes essential to implement 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 making the city 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/requesting them. Communication with the media is coordinated by the institution's Press Office. Communication with other persons, departments or institutions requires the approval of the senior manager, who endorses/countersigns the documents

communicated. External communication for the purposes of information gathering and surveys is carried out via the Institution's website and the Communication Directorate.

Monitoring and reporting

Monitoring and reporting on progress are key aspects of the EPADP. The Municipality of Reșița is committed to continuously monitor progress towards the set targets and to submit monitoring reports every two years. These reports will include a monitoring inventory of emissions, a quantitative analysis of 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.

Sources

- [1] *APM Caras Severin* . (2023). Retrieved from <http://apmcs.anpm.ro/ro/rapoarte-anuale1>
- [2] Center, J. R. (2018). *guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)'*.
- [3] *Climate Adapt* (2023). Retrieved from <https://climate-adapt.eea.europa.eu/knowledge/tools/urban-adaptation>
- [4] *Caras-Severin Youth Council*. (no year). Retrieved from <https://www.cjcs.ro/plan-de-analiza.php>
- [5] *Convention of Mayors* (no year). Retrieved from <https://eu-mayors.ec.europa.eu/ro/home?etrans=ro>
- [6] Ghinea, D. (no year). *Geographic Romania*. Retrieved from <https://romaniadategeografice.net/unitati-admin-teritoriale/municipii/municipii-r/resita/>
- [7] *Google Maps* (no year). Preluat de pe https://www.google.com/maps/d/viewer?mid=1TguoDW6YBWbaOjwTisAh2WdpOg&hl=en_US&ll=45.3096055592386%2C21.90403465&z=13
- [8] *IPCC* (no year). Retrieved from <https://www.ipcc.ch/>
- [9] *Joint Research Center*. (no year). Retrieved from https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/joint-research-center_en
- [10] *Sustainable Urban Mobility Plan* (2021). Retrieved from [https://www.primariaresita.ro/portal/cs/resita/portal.nsf/allbyunid/E9E8C8542CB69BB4C22587F80022FAC1/\\$FILE/Report%20PMUD%20-%202022%20Plan%20for%20Sustainable%20Urban%20Mobility%20at%20the%20Municipality%20Resita%20and%20the%20Metropolitan%20Zone.pdf](https://www.primariaresita.ro/portal/cs/resita/portal.nsf/allbyunid/E9E8C8542CB69BB4C22587F80022FAC1/$FILE/Report%20PMUD%20-%202022%20Plan%20for%20Sustainable%20Urban%20Mobility%20at%20the%20Municipality%20Resita%20and%20the%20Metropolitan%20Zone.pdf)
- [11] *Resita City Hall*. (without year). *SDL 2015-2025*. Retrieved from [https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/8344F47786786C39C22581E1004756C4/\\$FILE/SDL%20Resita.pdf](https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/8344F47786786C39C22581E1004756C4/$FILE/SDL%20Resita.pdf)
- [12] *SDG*. (no year). Retrieved from <https://sdgs.un.org/goals>
- [13] *SIDU*. Retrieved from [https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/05D7F7167EBA162EC2258A840030F009/\\$FILE/STRATEGY%20INTEGRATED%20DE%20DEVELOPMENT%20URBAN%20A%20MUNICIPIUM%20RESITA%202022-2030.pdf](https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/05D7F7167EBA162EC2258A840030F009/$FILE/STRATEGY%20INTEGRATED%20DE%20DEVELOPMENT%20URBAN%20A%20MUNICIPIUM%20RESITA%202022-2030.pdf)
- [14] *Simply Positive* (no year). Retrieved from <http://simplypositive.eu/>
- [15] *Smart City 2027* (no year). Retrieved from [https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/16094AAFD6F93CA7C22587E20028AACD/\\$FILE/Strategy%20Result%20Smart%20City.pdf](https://www.primariaresita.ro/portal/cs/resita/portal.nsf/AllByUNID/16094AAFD6F93CA7C22587E20028AACD/$FILE/Strategy%20Result%20Smart%20City.pdf)
- [16] *Local Development Strategy of the Local Action Group Resita*. (2019). Retrieved from <https://galresita.ro/wp-content/uploads/2019/03/sdl.pdf>
- [17] *UNFCCC* (no year). Retrieved from <https://unfccc.int/>

- [18] National Strategy - Adaptation to Climate Change 2022-2030 with 2050 Perspective (SNASC), Plan for the implementation of the National Strategy on Adaptation to Climate Change (PNASC) published in 2022;
- [19] The National Strategy for Sustainable Development of Romania 2030, prepared by the Romanian Government and published in 2018;
- [20] Risk analysis and coverage plan of Caras-Severin County, published in 2021;
- [21] Flood Risk Management Plan - Banat Water Basin Administration, updated
- [22] https://www.meteoblue.com/en/weather/week/re%c5%9fi%c5%a3a_romania_668954



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