



**MUNICIPAL ACTION PLAN FOR
ENERGY EFFICIENCY
(MAPEE) 2024 – 2026**

Suhareka, 2024

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1. INTRODUCTION

1.1.CONTEXT

1.1.1. THE OBJECTIVE OF MAPEE

Pursuant to the Energy Efficiency Law No. 06/L-079, Municipalities are obliged to prepare Municipal Action Plans for EE every 3 years, which must include the proposed municipal policies for improving energy efficiency in all sectors covered by the Municipality. Such a request is also in line with the commitments of the mayors of the main European cities within the Convention of Mayors of Municipalities signed in 2015, which convention's main focus is the reduction of CO2 emissions in the territory of the respective Municipalities by 40% up to at the end of 2030 and in line with the general national policies, the municipalities of Kosovo are obliged to draw up relevant action plans. In this aspect, as the primary objective of the Municipal Action Plans for Energy Efficiency (MAPEE) is to make a significant contribution to the reduction of CO2 emitted at the municipal level, respectively at the country level through the increase of energy efficiency and the increase of energy produced by renewable energy sources. Such action plans can be considered as subsequent development after a period of implementation of the Municipal Action Plans for Energy Efficiency whose focus has been saving energy through its more efficient use. The drafting and implementation of MAPEE is a municipal obligation that originates from the Law on Energy Efficiency 06/L-079.

The primary benefit for the Municipalities resulting from the development and implementation of MAPEE is the saving of energy, i.e. the diversification of forms of energy production with a focus on renewable sources and in this way the improvement of the environment at the municipal and national level as a result of reducing emissions of CO2. Other side benefits that would result in this case for the municipalities are related to:

- Local economic development;
- Improving the municipal energy infrastructure;
- Increasing the quality of constructions through the implementation of relevant standards in the context of energy performance of buildings;
- Improvement of public services related to energy and the environment
- Improvement of living conditions and comfort in the territory of the Municipality;

- Reducing CO2 emissions in all sectors by implementing energy efficiency measures, using renewable energy sources, managing consumption through relevant instructions and through citizen awareness;
- Sensitization and awareness of decision makers regarding energy saving policies, operators and end users.

Through the successful implementation of MAPEE, the municipality of Suhareka, in addition to achieving short-term goals in terms of sustainable energy supply, aims to make significant progress towards its vision of a clean, energy-sustainable and economically developed municipality by based on the principles of green economy and recycling.

1.1.2. LEGAL AND POLITICAL FRAMEWORK

The first steps towards the creation of Kosovo's Energy Policies were made in 2004 with the adaptation of three basic laws on energy: the Law on Energy, the Law on Electricity and the Law on the Energy Regulator. Substantial progress towards creating a stable legal framework for energy has been achieved since the signing of the Energy Community Treaty for South-East Europe in 2005. During the past decade several legal documents have been adopted and amended so that energy legislation is in full compliance with EU legislation. The legal framework for energy in the Republic of Kosovo consists of strategic documents, laws, guidelines and administrative regulations. Within such documents, the responsibilities and powers of the municipalities in the field of energy are defined, some of which will be briefly commented on below.

NEW LAW ON ENERGY (LAW No. 05/L -081) - Article 9- The role of local government states that local government bodies must plan the needs and method of energy supply in their development documents and those documents harmonize them with the Strategy and the Strategy Implementation Program, as well as energy balances.

ADMINISTRATIVE INSTRUCTION (QRK) No. 09/2017, dated September 6, 2017, FOR MUNICIPAL ENERGY OFFICES - defines the duties and responsibilities of municipal energy offices to address issues of planning, implementation and monitoring of energy policies at the local level. Some of the main responsibilities listed in this UA for Municipal Energy Offices are as follows:

- Creating a database and maintaining the information system for the regular collection of data on energy consumption on a periodic basis, energy costs and other relevant data, including keeping a register which enables the selection of indicators energy efficiency potential for municipal buildings that are energy consumers,

- Reporting on the implementation of the MAPEE and in cases where it is necessary to give proposals regarding the corrections that must be made for the full implementation of the program,
- Development of activities related to planning in the energy sector, based on the Energy Strategy, to support the sustainable economic and social development of municipalities,
- Provision of necessary data for the relevant Ministry in function of the review and preparation of the Energy Strategy Implementation Program for three (3) years in accordance with the Law on Energy,
- Continuous monitoring of progress related to the implementation of MAPEE at the municipal level and relevant reporting to the responsible Ministry.

The legal basis of the Republic of Kosovo, which regulates the field of energy, namely EE, consists of laws, administrative instructions (UA) and specific regulations. In this context, the main legal acts are as follows:

- Law on Energy 05 / L-081
- Law on Electricity 05 / L-085
- Law on the Energy Regulator 05 / L-084
- Law on Energy Efficiency 06 / L-079
- Law on Energy Performance in Buildings 05/L-101
- Law on Central Heating 03 / L-116
- Law on Constructions 04 / L-110
- Administrative Instruction No. 09/2017 for Municipal Energy Offices
- Administrative instruction No. 05/2017 for energy targets from renewable sources
- Administrative instruction No. 06/2017 for promoting the use of energy from renewable sources
- Administrative instruction No. 03/2019 on the energy content of fuels designated for end use
- Administrative instruction No. 03/2020 regarding energy efficiency requirements for the purchase of products, services and buildings from central level institutions
- Administrative instruction No. 10/2020 on common methods and principles for calculating the impact of energy efficiency

- Administrative instruction No. 04/2020 for the potential of energy efficiency in heating and cooling
- Administrative instruction No. 06/2020 for the calculation of electricity from co-production
- Administrative instruction No. 07/2020 for the general conditions for the cost-benefit analysis regarding measures to promote energy efficiency in heating and cooling
- Administrative instruction No. 05/2020 for the methodology related to the determination of efficiency from the co-production process
- Administrative instruction No. 05/2021 for the general reporting framework for energy efficiency
- Administrative instruction No. 06/2021 for energy services (ESCO)
- MESP Regulation No. 01/2018 for the inspection of heating systems and air conditioning systems
- MESP Regulation No. 02/2018 for the national methodology for calculating the integrated energy performance of buildings
- MESP Regulation No. 03/2018 for the energy performance certification procedure in the building
- MESP Regulation No. 04/2018 for the minimum energy performance requirements of buildings
- Regulation on the general operating conditions of the Kosovo Fund for Energy Efficiency (FKEE), 2019
- Regulation No. 01/2020 for minimum criteria for energy auditors including those performed as part of energy management systems
- Regulation No. 02/2020 for minimum billing requirements and billing information based on actual consumption
- Regulation No. 05/2020 for systems of energy service providers and minimum criteria for energy audit.

In order to support member countries to move from the use of fossil energy resources to clean forms of energy, as well as in order to fulfill the commitments given within the framework of the Paris agreement approved in 2015, the EU in 2019 revised the framework own energy and climate law. The new EU legal framework offers numerous advantages for consumers, the

environment and the economies of the respective countries. In this context, the main directives within the revised legal framework of the EU are as follows:

- Directive on the energy performance of buildings (EU 2018/844)
- Directive on renewable energy sources (2018/2001/EU)
- Directive on energy efficiency (EU 2018/2002)
- Regulation on the Governance of the Energy Union and Climate Action (EU 2018/1999)
- Regulation for the internal electricity market (EU 2019/943)

1.1.3. PREPARATORY ACTIVITIES AND PROCESS

MAPEE is a comprehensive mid-term document which is drafted with the aim of changing the municipal ecosystem in the field of energy and environmental protection. As such, MAPEE are complex documents, the implementation of which requires the commitment of the highest municipal structures, inclusiveness and consistency, which must be accompanied by relevant measures in the domain of human resources, institutional regulation and communication with citizens. Some of the concrete actions that need to be undertaken in order to create the necessary preconditions for the successful drafting and implementation of the MAPEE are as follows:

- Integration of the objectives and measures of MAPEE in the general development strategy of the Municipality;
- Appointment of professional staff for planning and implementation of energy saving projects, application of energy efficiency measures, application of renewable energy technologies and ecologically acceptable fuels;
- Evaluation and planning of the necessary financial means for the implementation of MAPEE;
- Continuous monitoring of the implementation of energy saving measures and financial savings, as well as monitoring of the reduction of greenhouse gases;
- Supporting the implementation of the measures foreseen in the whole period of the implementation of the MAPEE, until 2026;
- Monitoring and reporting on the dynamics of MAPEE implementation until 2026;
- Continuous information of citizens regarding the degree of implementation of MAPEE;
- Ensuring the active participation of all key actors and citizens during the entire period of MAPEE implementation.

MAPEE DEVELOPMENT

MAPEE consists of 9 important activities:

- Determination of the deadline for the implementation of MAPEE through the selection of the base (reference) year;
- Classification of energy consumers in the Municipality of Suhareka according to sectors;
- Analysis of energy consumption according to sectors;
- Determining priority sectors for action, based on the results of energy consumption analysis;
- Development of the basic CO₂ emission inventory (IEB);
- The development of MAPEE which, through the improvement of energy EE, aims to reduce energy consumption, namely the reduction and reduction of CO₂ emissions until 2026;
- Determination of the schedule and program of implementation of MAPEE;
- Determination of financing mechanisms for the implementation of MAPEE;
- Creation of the legal framework for the implementation of MAPEE.

The European Commission recommends that the year 1990 should be taken as a reference year, if the municipality has the required information on energy consumption and CO₂ emissions. If the municipality does not have the required data for the year 1990, it is recommended that the year for which the municipality has the required data is taken as the reference year.

In the present case, the necessary data for the drafting of this plan have been provided by municipal officials, from similar municipal plans in the past and from other relevant references. Consequently, the data provided provide information regarding energy consumption in years such as 2019, 2020, 2021 or even 2022. Therefore, for the needs of drafting the MAPEE for the municipality of Suhareka, based also on the lack of any extended investment related to the improvement of EE within those years, it has been estimated that energy consumption across different sectors has been more or less the same. In this way, the year 2022 was taken as the reference year for energy consumption and CO₂ emissions in the framework of the MAPEE design.

As for energy consumers in the Municipality of Suhareka, in accordance with the recommendations of the European Commission, they are categorized into three sectors:

- Buildings;
- Transport;
- Public lighting.

For the purpose of more detailed treatment, the building sector is further divided into the following three sub-sectors:

- Buildings owned by the Municipality of Suhareka;
- Commercial and service sector buildings (offices of private companies, banks, commercial activities, private schools, private medical services, etc.);
- Residential buildings.

While within the transport sector, the consumption of vehicles owned by the municipality of Suhareka and other public institutions (health, educational, cultural) as well as public service enterprises (firemen, water supply, etc.) has been analyzed.

The public lighting sector includes the lighting of public spaces such as streets, squares, presents and the like.

In order to analyze energy consumption in the building sector, namely in all sub-sectors of buildings, the following data has been provided:

- Number of buildings and their characteristics;
- Electricity consumption;
- Energy consumption for heating;
- Consumption of other fuels for heating (firewood, pellets, oil, etc.).

On the other hand, the data that have been analyzed regarding energy consumption in the transport sector are:

- Number of vehicles used by the relevant institution;
- Type of fuel used by vehicles;
- Amount of fuel used.

Unlike the previous two sectors, the analysis of the energy consumption of the public lighting sector is simpler. The following data are required for this type of analysis:

- The structure and characteristics of the public lighting network (the number of lamps, their type, and the length of streets covered by lighting, respectively the equivalent length or the surface covered for the lighting of squares/parks;
- Electricity consumption for lighting needs.

Although the Republic of Kosovo has not yet ratified the Kyoto Protocol, the determination of the CO₂ Reference Emission Inventory for the Municipality of Suhareka will be made in accordance with the Protocol of the Intergovernmental Panel on Climate Change (IPCC) using the official emission factors of Republic of Kosovo. PNNK is the implementing body of the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) for the implementation of the United Nations Convention on Climate Change (UNFCCC).

In order to identify the measures and activities, the implementation of which results in a significant reduction of CO₂ emissions until 2026 with satisfactory economic and energy parameters, the following parameters related to the proposed energy saving measures will be processed:

- Possible energy savings until 2026;
- Deadline and schedule of implementation;
- Financing opportunities;
- Implementation costs;
- Potential reduction of CO₂ emissions until 2026.

It should be emphasized that one of the most important aspects of MAPEE is its harmonization with the legal framework. All the proposed measures and activities must be harmonized with the relevant legislation of the Municipality of Suhareka, the Republic of Kosovo and the European Union.

1.1.4. IMPLEMENTATION OF MAPEE AND EXPECTED BENEFITS

The benefits expected from the implementation of the MAPEE are of a financial, environmental and operational nature. Specifically, some of the expected benefits are as follows:

- Improvement of EE in production processes and the implementation of RES technologies aimed at reducing the negative impact on the environment, increasing productivity and the participation of RES in the overall energy consumption in the municipal territory,
- Better planning and optimization of services related to energy, water, waste collection and recycling as well as public lighting of streets and squares,
- Saving energy and increasing investments in the energy sector through attracting different investments from local or international financial institutions as well as through different public-private partnership schemes.
- Increasing the municipal budget for capital investments, or social investments, reducing energy consumption through the implementation of energy saving measures.
- Fulfilling national obligations arising from national laws and regulations.

1.1.5. MIRATAPPROVAL AS IMPLEMENTING DOCUMENT

The approval of the MAPEE as an official document by the Municipality of Suhareka is the key element for its successful implementation and, ultimately, the achievement of the reduction of CO₂ emissions until 2026. For this reason, it is important that the main managing authorities Municipalities are actively involved in the process of development, implementation and monitoring of MAPEE. Moreover, it is also very important to create a Working Group as an advisory body that will monitor and evaluate all phases of the implementation of MAPEE.

1.1.6. MAPEE MONITORING, IMPLEMENTATION CONTROL AND REPORTING

Immediately after the formal approval, the MAPEE should start to be implemented while the officials responsible for energy should monitor its implementation in regular periods of time. Based on the continuous monitoring, the relevant reports should be drawn up and forwarded to the municipal bodies and the ME. The reporting process must be based on the platform for monitoring and verification (MVP) approved by the ME, while the reporting of the relevant results must be done in periods as provided by the Law on EE No. 06/1-079. The entire process of monitoring, control and reporting related to the implementation of MAPEE should be led by the municipal energy manager, respectively the person charged with such a task.

2. COMPREHENSIVE SUMMARY

The potential for energy saving has been analyzed in the public sector and in a part of private consumers. In the framework of the public sector, energy consumption was analyzed in:

- Public service buildings
 - *Municipal administration buildings*
 - *Buildings of the education sector*
 - *Health buildings*
 - *Culture and sports buildings*
- Public lighting
- Transport for the needs of the municipality, institutions and public enterprises

Within the private sector, energy consumption was analyzed in:

- Residential buildings
- Commercial buildings and private services

In addition to energy consumption and the potential for its saving, the situation related to the capacity of renewable resources installed in municipalities and the potential for increasing these capacities has also been analyzed.

In the following, the main data related to energy consumption, the amount of CO₂ emitted, the energy saving potential and the amount of CO₂ reduction are presented, in a summarized form for the building sector (public and private), the public transport sector and lighting sector.

Table 1: Summary data for the public and private sector related to energy and CO₂ at the level of the Municipality.

Sector	Reference Year (2022)		Year 2026	
	Energy consumption (kWh/year)	CO ₂ emission (kg/year)	Energy saving potential (kWh/year)	Potential for CO ₂ reduction (kg/year)
Public	12,061,832	3,388,327	1,815,548	1,427,613
Private	626,030,252	194,708,248	6,699,778	3,185,523

Total	638,089,173	198,096,575	8,515,326	4,613,136
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2.1.PUBLIC SERVICES BUILDINGS

The following table presents summary data related to energy consumption, the amount of CO2 emitted, the energy saving potential and the amount of CO2 reduction for public service buildings such as administrative, medical, educational, cultural and sport.

Table 2: Energy consumption and CO2 emission in the reference year and potential savings until 2026, in public service buildings

Sector		Reference Year (2022)		Year 2026	
		Energy consumption (kWh/year)	CO2 emission (kg/year)		Energy consumption (kWh/year)
Public Services Buildings	Administrative	240,472	275,978	72,492	82,851
	Education	8,001,785	757,997	1,281,071	781,232
	Health	1,787,836	1,156,063	260,406	347,168
	Culture/Sports	374,617	285,534	-	-
Total		10,404,710	2,475,572	1,613,969	1,211,251

2.2.RESIDENTIAL BUILDINGS (RESIDENTIAL SECTOR)

The residential buildings sector consists of individual and collective residential buildings. The following table presents summary data for all housing units regarding energy consumption, the amount of CO2 emitted, the energy saving potential and the amount of CO2 reduction

Table 3: Energy consumption and CO2 emissions in the reference year and potential savings until 2026, in residential buildings

Sector	Reference Year (2022)		Year 2026	
	Energy consumption (kWh/year)	CO2 emission (kg/year)		Energy consumption (kWh/year)
Residential	556,054,536	150,591,789	6,415,954	2,777,384
Total	556,054,536	150,591,789	6,415,954	2,777,384

2.3.COMMERCIAL SECTOR AND PRIVATE SERVICE BUILDINGS

The sector of private commercial buildings consists of hotels, motels, restaurants and similar buildings, wholesale and retail trade buildings, private enterprise buildings, buildings of private medical, educational, banking services, etc. The following table presents summary data for all reported buildings of the commercial sector regarding energy consumption, amount of CO2 emitted, energy saving potential and amount of CO2 reduction.

Table 4: Energy consumption and CO2 emission in the reference year and saving potential until 2026, in commercial/private service buildings.

Sector	Reference Year (2022)		Year 2026	
	Energy consumption (kWh/year)	CO2 emission (kg/year)		Energy consumption (kWh/year)
Commercial/Private Services	69,975,716	44,116,459	283,824	408,139
Total	69,975,716	44,116,459	283,824	408,139

2.4.TRANSPORT SECTOR

Transport in the Municipality of Suhareka consists of the public transport fleet for the needs of passengers, the fleet of private buses/combibuses for the transport of passengers, taxis and the fleet of private vehicles of the Municipality's residents and the fleet of vehicles for the needs of public administrative services, health, educational, cultural and sports. Summary data regarding energy consumption, amount of CO2 emitted, energy saving potential and amount of CO2 reduction are as follows.

Table 5: Energy consumption and CO2 emissions in the reference year and potential savings until 2026, in the transport sector.

Sector	Reference Year (2022)		Year 2026	
	Energy consumption (kWh/year)	CO2 emission (kg/year)		Energy consumption (kWh/year)
Public transport (public institutions and enterprises)	1,260,381	342,242	63,019	17,112
Total	1,260,381	342,242	63,019	17,112

2.5.PUBLIC LIGHTING

Public lighting in the Municipality of Suhareka consists of the lighting of squares, parks and public streets. Summary data regarding energy consumption, amount of CO2 emitted, energy saving potential and amount of CO2 reduction are as follows.

Table 6: Summary data for the public lighting sector related to energy and CO2 at the level of the Municipality.

Sector	Reference Year (2022)		Year 2026	
	Energy consumption (kWh/year)	CO2 emission (kg/year)		Energy consumption (kWh/year)
Public lighting (streets, squares and parks)	396,741	570,514	138,560	199,250
Total	396,741	570,514	138,560	199,250

3. BASIC INFORMATION ABOUT THE MUNICIPALITY

3.1.POSITION AND TOPOGRAPHY

The municipality of Suhareka is located in the southern part of Kosovo. It is bordered by the municipalities of Prizren, Mamusha, Rahovec, Malisheva, Lipjan, Shtime, Ferizaj and Shtërpce. It lies at a northern latitude of 42°15' - "Sharri" National Park (south), 42°30' - Berisha and Javori Mountains (north). Eastern longitude: 20°45'- municipality of Rahovec (west), 21°00'- Jezerci Mountains, Guri i Delloci (east).

The municipality of Suhareka is surrounded by high mountains and in the northwest by the mountains of Pagarusha and Temeqina with heights above sea level of 796 to 828m, to the north by those of Carraleva 922 to 1048m, to the east by the mountains of Jezerci 1677m (Kryet e Ahishta) and to the south-east with the mountains of Sharri 2092m (Dera e Pasha) while to the west lies the plain (lowland) of Prizren.

The average height above sea level in the municipality is 455m. The area of this municipality is 361.78 km² (which covers 3.3% of the territory of Kosovo). From the area of the municipality (of 36099 ha) 15,074 ha or 41.7% are covered with forests, 19,373 ha or 53.7% are agricultural land and 1652 ha or 4.6% other area.

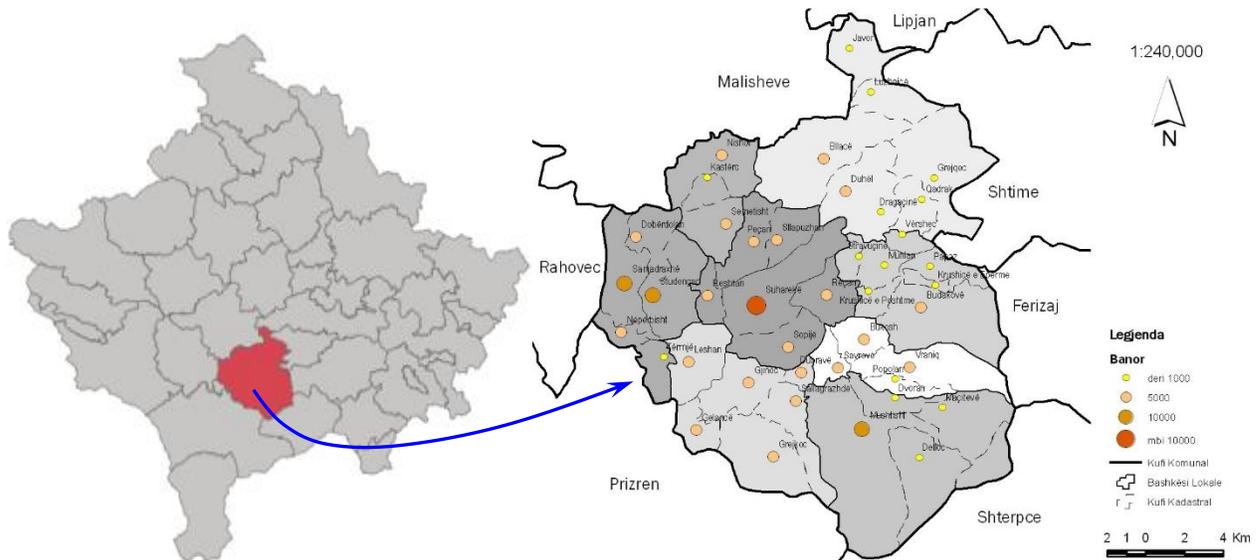


Figure 1: Geographic position of Suhareka

3.2. POPULATION AND RESIDENCES

Based on the 2011 census, Suhareka had 59,722 inhabitants, while according to estimates at the end of 2021, Suhareka has 56,366 inhabitants. Based on the 2011 population census, a high concentration of 49,300 inhabitants is observed in rural areas, while 10,422 inhabitants live in urban areas, respectively 82.5% in rural areas and 18.5% in urban areas. For comparison, based on the 2011 census, 62% of the population in the Republic of Kosovo live in rural areas, while 38% live in urban areas.

The municipality of Suhareka, as a territorial unit, consists of: the city of Suhareka, urban neighborhoods and villages. The territory of the Municipality includes 2 Suharek and the following 41 settlements: Bllacë, Budakovë, Bukosh, Breshanc, Delloc, Dobërdelan, Dubravë, Duhël, Dvoran, Greikoc, Greiçec, Gelancë, Gjinoc, Javor, Kastërc, Krušicë e Epërme, Krušicë e Poshtme, Leshan, Luzhnica, Maqiteve, Mohlan, Mushtisht, Neprebishte, Nishor, Papaz, Peqan, Popolan, Qadrak, Reshtan, Reqan, Savrovë, Samadrexë, Sallagrazhdë, Semetishte, Sllapuzhan, Sopiçe, Stravučinë, Studençan, Tërnje, Vëršec and Vraniç.

According to the latest official data of the Kosovo Statistics Agency of 2021, the Municipality of Suhareka has 41 settlements, where 58,184 residents live on an area of 361.78 km² with a residential density of 158 residents/km².

3.3. LOCAL CLIMATE

The average annual air temperature in Suhareka is 11°C. In the month of August, the absolute maximum of 38.2 °C is announced. The absolute amplitude is 52.3 °C. The municipality of Suhareka is located in the south of Kosovo and has a continental climate with a Mediterranean influence.

The key climate values are listed below:

- Average annual relative humidity values in Suhareka is 74.3%. The lowest relative air humidity in Suhareka is in August 63.2%.
- In Suhareka, the cloudiness is the least in the month of August (2.7), while the average annual cloudiness is 5.0 tenths of the sky.
- The average annual rainfall in Suhareka is 674.0 mm. The largest rainfall is in October, while the smallest is in February and January.
- In Suhareka, winds from the northeast (193%), east (32%), and southwest (32%) offend most often, while winds from the south (33%), and northwest (13%) offend the least. Winds from the southwest (4.6m/sec) and the northeast (3.6m/sec) have the highest average speed.

3.4.LOCAL ADMINISTRATIVE AND ORGANIZATIONAL STRUCTURE FOR MAPEE IMPLEMENTATION

Public administration services are provided through the main municipal building in Suharekë and 7 local communities: Mushtisht, Studençan, Duhël, Gjinoc, Nishor, Bukosh, Mohlan. The central administration in the Koumna consists of the Assembly with the relevant committees, the Mayor's Office with the relevant offices and 10 directorates which provide services to citizens in the relevant fields. The detailed organizational chart of the municipal organization is presented in the figure below.

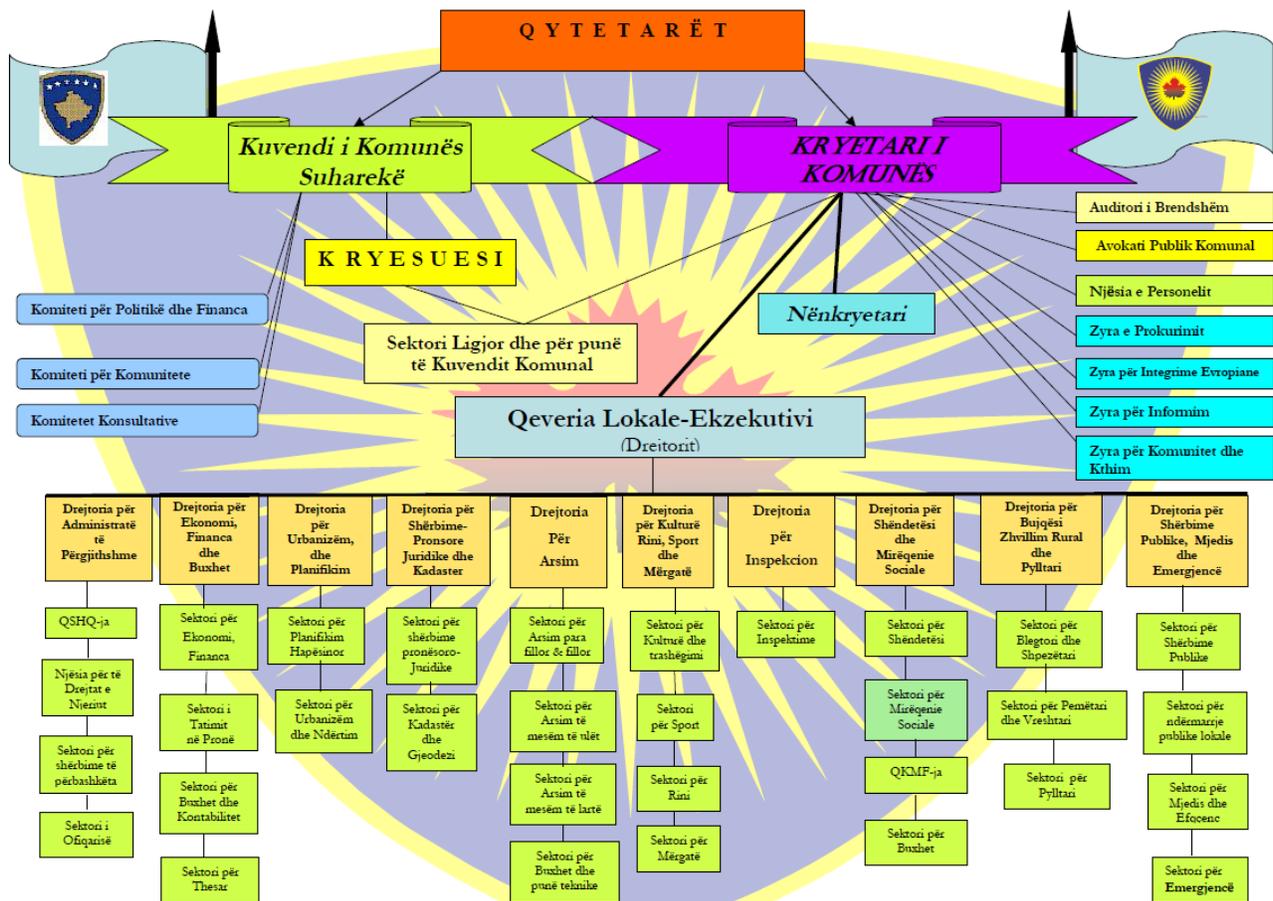


Figure 2: Organogram of the Municipality of Suhareka

As can be seen from the presented organizational chart, the directorates that operate in the Municipality are:

- Directorate for General Administration,
- Directorate for Economy, Finance and Budget,
- Directorate for Urbanism and Planning,
- Directorate for Property, Legal and Cadastre Services,

- Directorate for Education,
- Directorate for Culture, Youth, Sports and Migration,
- Directorate for Inspection,
- Directorate for Health and Social Welfare,
- Directorate for Agriculture, Rural Development and Forestry,
- Directorate for Public Services, Environment and Emergency

3.5.ECONOMIC AND FINANCIAL INDICATORS

Economic development in the Municipality of Suhareka is mainly based on several areas which are a priority for the development of our municipality and have been evaluated as a good opportunity for development in areas such as: Agriculture, Tourism, Energy and Production.

Small and medium-sized enterprises are characterized by different development of activities, while large enterprises are the Rubber Production Factory "Balkan", the Wine Production Factory "AgroKosova Holding", the Leather Processing Factory "Solid", the Factory for textile "Arta-Text", the factory for the processing of meat products "Flor-en", the factory for the processing of soft drinks "Frutex", and a number of enterprises for the processing of wood, plastic, aluminum, metal products, etc.

An important aspect of economic development is represented by the Industrial Zone in Shirokë and the Agro Zone in Samadrexë, as well as the Morinë-Merdare highway that practically passes through the municipality of Suharekë.

Based on the population census of 2011, out of a total of 42,313 economically active inhabitants, 15,013 inhabitants are economically active, while 8,043 inhabitants are in regular employment. Regarding the gender aspect, male employment dominates with 83% compared to 17% of female employment.

The municipality of Suhareka has a good geographical position, which enables the development of cross-border and inter-municipal cooperation, it has good natural resources such as forest areas, arable land, pastures, orchards, various medicinal plants and other land and underground assets. As for active economic enterprises, a balanced development can be observed between the urban area, where 1090 economies operate, and the rural area, where 942 economies operate.

The municipality of Suhareka has two Economic Zones:

- Industrial Zone in Shirokë;
- Agrozone in Samadrexha

The total land surface in the municipality of Suhareka is 36,099 ha. From this surface, 19,377 ha (53.7%) - fertile agricultural land, 1652 ha (5%) - infertile land or wasteland, and 15,074 ha (42%) - forests.

Of the total area of agricultural land, 12,666 ha is arable land, 1,652 ha uncultivated and 2,250 ha meadows and pastures. This land is planted with agricultural crops such as cereals, vineyards, vegetables and trees.

According to data from the Directorate for Agriculture, Rural Development and Forestry in the Municipality of Suhareka during the years 2014-2017, 4,481 ha were planted with cereals, 949 ha with grape vines, 646 ha cultivated with vegetables and 279 ha with trees. The rest of the land consists of 2,250 ha of meadows, 2,010 ha converted into pastures and 2,300 ha remaining fallow.

Table 7: The budget of the Municipality of Suhareka for the last three years in (€).

	2021		2022		2023	
Total budget	16,664,992		16,334,504		19,807,625	
Expenses	Municipal	Capital	Municipal	Capital	Municipal	Capital
Total/expenses	358,449	4,904,607	358,449	4,433,187	551,919	6,043,331
Government Grant	256,449	4,148,220	256,449	3,788,220	409,919	5,020,662
Municipal revenues	102,000	734,956	102,000	644,967	142,000	1,022,669

As can be seen from the table above regarding the budget of the Municipality for the years 2021, 2022 and 2023, an increase of the total budget in 2023 compared to that of 2022 and that of 21% is observed. An even greater increase is observed for the two categories of expenses which are relevant in the context of developments in the field of EE. Specifically, capital revenues have increased by 36%, while revenues for municipal expenses have increased by 54%. Such an increase has resulted as a result of the increase in the government grant but also as a result of the increase in own revenues from the Municipality.

3.6.COHERENCE WITH ENERGY POLICIES AT THE NATIONAL LEVEL

The drafting of the MAPEE for the period 2024-2026 is in full harmony with the strategic orientations of policies at the national level, which stem from Kosovo's international obligations as a signatory of the Energy Community Treaty and recently also of the Sofia Declaration on the Green Agenda for the Western Balkans

Specifically, the objectives and goals of the implementation of MAPEE are directly related to two of the five pillars of the Sofia Declaration on the **Green Agenda for the Western Balkans**, which are:

- First pillar: Climate, energy and Mobility
- Third pillar: Reduction of pollution

Nonetheless, the other pillars of this declaration are at least indirectly related to the topics addressed and the expected results from the implementation of the MAPEE, including the addressing of energy poverty, which is one of the actions foreseen within the first pillar.

As expected, in line with the Sofia declaration and Kosovo's obligations in relation to the Secretariat of the Energy Community, other national strategic documents have been drawn up. In this regard, the Government's Program for Economic Reforms 2023-2025, within the framework of the implementation of recommendations and policies, envisages the adoption of a coherent long-term energy and climate strategy for reducing carbon emissions, including plans for the gradual removal of the use of coal and fossil fuels, as envisaged under the Sofia Declaration, then increasing energy efficiency incentives for the private sector and households and improving support schemes for renewable energy projects by introducing competitive bids/auctions. Also, within the framework of the structural reforms in this document as a measure of reform No. 2, the promotion of EE and RES in function of the green transition is foreseen. Through this measure, it is proposed to prioritize the improvement of EE in the residential sector and municipalities can directly benefit from this measure if they are prepared with relevant programs. In the framework of this measure, the increase in the generation of electricity from RES is also foreseen, from which the municipalities can again benefit directly.

At the beginning of 2023, the Energy Strategy of the Republic of Kosovo 2022-2031 was also approved, in which the strategic objectives related to the energy aspects addressed in the current MAPEE for Suharekë are set. Thus, as objective No. 2 of the Strategy, the decarbonization and promotion of renewable energy has been identified, within which the decarbonization of the transport and industry sectors is foreseen, while as a target related to RES, at least 35% of the electricity consumed by 2031 is foreseen be based on RES. Whereas object No. 3, the increase in energy efficiency has been identified, within which two specific objectives are included, namely the improvement of energy efficiency in buildings and the promotion of cogeneration and central heating systems (heating from a distance). The further improvement of energy EE is envisaged to be the continuation of the implementation of EE measures through various support schemes, the promotion of buildings with almost zero energy consumption, the support of the use of energy-efficient technologies, e.g. heat pumps as the beginning of the implementation of the certification process of buildings in terms of their energy performance.

4. EXPERIENCE IN IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES

REALIZED PROJECTS

Successful implementation of municipal EE measures cannot be realized if municipal authorities are not involved in all stages of its design. In this way, it must be ensured that the municipal authorities feel co-owners of MAPEE. In addition, in the process of successful implementation of PVKEK, the prior experience of municipal structures in the implementation of similar plans is of fundamental importance. In this aspect, the municipality of Suhareka has so far been involved in the design and implementation of the following plans:

- Municipal Plan for Energy Efficiency (MAPEE) 2014-2020
- Municipal Action Plan for Energy Efficiency (PVKEK) 2019-2021

Various projects related to the improvement of EE have also been implemented in the municipality. Some for which it was possible to provide notes from the website of the former Kosovo Agency for EE are presented in the following table.

Table 8: Summary of projects implemented in the Municipality related to EE.

Name of the project	Financial source	Year	Investment amount
Lighting of the road network in the villages of Mushtisht, Studenqan, Duhel, Suharekë	Municipality	2019	155,212 €
Lighting of the Neperbisht, Terrnje, Dubrave, Bllace network	Municipality	2018	108,000 €
Renovation of "Fluturat" Suhareke nursery school	Valon Vataj	2019	100,000 €

4.1.IMPACT ON THE DEVELOPMENT OF MUNICIPAL CAPACITIES FOR EE

Based on the completed projects described above, it results that the Municipality of Suhareka has already created initial experience related to the planning, implementation and relevant report of EE projects. In view of such developments, the Municipality has established the Office for Energy Management, which is responsible for the coordination of municipal actions in order to increase investments in the field of EE, as well as in planning the measures and actions that should follow. In this context, it can be said that the Municipality has already created the institutional core which could be further developed in the Energy Management System as the

desired level of municipal organization for addressing all issues related to a well system organized and functional energy supply in the territory of the Municipality.

5. TREGUESIT E ENERJISË KOMUNALE (FURNIZIMI DHE PRODHIMI I ENERJISË KOMUNALE)

5.1.ENERGY SUPPLY

Energy supply in the Municipality in all sectors is regulated based on the principles of free market operation. As in all other municipalities, in the Municipality of Suhareka, the energy supply includes the supply of electricity for all sectors within the territory of the municipality, the supply of fuel for the needs of public and private transport and the supply of fuel for the needs of heating public sector, private commercial sector and residential sector

In this context, electricity is supplied by the electricity supply and distribution company (KEDS). The supply of fuel for the needs of the public or private transport sector is covered by the import, which is carried out through the respective private enterprises. On the other hand, the supply of public institutions with fuel for heating needs or with other forms of energy for this purpose is done by private companies, while fuel for heating needs in the commercial and residential sectors is provided by the businesses themselves, respectively. families. In the absence of relevant data on the difference between supplied and consumed energy, in this study it is considered that these two parameters are the same, therefore the corresponding figures will be presented in the section related to energy consumption in different sectors within the municipality .

Regarding the types of energy supplied in order to cover the energy needs of all sectors, the municipality is supplied with electricity, fuel for transport, fuels of biomass origin and a small amount of other fuels (gas, lignite , oil, etc.). Based on the analysis of consumption in all sectors, the amount of energy consumed in the municipality according to types is as in the following table.

Table 9: Types of energy consumed, quantity and energy value

Type of energy and unit	Quantity per year	Energy value (kWh)	Participation in total
Electricity (kWh)	126,708,145	126,708,145	19.86%
Transport fuel-Diesel (liters)	124,463	1,232,184	0.19%
Fuel for transport - Gasoline (liters)	2,719	25,287	0.00%

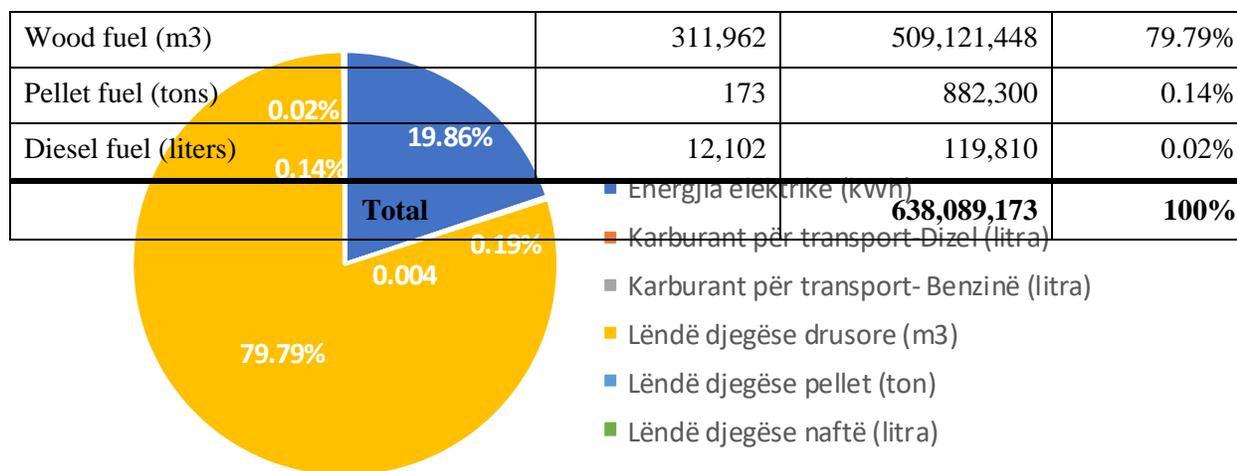


Figure 3: The participation of different types of energy in the total energy consumed

5.2.ENERGY PRODUCTION

There is no company operating in the municipality of Suhareka for the production of any form of energy from fossil or renewable sources. All the electricity that is supplied and consumed within the municipality is produced in the Kosova A and Kosova B thermal power plants, or originates from imports at the country level. Likewise, the municipality does not have any company for the production of any form of fuel for transportation needs. The same applies to thermal energy, so there is no municipal company for the production of this form of energy, but the same, mainly in the form of wood biomass, is provided by private companies (for the needs of institutions) or privately by businesses and by households.

6. ANALYSIS OF ENERGY CONSUMPTION BY SECTORS

In order to provide a complete overview of energy consumption within the territory of the municipality, the relevant consumption has been treated according to the following sectors:

- Building sector,
- Transport sector,
- Public lighting sector

The building sector is further divided into sub-sectors:

- The sector of buildings owned by the municipality (public buildings)
- The sector of commercial buildings and private services
- Sector of residential buildings (household sector)

The relevant data for the analysis of energy consumption in the relevant sector were provided by the Municipality officials, from the Municipality website and from the sources listed at the end of the report in the Resources Section.

Summary data related to energy consumption in the apostrophized sectors are presented in the following table.

Sector name	Energy consumption (kWh/year)
The building sector	636,434,962
Transport sector	1,260,381
Public lighting sector	396,741
Total	638,092,084

Table 10: Energy consumption by sector in the Municipality of Suhareka

6.1. ENERGY CONSUMPTION IN BUILDINGS

Based on the table above, the building sector represents the sector with the highest energy consumption at the level of the Municipality. Energy consumption in the relevant sub-sectors of the building sector is presented in the following table.

Table 11: Summary data related to energy consumption in buildings.

Sektori/Nësektori	Sipërfaqja e totale (m2)	Konsumi i energjisë termike (kWh)	Konsumi i energjisë elektrike (kWh)	Konsumi total i energjisë (kWh)
Ndërtesa komunale	86,338	8,685,566	1,719,144	10,404,710
• Ndërtesat e administratës	3,047	49,500	190,972	240,472
• Ndërtesat e arsimit	74,402	7,474,764	527,021	8,001,785
• Ndërtesat e shëndetësisë	3,885	984,302	803,534	1,787,836
• Ndërtesat e kulturës dhe sportit	5,004	177,000	197,617	374,617
Ndërtesat komerciale & shërbimeve private	335,698	40,162,488	29,813,228	69,975,716
Ndërtesat rezidenciale	2,589,914	461,275,504	94,779,032	556,054,536
Total	3,011,950	510,123,558	126,311,404	636,434,962

The assessment of thermal and electrical energy distribution in % according to subsectors is presented in the following diagrams.

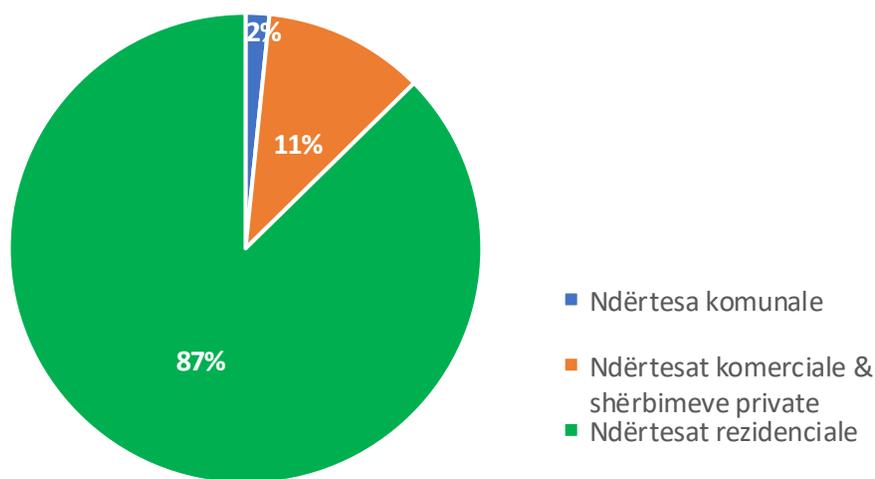


Figure 4: Thermal energy consumption in buildings according to relevant subsectors

6.1.1. ENERGY CONSUMPTION IN MUNICIPAL-OWNED BUILDINGS

The buildings owned by the Municipality are categorized into the following subgroups:

- Administration buildings
- Education buildings
- Health buildings
- Culture and sports buildings

6.1.1.1. ADMINISTRATION BUILDINGS

Within the administration buildings are included the buildings in which the municipal administration operates and the buildings that provide direct services to the citizens. The data related to the relevant parameters of energy consumption in the administration buildings were partially obtained from the Municipal officials and from the Action Plan for Energy Efficiency 2019-2021, drawn up for the Municipality of Suhareka with the support of the EU Office in Kosovo. The list of such buildings with the main data such as heating surface, specific consumption and total energy consumption per year are presented in the following table. As presented in the table, the municipal administration consists of the main facility of the Municipality, the facilities of several directorates and several offices of the country, with a total area of 4,594 m². The average specific energy consumption of the administration buildings is 105 kWh/m² year, while the total consumption of energy is 303,874 kWh/year.

Table 12. Energy consumption in municipal administration buildings

No.	Name of the institution	Total area (m ²)	Specific consumption (kWh/m ² year)	Total consumption per year (kWh/year)
1	The main facility of the Municipality	1,953	65	127,201
2	Finances	234	99	23,272
3	Directorate for Geodetic and Cadastre	180	208	37,424
4	Public services	400	94	37,424
5	Registrar office - Mushtisht	100	57	5,710
6	Registrar office - Studenqan	110	44	4,872
7	Registrar office - Nishor	70	65	4,569
Total		3,047	Average =90	249,472

Table 13: Energy consumption by type in municipal administration buildings

Sector/Sub sector	Energy type	Total consumption per	Percentage in total
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		year (kWh/year)	consumption (%)
Municipal administration	Thermal energy (diesel)	49,500	21
	Electric energy*	190,972	79
Total		240,472	100

* Total electricity (for heating, lighting, equipment, etc.)

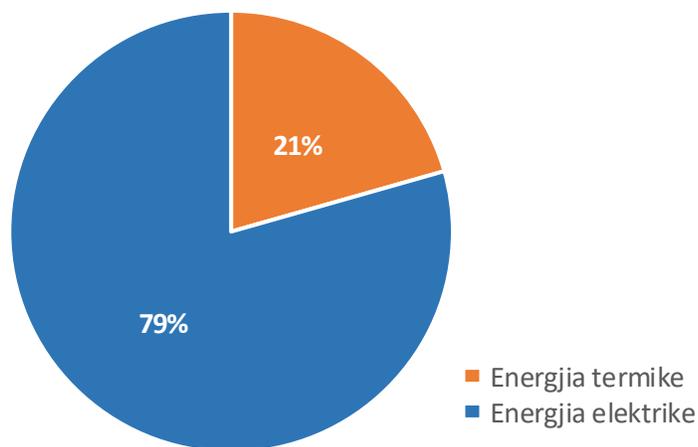


Figure 5: Energy participation by type in total energy consumption in municipal administration buildings

6.1.1.2. ENERGY CONSUMPTION IN EDUCATION BUILDINGS

The list of such buildings with the main data such as heating surface, specific consumption and total energy consumption per year are presented in the following table. As presented in the table, education buildings consist of primary school facilities (mostly), secondary schools and a pre-educational institution. The total reported area of educational buildings is 74,402 m². The average specific energy consumption of educational buildings is 153 kWh/m² year, while the total energy consumption is 8,001,785 kWh/year.

Table 14: Energy consumption in education buildings

No.	Name of the institution	Total area (m ²)	Specific consumption (kWh/m ² year)	Total consumption per year (kWh/year)
1	Primary School SH.F.M.U „7 MARSI"	2,078	221	460,181
2	Primary School „17 Shkurti "	2,145	103	221,046
3	Primary School „Destan Bajraktari"	4,700	84	394,044
4	Primary School „Shkendija" Suharekë	2,516	100	252,655
5	Primary School „Shkendija" Reqan	360	287	103,301

6	Primary School,,E.Durham"	7,000	58	404,649
7	Primary School,,E.Durham"	723	51	36,678
8	Primary School,,Besim Ndreca"	358	248	88,949
9	Primary School,,Shaban Mazreku"	1,598	163	260,899
10	Primary School GJ.K ,,Skenderbeu"	1,273	111	140,833
11	Primary School,,D.Grejkocit"	1,708	100	171,512
12	Primary School,,Migjeni"	3,975	71	283,397
13	Primary School,,Drita"	934	148	138,098
14	Primary School,,V.P.Shkodrani" Leshan	652	216	140,828
15	Primary School,,V.P.Shkodrani" Tërre	304	240	72,997
16	Primary School,,F.Arbrit"	700	208	145,347
17	Primary School,,Kongresi I Manastirit"	2,456	93	229,567
18	Primary School,,Rilindja"	452	195	88,224
19	Primary School,,Ditura"	1,380	128	177,317
20	Primary School,,28 Nëntori"	336	279	93,839
21	Primary School,,Hasan Prishtina"	1,495	171	255,016
22	Primary School,,Bajram Curri"	1,682	55	92,475
23	Primary School,,Deshmoret e Tivarit" Peqan	1,162	184	213,512
24	Primary School,,Deshmoret e Tivarit" Sllapuzhan	1,445	114	165,369
25	Primary School,,Ramë Bllaca"	3,700	100	369,698
26	Primary School,,Ismet Jashari-Kumanova	430	118	50,809
27	Primary School,,Sadri Duhla" Duhël	4,700	52	243,686
28	Primary School,,Sadri Duhla" Lagja Sopaj	346	253	87,580
29	Primary School,,Sadri Duhla" Grejqec	244	421	102,644
30	Primary School,,Naum Veqilharxhi" Mohlan	1,640	119	195,427
31	Primary School,,Naum Veqilharxhi" Krushicë	800	139	110,802
32	Primary School,,Naum Veqilharxhu" Stravuqinë	240	187	44,896
33	Primary School,,Naum Veqilharxhi" Vërshec	240	185	44,292
34	Primary School,,L.Prizrenit" Budakovë	1,485	93	138,445
35	Primary School,,L.Prizrenit" Budakovë II	300	286	85,675
36	Primary School,,Deshmoret e Kombit" Vraniq	896	194	173,547
37	Primary School,,Deshmoret e Kombit"	450	173	77,683

	Popolan			
38	Primary School „Vëllezërit Frasherit"	1,200	108	129,153
39	Shkolla fillore „Iliria"	1,426	96	137,045
40	Primary School SH.F.M.U „7 MARSI"	300	82	24,480
41	Kindergarten „Fluturat"	4,358	91	397,141
42	High School „Jeta e Re"	2,490	145	361,217
43	High School „Skender Luarasi"	7,600	75	572,352
44	High School „Abdyl Ramaj"	2,078	221	460,181
Total		74,402	Mes = 153	8,001,785

Table 15: Energy consumption by type in educational buildings

Sector/Sub sector	Energy type	Total consumption per year (kWh/year)	Percentage in total consumption (%)
Educational buildings	Thermal energy (wood, pellet)	7,474,764	93
	Electric energy*	527,021	7
Total		8,001,2785	100

* Total electricity (for heating, lighting, equipment, etc.)

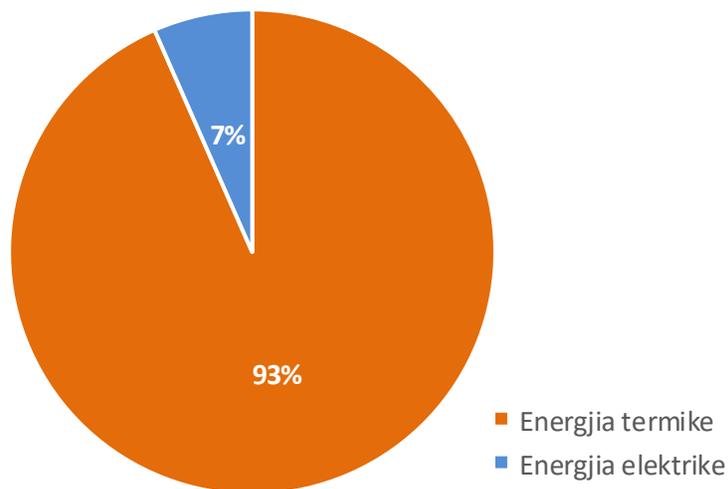


Figure 6: Participation of energy by type in total energy consumption in education buildings

6.1.1.3. ENERGY CONSUMPTION IN HEALTHCARE BUILDINGS

Health care services in the Municipality of Suhareka are provided by the Main Center of Family Medicine, several other centers of family medicine and by ambulances in the respective settlements. The list of such buildings, for which the necessary data related to the heating surface, specific consumption and total energy consumption per year have been provided, are presented in the following table. As presented in the table, the total area of health buildings for which the necessary data has been provided is 3,885 m². The average specific energy consumption of such buildings is 446 kWh/m² year, while the total energy consumption is 1,804,488 kWh/year.

Table 16: Energy consumption in buildings under the health sector

No.	Name of the Institution	Total area (m ²)	Specific consumption (kWh/m ² year)	Consumption in total per year (kWh/year)
1	QKMF Suhareke	2,272	653	1,244,457
2	QMF Bukosh	261	550	104,480
3	QMF Mushtisht	325	416	116,459
4	QMF Grejkoc	111	478	41,148
5	AMB Sopi	117	520	46,775
6	QMF Studenčan	258	183	38,403
7	AMB Samadraxhe	95	170	12,581
8	QMF Duhel	241	575	109,204
9	QMF Mohlan	205	425	74,329
Total		3,885	Mes = 441	1,787,836

Table 17: Energy consumption by type in healthcare buildings

Sector/Sub sector	Energy type	Total consumption per year (kWh/year)	Percentage in total consumption (%)
Health care buildings	Thermal energy (diesel, wood, pellet)	984,302	55
	Electric energy*	803,534	45
Total		1,787,836	100

*Total electricity (for heating, lighting, equipment, etc.)

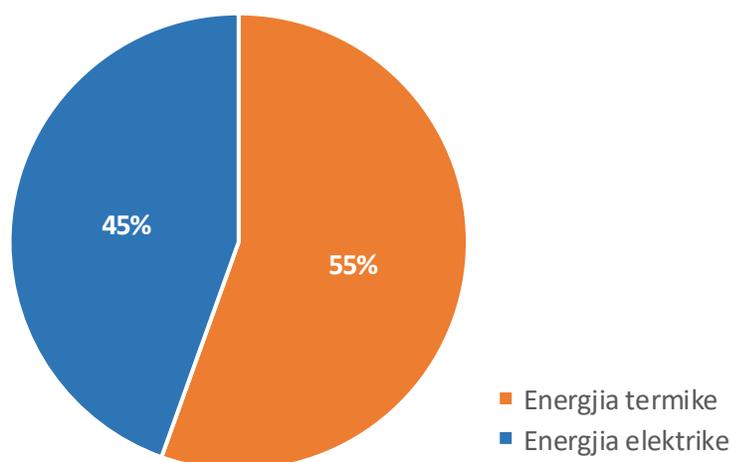


Figure 7: Share of energy by type in total energy consumption in healthcare buildings

6.1.1.4. ENERGY CONSUMPTION IN CULTURE AND SPORTS BUILDINGS

Based on the data from the Municipal officials and the Action Plan for Energy Efficiency 2019-2021 in Suhareka, 3 buildings have been identified in the category of cultural and sports buildings, as presented in the following table. The main data related to the area and energy consumption are also presented in the following table. As can be seen from the table, the total area of these buildings is 3,467 m², the average specific energy consumption per year is 41 kWh/(m² year) while the total energy consumption per year is 212,848 kWh/year.

Table 18: Energy consumption in cultural and sports buildings

No	Name of the Institution	Total Area (m ²)	Specific Consumption (kWh/m ² year)	Consumption in total per year (kWh/year)
1	Palestra Sportive	2,957	80	236,116
2	Biblioteke “Hajdin Berisha”	1,547	85	132,069
3	Muzeu	500	13	6,432
Total		5,004	Mes = 59	374,617

Tabela 19: Konsumi i energjisë sipas llojit në ndërtesat e kulturës dhe sportit

Sector/Sub sector	Energy type	Total consumption per year (kWh/year)	Percentage in total consumption (%)
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Ndërtesat e kujdesit shëndetësor	Thermal energy (diesel, wood, pellet)	177,000	47
	Electric energy*	197,617	53
Total		374,617	100

* Total electricity (for heating, lighting, equipment, etc.)

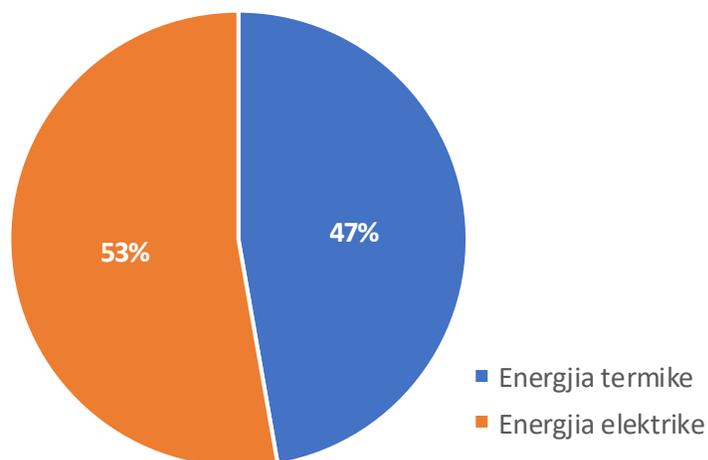


Figure 8: Energy participation by type in total energy consumption in cultural and sports buildings

6.1.2. ENERGY CONSUMPTION IN RESIDENTIAL BUILDINGS

The following data have been generated based on data from the municipality on the number of residential buildings, respectively residential houses and the total residential area, taking into account the relevant studies related to the average energy consumption per m² of the residential area. In this aspect, the number of residential houses (objects) from the Municipality of Suhareka was reported to be 17,657 units with a total area of 2,589,914 m². In order to evaluate the electricity consumed by buildings in the residential sector, the official data from KEDS was used for the consumption of this category of consumers for the years 2020, 2021 and 2022, while the data in the current study are based on the average consumption in period 2020-22. The relevant data regarding the total energy consumption by residential buildings, the share of electricity and the share of other forms of energy (mainly biomass for heating), are presented in the following table.

Table 20: Energy consumption in buildings of the residential sector

Sector/Subsector	Number of buildings	Total area (m ²)	Specific Consumption (kWh/m ² year)	Consumption in total per year (kWh/year)
Residential	17,657	2,589,914	215	556,054,536
Total				556,054,536

In the absence of detailed data, it has been considered that only biomass and electricity are used for heating the buildings of the residential sector. Within biomass (wood, pellets, briquettes), the overwhelming part consists of firewood. In the general case, the energy used in buildings of the residential (housing) sector consists of energy for thermal needs (energy used for heating) and of electricity which, in addition to lighting and supply of equipment, is also partially used for heating needs.

Table 21: Energy consumption by type in buildings of the residential sector

Sector/Sub sector	Energy type	Total consumption per year (kWh/year)	Percentage in total consumption (%)
Residential	Thermal energy (diesel, wood, briskets pellet)	461,275,504	83
	Electric energy*	94,779,032	17
Total		556,054,536	100

*Total electricity (for heating, lighting, equipment, etc.)

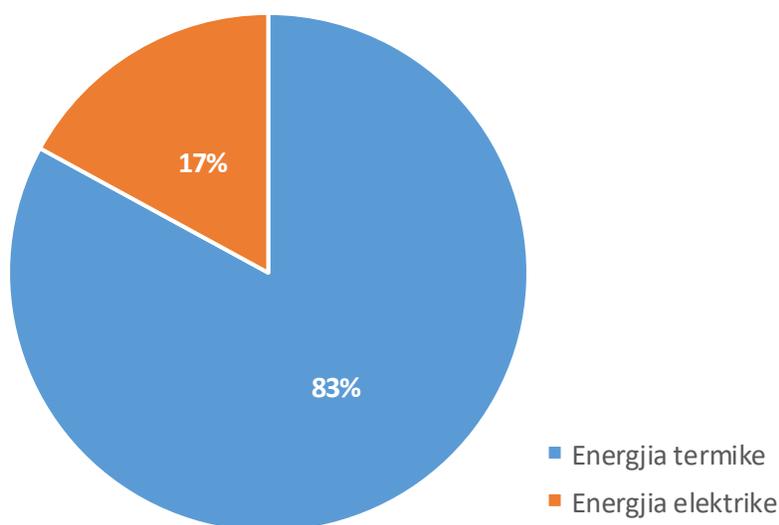


Figure 9: Energy participation by type for heating of buildings in the residential sector

6.1.3. ENERGY CONSUMPTION IN THE COMMERCIAL AND PRIVATE SERVICES SECTOR

Based on the data of the GAP institute regarding the identity card of the Municipality of Suhareka for the year 2021, it has been estimated that a total of 2,373 businesses are active in Suhareka. Relying on the data of the study of the World Bank for the EE of buildings in Kosovo, the specific energy consumption per m² of commercial buildings has been acquired, while the share of energy for heating needs has been acquired based on the data from other studies, e.g. from Croatia. Based on such analysis, the energy consumption for the buildings of the commercial sector and private services has been estimated, presented in the following table.

Table 22: Energy consumption in commercial/private service sector buildings

Sector/Subsector	Number of buildings	Total area (m ²)	Specific consumption (kWh/m ² year)	Consumption in total per year (kWh/year)
commercial/ private services	2,737	335,698	208	69,975,716
Total	2,737	335,698	Mes = 208	69,975,716

Table 23: Energy consumption by type in commercial/private service sector buildings

Sector/Subsector	Energy type	Total consumption per year (kWh/year)	Percentage in total consumption (%)
Komericial/shërbimeve private	Thermal energy (diesel, wood, pellet)	40,162,488	57
	Electric energy*	29,813,228	43

*Total electricity (for heating, lighting, equipment, etc.)

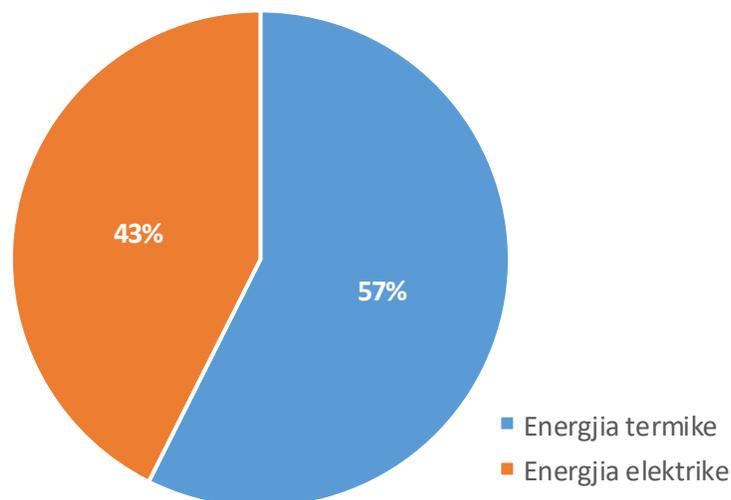


Figure 10: Share of energy by type in total energy consumption in the commercial/private utility sector

6.2. ENERGY CONSUMPTION IN THE TRANSPORT SECTOR

Energy consumption in the transport sector in the Municipality includes energy consumption by vehicles used for individual needs, private transport vehicles (taxis) and transport vehicles of public institutions and enterprises. In the following, the main data covering energy consumption by transport vehicles of institutions and public enterprises, based on the Municipal Action Plan for Energy Efficiency 2019-2021, are presented. As can be seen from the table presented below, the total number of vehicles of institutions and public enterprises is 51, of which 48 are of diesel type and 3 of gasoline type. The total consumption of diesel is 124,463 liters/year, corresponding to 1,235,094 kWh/year, while gasoline consumption is 2,719 liters/year, corresponding to 25,287 kWh/year. Total energy consumption is 1,260,381 kWh/year. As can be seen from the following figure, 98% of the fuel consumed by the vehicles of public institutions is diesel, while only 2% is gasoline.

Table 24: Energy consumption for transportation in public institutions and enterprises

Type of institution	Institution	Diesel			Gasoline/petrol		
		No.	Liters	kWh	Nr.	Litre	kWh
Public Institution	Municipal administration	12	25,923	256,638	1	984	9,151
	QKMF/QMF	9	14,150	140,085	0	0	0
	QPS	1	600	5,940	1	750	6,975
Public	Fire Department	9	42,331	419,077	1	985	9,161

Enterprise	“Hidroregjioni jugor” Water Supply	10	11,290	111,771	0	0	0
	‘Eko regjioni’ Waste Management	7	30,463	301,584	0	0	0
TOTAL		48	124,757	1,235,094	3	2,719	25,287

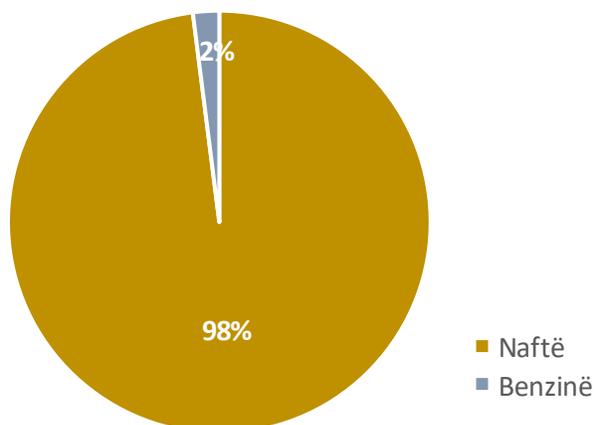


Figure 11: Distribution of diesel/gasoline fuels from the vehicles of public institutions/enterprises

6.3. ENERGY CONSUMPTION IN PUBLIC STREET LIGHTING

Public lighting in the municipality of Suhareka includes the lighting of public streets, two squares and courtyards of some public institutions. Relevant data related to the main parameters of public lighting were obtained from the Municipal Action Plan for Energy Efficiency 2019-2020. The equivalent length covered by public lighting is 29,940 m. Lighting is provided by a total of 583 lamps with an average power of 166 W. All lamps are estimated to be of the metal-halide type, therefore there is a high energy saving potential by replacing them with LED lamps, which are significantly more efficient. As presented in the following table, the total annual consumption of electricity from current lighting in the municipality is 396,741 kWh, and it is calculated that the lamps are in operation an average of 4,100 hours/year as provided in UA No. 05/2021 For the general reporting framework for Energy Efficiency.

Table 25: Basic data of public lighting in the Municipality of Suhareka

Lit area	Equivalent length (m)	Number of bulbs	Average power (W)	Annual consumption (kWh/vit)	Specific Consumption (W/m)
Squares, parks, yards	1,150	88	125	45,201	9.6

Roads	25,790	495	173	351,540	3.3
Total	26,940	583	166	396,741	3.6

7. ESTIMATION OF ENERGY CONSUMPTION AND CO2 EMISSION FOR THE PERIOD 2024-2026 ACCORDING TO THE BASE SCENARIO

In order to assess the real energy consumption for the period of validity of MAPEE 2024-2026, detailed data are needed regarding energy consumption trends in all the treated sectors and then consumption modeling for the following years. In the absence of such data, the basic data presented in the Energy Strategy of the Republic of Kosovo 2022-2031 were used, according to which the average growth trend of final energy consumption from 2008 to 2020 was 2.3%. Therefore, for the purposes of drafting this plan, it has been estimated that a similar trend of consumption growth, in the case of the scenario without EE measures (the base scenario), also applies to the Municipality of Suhareka until 2026. Based on such a trend and in the energy consumption in the reference year 2022, the energy consumption for the years 2024, 2025 and 2026 (subsequent table) has been estimated, in the treated sectors.

Name of the sector	Consumption throughout the years (kWh/vit)			
	2022 (reference year)	2024	2025	2026
Buildings sector	636,434,962	666,047,644	681,366,740	697,038,175
Transport Sector	1,260,381	1,319,025	1,349,363	1,380,398
Public Lighting Sector	396,741	415,201	424,751	434,520
Total	638,092,084	667,781,871	683,140,854	698,853,093

Table 26: Energy consumption in the reference year and forecast for the years 2024-2026.

Table 27: CO2 emission in the reference year and forecast for the years 2024-2026

Name of Sector	Emission of CO2 (kgCO2/year)			
	2022 (reference year)	2024	2025	2026
Buildings sector	197,184	201,719	206,359	211,105
Transport Sector	342	350	358	366
Public Lighting Sector	571	584	597	611
Total	198,097	202,653	207,314	212,082

Table 28: Comparison of energy consumption and CO2 emissions for the year 2026, in the case without measures and the case after the implementation of EE and RES measures

Name of the sector	After EE measurements and BRE		After the implementation EE measurements and BRE		Savings	
	Energy (kWh/year)	CO2 (kgCO2/year)	Energy (kWh/year)	CO2 (kgCO2/year)	Energy (kWh/year)	CO2 (kgCO2/year)
Buildings	697,038,175	215,960,244	688,724,428	211,563,470	8,313,747	4,396,774
Transport	1,380,398	374,831	1,317,379	357,719	63,019	17,112
Public Lighting	434,520	624,840	295,960	425,590	138,560	199,250
Total	698,853,093	216,959,915	690,337,767	212,346,779	8,515,326	4,613,136

8. PUBLIC OBJECTIVES AND BENEFITS

The municipal objectives that are intended to be achieved through the drafting and implementation of MAPEE are directly related to the nature of this document, which means that with the implementation of this document, the municipality aims to improve the overall municipal energy landscape. Such a thing is intended to be achieved through the implementation of the foreseen measures which envisage the improvement of energy efficiency in all relevant sectors for the municipality and in this way the reduction of municipal expenses for energy services. Likewise, through the improvement of EE but also the inclusion of RES in energy production, it is intended to reduce greenhouse gas emissions and in this way improve the climate at the local level and in this way contribute to the entire country towards the transition to an energy sector without carbon. Another important aspect for the municipality, which is intended to be achieved by the implementation of this plan, is the reduction of energy poverty of families, namely the provision of the opportunity to have relevant energy services for the vast majority of families in the municipal territory. In general, the municipal objectives and benefits related to the effective implementation of MAPEE can be grouped as related to:

- Improvement of EE
- Promotion of the use of RES
- Reduction of greenhouse gas emissions
- Addressing energy poverty

8.1.ENERGY EFFICIENCY

Some of the specific objectives of MAPEE that are related to the improvement of EE are as follows:

- Promotion of the process of creation and development of the energy management system;
- Creation of professional capacities for MVP planning, monitoring and reporting;
- Raising awareness of energy saving among decision makers, operators, and end consumers;
- Improvement of municipal services;
- Reduction of energy consumption in public municipal facilities, in public lighting and in transport;
- Reduction of energy consumption in the residential sector;
- Reduction of energy costs for the municipal budget;
- Improving the efficiency of energy systems and the energy performance of buildings;

- Improvement of sanitary conditions and level of comfort in public buildings and those of the residential sector;

8.2.RENEWABLE ENERGY

Energy Strategy of the Republic of Kosovo 2022-2031, as strategic objective No. 2 has established Decarbonization and Promotion of Renewable Energy where the specific goal is the promotion of energy prosumers and renewable energy communities. This strategy envisages that through the greater use of RES for heating needs, the demand for electricity will be reduced, the security of supply will also be reduced and environmental pollution will also be reduced. In this way, by implementing MAPEE, the municipality of Suhareka will have the opportunity to improve the local energy landscape, respectively, it will have the opportunity to diversify its energy resources through the use of local potential for renewable energy sources. In this framework, first of all, the possibility of using solar energy and wind energy will be offered, for which, based on relevant studies, it is estimated that Suhareka has average potential.

8.3.GREENHOUSE GAS REDUCTIONS

The two previous objectives are directly reflected in the achievement of an objective related to the reduction of greenhouse gas emissions, primarily carbon dioxide CO₂. In this way, the municipality of Suhareka will contribute directly to the achievement of one of the national objectives related to the protection of the environment, for which Kosovo has pledged as one of the signatory states of the Sofia Declaration on the Green Agenda for the Western Balkans, signed in the year 2020. The achievement of the objectives related to the reduction of greenhouse gases will also be reflected positively in terms of the Municipality's contribution to the achievement of the objectives of the Energy Strategy of the Republic of Kosovo 2022-2031, which foresees that the decarbonization of the transport and energy to be integrated into the National Energy and Climate Plan 2025-2030.

8.4.ENERGY POVERTY

Energy poverty is defined as the inability to provide an adequate level of energy services in the family, e.g. the impossibility of adequate heating of living spaces. The high percentage of families that are characterized by energy poverty has led to this issue being identified as one of the things that must be addressed within the framework of the planned actions to achieve the first objective of the Sofia Declaration on the Green Agenda for the Western Balkans, signed in 2020. For the needs of addressing energy poverty and ensuring basic living standards, the Sofia declaration foresees the development of relevant programs as well as relevant financing schemes. Taking such steps is particularly important for Kosovo, considering that relevant studies show that among the countries of the Western Balkans, Kosovo is characterized by the greatest energy

poverty. Based on such a study by the Energy Community (conducted by DOOR, EHP, 2021), in Kosovo up to 40% of housewives live in energy poverty, while Montenegro is characterized by the lowest energy poverty which is between 8-15%. Considering that one of the reasons for the presence of energy poverty is the poor energy performance of residential buildings as well as the low efficiency of electrical household appliances, the adequate implementation of MAPEE and the promotion of the relevant results to citizens will undoubtedly be reflected in the reduction of energy poverty within the territory of the Municipality

9. ANALYSIS OF GREENHOUSE GAS EMISSIONS

9.1.CO2 REFERENCE INVENTORY

The analysis of gas emissions includes the three sectors of final energy consumption in the Municipality of Suhareka: buildings, transport and public lighting, in accordance with the classification of the sector in the recommendations of the European Commission. The CO2 emission calculation is made for each type of fuel consumed in the relevant sector as well as for the final energy consumed, in this case electricity.

The CO2 emission factors from the relevant fuel, respectively from the respective final energy, are obtained based on Regulation No. 02/18 for the National Methodology for Calculating the Integrated Energy Performance of Buildings and in the Guidelines for Mayors of Municipalities (CoM) for Climate and Energy regarding the reporting method (The Covenant of Mayors for Climate and Energy Reporting Guidelines, 2016). The corresponding values are presented in the following table

Table 29: CO2 emission factors from different sources

Power source	Emission factor (kgCO ₂ /kWh)
Coal-lignite	0.353
Firewood/pellets	0.031
FUEL	0.249
Diesel	0.272
electric energy	1.438

The calculated values of CO2 emissions based on the energy consumed for the reference year 2022 are presented in a summarized form in the following table

Table 30: The amount of CO2 emitted depending on the source and sector in the reference year 2022

SECTOR	Emission (kg CO ₂)				
	From electricity consumption	From oil consumption	From petrol consumption	From wood/pellet consumption	Total
BUILDINGS OWNED BY THE MUNICIPALITY					

Education	757,856	0	0	140.86	757,997
Health	1,155,482	571.74	0	9.67	1,156,063
Adminsitration	274,618	1360	0	0	275,978
Cultural and sports buildings	284,173	1360	0	0.7750	285,534
Total	2,472,129	3,292	0	151.31	2,475,572
Total					
Total	42,871,422	0	0	1,245,037	44,116,459
HOUSING					
Total	136,292,248	0	0	14,299,541	150,591,789
TRANSPORT					
Total	0	335,946	6296.39	0	342,242
PUBLIC LIGHTING					
Total	570,514	0	0	0	570,514
TOTAL AMOUNT	182,206,312	339,237	6,296.39	15,544,729	198,096,575

9.2.EVALUATION OF CO2 EMISSIONS FOR THE PERIOD 2024-2026 ACCORDING TO THE BASELINE SCENARIO

The assessment of CO2 emitted for the validity period of the current Plan, i.e. for the period 2024-2026, was made based on the estimated energy consumption for the respective years and the relevant CO2 emission factors. The estimated amount of CO2 that will be emitted in the years 2024-2026, according to the basic scenario, i.e. the scenario without EE measures, in the relevant sectors is presented in the following table.

Table 31: The amount of CO2 emitted in the reference year and the emission forecast for the years 2024-2026.

Sector name	CO2 emitted by year (kg CO2/year)			
	2022 (reference year)	2024	2025	2026
Building sector	197,183,819	206,358,585	211,104,833	215,960,244
Transport Sector	342,242	358,166	366,404	374,831
Public lighting sector	570,514	597,059	610,791	624,840
Total	198,096,575	207,313,811	212,082,028	216,959,915

10. POLICIES AND MEASURES FOR IMPROVING ENERGY EFFICIENCY, ENERGY PRODUCTION FROM RES AND REDUCING CO2 EMISSIONS

In accordance with the Law on Energy Efficiency, local government authorities have the obligation to draw up municipal plans for EE and at the same time can undertake and establish incentive measures for the improvement of EE and RES in all sectors in the territory of the Municipality.

Some of the planning and incentive measures that can be implemented by the authorities of the Municipality of Suhareka are as follows:

- Improvement of the envelope of buildings through the measure of thermal insulation, for buildings whose envelope does not meet the minimum criteria of energy performance in public buildings that are under municipal management.
- Providing support to households and the private services sector for improving the envelope of buildings through the installation of thermal insulation materials;
- Installation of central heating systems that work with pellet boilers instead of individual or even central electric heating devices, especially in the household sector;
- The use of renewable sources of energy, especially solar thermal and PV, to reduce the consumption of electricity in the public and household sectors.
- Use of advanced technologies for heating and cooling, such as: heat pumps, inverter systems, etc.
- Application of renewable energy sources, especially PV systems for self-consumption.
- Support for the promotion of sustainable mobility and electromobility.
- Organization of awareness campaigns and continuous informing of consumers about ways to save energy and current topics in the field of energy saving. One such example is the call that the Kosovo Fund for Energy Efficiency and the Ministry of Economy have launched to provide financial support for investments in energy efficiency.

Obviously, the measures listed above should only be seen as possible options, and by no means as the only measures.

In addition to the obligation to draw up and approve the municipal Plan for EE, which in principle includes the public sector, the implementation of any financial support measure at the local level, it is necessary to carry it out in the manner provided by the relevant standards and laws in force by qualified installers, to organize proper supervision of the works, so that financial support is provided for the installation of new equipment with high energy efficiency and in

accordance with EU standards. Also, it is necessary to create the necessary mechanism for information and communication as well as for successful control of the implementation of the approved measures. Incentive measures can be in the form of financial relief, i.e. covering part of the expenses during the implementation of the measures, financed by the Municipality or with the help of donors, as well as in the form of a reduction of certain fees or taxes paid to the Municipality and that it is within its jurisdiction to change them.

10.1. LOCAL POLICIES AND MEASURES

The subcategory of promotional, informative and educational measures and activities aimed at reducing CO₂ emissions on the one hand, but also improving the quality of life of all citizens, consists of the following measures:

1. Drafting, approval, implementation and monitoring of the implementation of the Municipal Action Plan for Energy Efficiency;
2. Functionalization of the municipal office for energy (according to the law on EE, municipalities must establish the office for Energy or appoint at least one official for energy);
3. Enrichment of the website of the Municipality with the information portal regarding the measures planned and implemented by the Municipality regarding EE and RES, in order to share the latest information with the citizens;
4. Implementation of thematic promotional and informational campaigns to raise citizens' awareness of energy efficiency and renewable resources in buildings, which may be:
 - How to build a house with high energy efficiency?;
 - Renovation of buildings based on the principles of sustainable construction;
 - Energy certificates – energy consumption as a market category during the purchase, rental and renovation of buildings;

10.2. ENERGY EFFICIENCY MEASURES

Experiences from completed projects, from various studies, from energy audits, and recommendations of the Energy Community Secretariat, the most favorable measures for energy efficiency in terms of cost/benefit ratio are:

- Wrapping thermal insulation of the building;
- Replacement of windows with double glazing (low-e), or with triple glazing;
- Replacing the inefficient heating system with efficient systems;
- Installation of an efficient LED lighting system;
- Installation of photovoltaic systems for the production of electricity for self-consumption.

- Installation of solar-thermal systems for heating sanitary water.

In addition to the direct implementation of the measures mentioned above, a key role is played by the proper information of end consumers. Some of the key notions/terminologies through which information related to the possibilities of energy saving and the use of alternative energy sources can be conveyed to citizens are as follows:

- Familiarity with Energy Efficiency Labels – Why buy equipment with high energy class A, A+, A++?
- Adequate thermal insulation for buildings and installation of high-efficiency windows;
- Application of solar systems for the preparation of sanitary water - solar collectors;
- Application of solar systems for electricity production - photovoltaic panels;
- Application of internal lighting with LED technology;
- The importance of installing thermostatic valves;
- Household electrical appliances with high energy class;
- Options for using biomass heating systems;
- Application of thermo-pumps (heat pumps);
- Smart building - what is it?;
- What is a passive house, or house with close to zero energy consumption?

10.3. ENERGY EFFICIENCY MEASURES IN ADMINISTRATIVE BUILDINGS

In terms of energy conservation, even though there is potential for saving in many of the administrative buildings, priority should be given to those buildings that have longer hours of use and that serve a larger number of citizens. In general, electricity consumption dominates in these categories of buildings, therefore the installation of PV systems would help to preserve the budget and contribute to the reduction of pollution.

Measure 1	Instalimi i sistemeve PV për vetëkonsum në ndërtesat administrative
Title of the recommended measure	Implementation of technical measures for EE installation of photovoltaic systems for self-consumption.
Responsibility for implementation	Directorate for Public Services, Directorate for Finance
Implementation period	2024-2026
estimated cost (€)	€48,000
Calculated savings (kWh)	57,292 kWh

Calculated CO2 reduction (kgCO2)	82,835kgCO2
Funding source (1)	Municipal budget
Source of funding (2)	Donor, FKKE and ESCO
Short description	Installation of photovoltaic systems for self-consumption on the tower of administrative buildings

Measure 2	Measures to improve energy efficiency in administrative buildings
Title of the recommended measure	Implementation of technical measures for EE, improvement of internal heating and lighting installations
Responsibility for implementation	Directorate for Public Services, Directorate for Finance
Implementation period	2024-2026
Estimated cost (€)	€19,760
Calculated savings (kWh)	15,200 kWh
Calculated CO2 reduction (kgCO2)	16.387 kgCO2
Funding source (1)	Municipal budget
Source of funding (2)	Donor, FKKE and ESCO
Short description	<ul style="list-style-type: none"> Improving the thermal insulation of the envelope of buildings (external walls, roof; replacement of windows)

10.4. EDUCATION SECTOR

The education sector is considered the sector with the most buildings and the greatest savings potential. The educational buildings sector has relatively high energy consumption as the average specific consumption is still high at 153 kWh/m²year, without adding the potential of electricity generation for self-consumption.

Although there is no criteria to determine the basic consumption for energy supplied in these cases, it is considered that any consumption above 85kWh/m² per year is high and should be treated with care, this energy is mainly lost as a result of many factors; lack or poor thermal insulation in the building envelope, inefficient internal installations, poor energy management, old installations, etc.

In the following, two measures that can be taken to improve EE in the education buildings sector are presented, without pretending that these are the only possible measures.

Measure 3	Measures to improve energy efficiency in educational buildings
Title of the recommended measure	Insulation or improvement of thermal insulation of facades, windows and roofs in at least 15 buildings for the Education sector
Responsibility for implementation	Directorate for Education, Directorate for Finance
Implementation start/end (years)	2024-2026
Estimated cost (€)	980.296 €
Estimated energy saved (kWh)	754,050 kWh – Thermal energy
Reduction estimate of (kg CO ₂)	23,376 kgCO₂ Based on the data provided, the education buildings are heated with biomass, therefore despite the large saving in energy terms, the saving in CO ₂ emission is small
Funding for the implementation of the measure	<ul style="list-style-type: none"> • The budget of the municipality • FKEE • ME • ESCO Energy Services • Ministry of Administration and Local Government.
Short description / comments	Complete insulation of external walls as well as thermal insulation of the roof, replacement of current windows with efficient windows, replacement of central heating systems and replacement of lighting in 15 schools owned by the municipality, with a total heated area of about 15,081 m ² . The average thermal energy saving that can be achieved through this measure is estimated to be 50 kWh/m ² , while the investment cost is estimated to be around €65/m ² .

Measure 4	Installation of PV systems for self-consumption in educational facilities
Title of the recommended measure	Implementation of technical measures for EE installation of photovoltaic systems for self-

	consumption.
Responsibility for implementation	Directorate for Education, Directorate for Finance
Implementation period	2024-2026
Estimated cost (€)	132,000€
Calculated savings (kWh)	527,021 kWh
Calculated CO2 reduction (kgCO2)	757,856 kgCO2
Funding source (1)	Municipal budget
Source of funding (2)	Donation, FKEE and ESCO
Short description	Installation of photovoltaic systems for self-consumption on the roof of educational buildings.

10.5. HEALTH SECTOR

One of the buildings with the highest energy consumption is the KKMf in Suhareke. The buildings in Mushtisht, Bukosh and Duhël also have potential for energy savings. These projects can be included as a joint project or as separate projects. The cost assessment in the following measure is done considering that the renovation of all these buildings is done within a joint project, while the individual cost assessment for specific measures should be done alone after an energy audit has been done for each building separately.

Measure 5	Masat për EE dhe BRE ne objektet e sektorit shëndetësor- Objektet QKMF-së dhe QMF
Title of the recommended measure	Implementation of technical measures for EE and BRE technologies (Solar panels)
Responsibility for implementation	Directorate for Education, Directorate for Finance
Implementation period	2024-2026
Estimated cost (€)	225,520€
Calculated savings (kWh)	260,406 kWh
Calculated CO2 reduction (kgCO2)	347,168 kgCO2
Funding source (1)	Kosovo Fund for EE
Source of funding (2)	Donors
Short description	The aim of this measure is to improve EE to 10% of the stock of this sector and to reduce by 30% the

	<p>consumption of electricity through the installation of solar panels</p> <ul style="list-style-type: none"> • Improvement of the thermal insulation of the walls and roof; replacement of windows, improvement of lighting in the buildings of QKMF and QMF • Installation of the photovoltaic system for the production of electricity for self-consumption.
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10.6. SECTOR OF CULTURE AND SPORTS

Buildings for culture do not have any potential for energy saving because the specific consumption per square meter is relatively low for these categories of buildings.

10.7. ENERGY EFFICIENCY MEASURES IN RESIDENTIAL BUILDINGS

Based on the analysis of the available data of the present study, it results that the buildings of the residential sector consume energy on average 215 kWh/m²year. On the other hand, based on the WB study, the average energy consumption in residential buildings (individual houses) after energy efficiency improvement measures would be 144 kWh/m²year.

Measure 6	Improving Energy Efficiency in Residential Buildings
Title of the recommended measure	Implementation of EE measures in the building envelope, including replacement of windows
Responsibility for implementation	Municipality in cooperation with citizens
Implementation period	2024-2026
Approximate estimated cost (€)	5,064,150 €
Calculated savings (kWh)	5,531,610 kWh
Calculated CO ₂ reduction (kgCO ₂)	1,494,586 kgCO₂
Funding source	Co-financing with the Kosovo fund for EE, citizens, municipalities, commercial banks
Short description	Treatment of at least 1% of the residential building sector per year, in line with the current trend of building renovation at the EU level; Thermal insulation, replacement of windows, improvement of the heating system, replacement of electrical

	appliances and efficient lighting.
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Measure 7	Measures to increase the use of eclectic energy from photovoltaic systems for self-consumption in residential buildings
Title of the recommended measure	Installation of photovoltaic systems for self-consumption in residential buildings
Responsibility for implementation	Municipality in cooperation with citizens
Implementation period	2024-2026
Approximate estimated cost (€)	440,000 €
Calculated savings (kWh)	520,344 kWh
Calculated CO2 reduction (kgCO2)	748,255 kgCO₂
Funding source	Co-financing with the Kosovo fund for EE, citizens, municipalities, commercial banks
Short description	Treatment of at least 0.5% of the residential buildings sector within 3 years. Installation of PV systems for self-consumption.

Measure 8	Promotion of solar water heating in residential buildings
Title of the recommended measure	Incentive scheme for the installation of solar collectors in 100 existing residential buildings
Responsibility for implementation	<ul style="list-style-type: none"> • Residential sector • Municipality of Suhareka • Kosovo Fund for Energy Efficiency • Ministry of Economy
Implementation period	2024-2026
Approximate estimated cost (€)	230,000 €
Calculated savings (kWh)	364,000 kWh
Calculated CO2 reduction (kgCO2)	534,543 kgCO₂
Funding source	Subsidy scheme where 55% of the cost is covered by the building owners while 45% of this is

	<p>provided in the form of subsidy by:</p> <ul style="list-style-type: none"> • Ministry of Economy • Donors • Private sector • Financial institutions • The budget of the municipality of Suhareka
<p>Short description</p>	<p>The economic rationality and the relatively short return on investment that is achieved as a result of the high consumption of energy for the preparation of warm water makes this measure attractive.</p> <ul style="list-style-type: none"> • At the moment, subsidies more than 45%, from the budget of the Ministry of Economy and this financial scheme is expected to continue; • Academic and scientific institutions should develop viable projects to help local manufacturers for these types of equipment; • It is necessary to organize an information campaign that will enable consumers to get to know the quality of the equipment offered and the benefits of using it. • Laboratories need to be accredited to test the quality of manufactured equipment; <p>The incentive scheme was calculated for 100 families with about 4 m² of solar collector surface for each family. Given the common practice of heating sanitary water with electricity, the thermal energy produced by the collectors is also electricity saved. The electricity saving resulting from this measure is estimated to be 364,000 kWh, calculating that within the 2024-2026 implementation period, the installation of the entire surface of the collectors (100 x 4 m²=400 m²) is done.</p>

10.8. ENERGY EFFICIENCY MEASURES IN COMMERCIAL AND PRIVATE SERVICE SECTOR BUILDINGS

Based on the number of businesses analyzed in this study (2373 businesses), the average consumption per m² of buildings in this sector is calculated to be 208 kWh/(m² year). Due to the nature of this sector, almost half or 43% of the energy consumed is electricity. Consequently, the

application of photovoltaic panels for self-consumption needs in this sector represents a very attractive measure that could significantly contribute to the improvement of EE and the reduction of CO2 emitted.

Measure 9	Measures to increase the use of eclectic energy from photovoltaic systems for self-consumption in commercial buildings and private services
Title of the recommended measure	Installation of photovoltaic systems for self-consumption in buildings of the commercial sector/private services
Responsibility for implementation	Municipality in cooperation with citizens
Implementation period	2024-2026
Approximate estimated cost (€)	240,000 €
Calculated savings (kWh)	283,824 kWh
Calculated CO2 reduction (kgCO2)	408,139 kgCO2
Funding source	Co-financing with the Kosovo fund for EE, citizens, municipalities, commercial banks
Short description	Treatment of at least 2% of buildings in the commercial sector and private services within 3 years. Installation of PV systems for self-consumption.

10.9. TRANSPORT

Measure 10	Improving EE in transport
Title of the recommended measure	Promoting the carpooling model for efficient transportation.
Responsibility for implementation	Municipality of Suhareka
Implementation period	2024 - 2026
Estimated cost (€)	This is a very complicated measure, the evaluation of which requires additional analysis and the development of the feasibility study. The investment costs should include the construction of parking areas, electro-mobility, electric charging points, installation of the car sharing model, promotion and

	procurement of vehicles, etc.
Calculated savings (kWh)	63,019kWh (Approximately 5% of the energy dedicated to transport can be saved through the implementation of this measure)
Calculated CO2 reduction (kgCO2)	17,112 kgCO2
Funding source	<ul style="list-style-type: none"> • The budget of Suhareka Municipality • Loans (EBRD, commercial banks) • FKEE
Short description / comments	<p>There are more than 1,000,000 carpools in over 2,000 cities worldwide. Based on these experiences, it is clear that a car for shared use replaces 3-5 personal cars. Shared use means the rational use of private vehicles and saves money for people who do not need personal vehicles (they do not need to buy cars, reduce the cost of fuel, pay all obligations and insurances, maintenance, etc.)</p> <p>Required activities:</p> <ul style="list-style-type: none"> • Promotion of the car sharing system as a simple service, which can be achieved with a minimum number of application forms, which only requires payment for time and mileage (actual use of the car), where registered users can drive the car 24 hours a day, registering in advance by phone, internet or on location. • The introduction of the car sharing system brings additional income to the municipality, either from the organizations that provide the cars in the car sharing system, or through granting concessions to interested entrepreneurs.

10.10.PUBLIC STREET LIGHTING

Based on the data of the Directorate of public services for the streets and squares managed by the Municipality of Suhareka, it is 396,741 kWh/year. In order to improve the EE, it has been estimated that by replacing the current lighting bodies with efficient LED type bodies, considerable energy savings can be achieved. The potential of saving electricity through the

replacement of inefficient lighting bodies with LED lighting bodies and energy management through the intelligent system in the general case is around 75%.

Measure 11	Improving the EE of public lighting
Title of the recommended measure	<ul style="list-style-type: none"> • Installation of LED lamps for energy saving in public lighting, Installation of public lighting control and management system in the Municipality of Suhareka • Installation of the LED lighting system combined with RES in Kroi i Sadrise street in Gelance.
Responsibility for implementation	Directorate of Public Services
Implementation period	2024-2026
Estimated cost (€)	97,000 €
Calculated savings (kWh)	138,560 kWh
Calculated CO2 reduction (kgCO2)	199,250 kgCO2
Funding source	<ul style="list-style-type: none"> • The budget of the municipality of Suhareka • Co-financing with EU funds • ESCO Energy Services
Short description / comments	<p>The EU regulation that deals with lighting products (EC Regulation 244/2009) has foreseen the ban on the production of traditional incandescent lamps as early as 2016.</p> <p>In this context, the local legal basis has also been harmonized: Government Decision dated 14.09.2022 no. 28/96 for lighting measures; UA (MEA) No. 03 2020 Regarding the requirements of Energy Efficiency for the Purchase of Products, Services and Buildings from Central Level Institutions.</p> <p>In this way, all sodium mercury and incandescent lamps have already had to be replaced with efficient lamps. Even in the case of efficient fluorescent lamps, it is recommended to replace them with even more efficient and longer-lasting lamps such as LED lamps</p> <p>This measure aims to replace conventional or fluorescent lamps with LED lamps in order to save</p>

	energy on all roads owned by the municipality. This measure will enable a 75% reduction in total electricity consumption.
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10.11.INTERSECTORAL MEASURES - AWARENESS RAISING, INFORMATION AND CAPACITY BUILDING

Measure 12	Education and promotion of EE and RES
Title of the recommended measure	Education and promotion of energy efficiency for the citizens of Suhareka
Responsibility for implementation	<ul style="list-style-type: none"> • Municipality of Suhareka • Civil society • Local media (radio/TV)
Implementation period	2024-2026
Estimated cost (€)	38,000
Calculated savings (kWh)	It cannot be estimated in advance
Calculated CO2 reduction (kgCO2)	It cannot be estimated in advance
Funding source	<ul style="list-style-type: none"> • • The budget of the Suhareka municipality • • National budget • • FKEE • • Donors (GIZ, UNDP, USAID), IFN
Short description / comments	<p>This measure includes several activities that must be implemented regularly:</p> <ol style="list-style-type: none"> 1. Placement of EE info kiosks in different parts of the Suharek municipality 2. Continuous information of consumers regarding energy saving and current issues related to energy saving; 3. Carrying out promotion and information campaigns with specific topics to raise citizens' awareness of energy efficiency of buildings: <ul style="list-style-type: none"> • How should an EE house be built?; • Making reconstructions in accordance with the principles of a sustainable building; • Energy certificates - Energy consumption as a market

	<p>category in the purchase, rental and repair of buildings;</p> <ul style="list-style-type: none"> • "Changing the behavior of citizens" towards energy saving • Measures for energy efficiency in households - thermostatic valves, solar systems for heating sanitary water, energy-efficient carpentry, home appliances with the energy label "A +++"; • Energy efficiency label - Why buy only equipment with energy class A +++? • Standby devices consume electricity! – Unplug the devices from the eclectic network sockets after use; • Energy-effective in home lighting; • Heating from biomass; • Solar collectors; • Heat pumps; • Intelligent Building - what is it?; • What is the house with small energy" (three-liter""); • What is passive ("one-liter") house?; • Possibilities of reducing fuel consumption through carpooling to increase the number of passengers; • Information and training on ecological ways of driving (driving schools); • Organization of information - demonstration workshop for citizens on the use of alternative fuel vehicles and opportunities for electromobility. • Campaign: Bicycle is healthier! <p>4. Organization of meetings with experts and citizens to promote the rational use of energy and to reduce CO2 emissions.</p> <p>Energy savings and CO2 reduction are difficult to quantify. However, it is a fact that the implementation of such measures help in the general education of citizens and in this way in energy savings which often come after several years, as a result of the change in the behavior of consumers in relation to energy consumption.</p>
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ACTION PLAN

Analyzing the situation in the field of energy efficiency and the level of use of renewable energy sources in the Municipality of Suhareka, the following priority projects have been proposed for implementation in the period from 2024 to 2026. This does not exclude the possibility of expansion for other projects, but the focus is on the following projects, see the table below. Funding sources will be focused on donors, line Ministries (ME, MMPHI, MF), FKKEE or ESCO.

Table 32: Proposed improvement action plan for the years 2024-2026

No.	Measures of energy efficiency and increasing the application of RES	2024	2025	2026
1	Installation of PV systems for self-consumption in administrative buildings	16,000	16,000	16,000
2	Measures to improve energy efficiency in administrative buildings			19,760
3	Measures to improve energy efficiency in educational buildings	300,000	300,000	380,296
4	Installation of PV systems for self-consumption in educational facilities	40,000	40,000	52,000
5	Measures for EE and RES in the facilities of the health sector - KKMF and QMF facilities	70,000	70,000	85,520
6	Improving Energy Efficiency in Residential Buildings*	1,600,000	1,600,000	1,864,150
7	Measures to increase the use of electricity from photovoltaic systems for self-consumption in residential buildings	140,000	140,000	160,000
8	Promotion of solar water heating in residential buildings	75,000	75,000	80,000
9	Measures to increase the use of eclectic energy from photovoltaic systems for self-consumption in the commercial and private services sector	80,000	80,000	80,000
10	Improving EE in transport	Kosto pas studimit të fizibilitetit		
11	Improving the EE of public lighting		45,000	52,000
12	Education and promotion of EE and RES	12,000	12,000	14,000
Total (except cost of measure 10)		2,333,000	2,378,000	2,803,726

* This measure is mainly based on investments from the private-residential sector, the Municipality will play a supporting role by informing citizens about the opportunities and criteria for investments in EE through various support mechanisms (such as the Kosovo Fund for EE, or other financial mechanisms).

MONITORING AND REPORTING REGARDING MAPEE IMPLEMENTATION

Continuous monitoring, control and reporting regarding the implementation dimensions of the MAPEE plan is an important component within the framework of improving energy and environmental sustainability at the level of the Municipality. Of course, from such a professionally planned and designed process for monitoring and reporting needs, the central level structures would also benefit in terms of the collection and adequate treatment of energy and environmental data from the Municipalities, in order to achieve national goals in these two aspects and in general the achievement of the country's strategic energy objectives. However, adequate monitoring, control and reporting can be achieved successfully, only if the municipalities have established the relevant municipal structures and have appointed competent and qualified persons from the field of energy. Therefore, in this function, the current Energy Law No. 05/L-081 in Article 7 (Paragraph 4) provided for the approval of by-laws for the purpose of establishing, financing and operating municipal energy offices, first of all in order to address issues of implementation and monitoring of relevant projects and activities at the local level. In accordance with the provisions of this article, the Ministry has also approved AI No. 09/2017 for Municipal Energy Offices, which clarifies the duties and responsibilities of municipal energy offices, including the way they are organized, the activities they must carry out, the way to cooperate with other institutions, the way to raise their own human capacities, etc. Article 8 of this AI also deals with the reporting process, but only in a superficial way, clarifying that the reporting should be done periodically and according to the foreseen requirements. On the other hand, the current Law on Energy Efficiency No. 06/L-079 in Article 6 (Paragraph 4) has foreseen the functionalization of municipal energy offices with qualified personnel for energy management in accordance with the legislation in force. Regarding the method of reporting, Law No. 05/L-079 respectively Law No. 08/L-123 for supplementing and amending the laws related to the rationalization and establishment of the lines of accountability of the executive agencies, foresee the following:

- Every year and no later than April 30, the Municipal Assembly approves and submits to the Ministry the progress report for the implementation of the Municipal Action Plan for Energy Efficiency for the previous year. Municipalities must use the separate software platform and/or data page for reporting. The Monitoring and Verification Platform is provided by the Ministry;
- Within sixty (60) days from the receipt of the report, the Ministry evaluates the progress achieved, assesses the needs and proposes improvement or other measures for the implementation of MAPEE at the local level. Based on the Ministry's remarks, the Municipalities change, if required, the Municipal Action Plan for the remaining period for implementation, no later than November 30 of the respective year.

- Municipalities regularly monitor the implementation of the plan and the achievement of energy saving goals. For this purpose, the municipalities must create and manage an information system for the collection of data on energy consumption in municipal buildings and monitor the savings realized by the implementation of measures in public buildings, using the platform based on the official electronic website for reporting, Monitoring and Verification Platform (MVP).

Based on the description related to the monitoring and reporting process that has to do with planning, implementation and relevant reporting, as well as related to the existing legal framework at the country level that deals with this issue, it can easily be concluded that the effective, systematic and substantive implementation of monitoring and reporting process related to MAPEE based on it, adequate planning of future plans can only be done if the Municipalities develop the relevant institutional and human capacities. In this aspect, the Municipality of Suhareka must appoint at least one qualified official for the supervision of activities in the field of energy and over time establish the office for energy as required by the Law in force on Energy and that on EE. The final goal is to build municipal capacities for proper planning, management and reporting in all aspects related to energy and the environment. This can be achieved by establishing the municipal office for energy, the recruitment of qualified persons from the field of energy, the freezing of their professional capacities and in this way the realization of the final goal, which is the creation and functioning of the Energy Management System (SME). at the level of the Municipality, as foreseen by Directive 2012/27 of the European Union. Some of the direct benefits of the Municipality, in case of the operationalization of the SME, would be:

- Stable energy supply,
- Reduction of municipal expenses for energy supply,
- Reducing the use of fossil energy sources and thus reducing environmental pollution,
- Improving the working conditions of employees and improving the services offered,
- Encouraging investments and economic development,
- Completing municipal legal objectives and making a significant contribution to achieving national EE-related objectives

A detailed and comprehensive treatment of the importance, way of organization and benefits from SMEs at the local level is provided in the Manual of the Association of Municipalities of Kosovo regarding the Implementation of Energy Efficiency Policies at the Local Level, published in 2020

11.METHOD OF FINANCING MAPEE

The ways of financing projects and activities within MAPEE are different, while their concrete identification is the responsibility of the municipal energy offices, respectively those responsible for energy at the level of the Municipality, in close cooperation with the relevant directorate for the management of the municipal budget. Some of the financing possibilities are as follows:

- Financing from the municipal budget
- Funding from the central government budget:
 - Kosovo Fund for Energy Efficiency
 - Municipal Borrowing and Commitments (Municipal Borrowing and Long-Term Commitments)
 - National financial instruments - Government transfers
- Funding from donors:
 - Western Balkans Investment Framework – WBIF
 - Facilitation of direct energy financing from the Western Balkans (WeBSEDF);
 - GIZ - Open Regional Fund for Southeast Europe (ORF)
 - European Investment Bank (EIB)
 - German Bank for Reconstruction (KfW)
 - World Bank
 - European Bank for Reconstruction and Development,
 - USAID,
 - Millennium Foundation Kosovo (MFK)
 - European Commission office in Kosovo, etc.
 - Funding from EU instruments
- ❖ IPA funds (Instruments for Pre-accession Assistance), are the means by which the EU supports partner countries with financial and technical assistance
- ❖ TAIEX (Technical Assistance and Information Exchange) is an EU instrument that helps partner countries familiarize themselves with EU laws, implement and implement them, and monitor their progress.

12.CONCLUSION

The main goal of MAPEE is to identify possible measures for reducing energy consumption at the municipal level, reducing CO2 emissions to meet the objectives at the local and national level, as well as expanding the use of renewable energy sources for the needs of energy services.

In the framework of MAPEE, the adequate description and presentation of aggregated and divided consumption according to sectors and energy carriers, for the building sector (public and private), the transport sector for the needs of public institutions and public companies/enterprises, as well as for the public lighting sector. Detailed and summary figures for

- Energy consumption and CO2 emissions for the reference year,
- The trend of consumption and emission for the period of validity of MAPEE, i.e. for the period 2024-206
- Recommended measures for reducing energy consumption and reducing the amount of CO2 emitted
- The amount of energy saved and the amount of reduced CO2 emissions

13. REFERENCES

1. Municipal officials,
2. Official Website of the Municipality: <https://kk.rks-gov.net/suhareke/>
3. AKEE website: <https://akee.rks-gov.net/te-dhena/>
4. Municipal Development Plan 2021-2029
5. Municipal Plan for Energy Efficiency 2014-2020
6. Municipal Action Plan for Energy Efficiency 2019-2021
7. Energy Strategy of the Republic of Kosovo 2022-2031
8. Kosovo Program for Economic Reforms 2023-2025
9. Strategic Environmental Assessment of the Municipal Zonal Map 2021-2025
10. Statistical Yearbook of the Republic of Kosovo 2022
11. Kosovo Statistics Agency: "Key Data" - Final Results, 2011
12. Kosovo Statistics Agency: "Dwellings and buildings by municipalities" 2013d
13. Sofia Declaration on the Green Agenda for the Western Balkans, 2020
14. Energy Community: Study on Addressing Energy Poverty in the Energy Community Contracting Parties, authors M. Ban et. al., Zagreb 2021
15. WB: National Building Energy Efficiency Study for Kosovo, 2013
16. VR Hrvatske: Program of energy renovation of commercial buildings for the period 2014 – 2020
17. Regulation No. 02/18 for the National Methodology for Calculating the Integrated Energy Performance of Buildings
18. CoM: The Covenant of Mayors for Climate and Energy Reporting Guidelines, 2016
19. UA No. 05/2021 For the general reporting framework for Energy Efficiency
20. GIZ: Model Municipal Energy and Climate Action Plan (MECAP) 2022 – 2030, October 2021
21. UA No. 09/2017 for Municipal Energy Offices
22. Law No. 05/L-081 for Energy, 2016
23. Law No. 06/L-079 on Energy Efficiency, 2018
24. Law No. 08/L-123 for supplementing and amending laws related to the rationalization and establishment of accountability lines of executive agencies, 2023
25. AKK: Implementation of Energy Efficiency Policies at Local Level, Prishtina, 2020