



BASHKIA BERAT

Municipal Energy and Climate Action Plan of the Municipality of Berat

Period: 2023-2040



MECAP Revision History

- *only included in the draft MECAP*
- *shall be deleted after the document is finalized and approved*

Date	Description	Comment
Q4, 2022	Data Collection	
Q1, 2023	Analysis of Data and elaboration of long list	
15.03.2023	Activity Planning Workshop (Location: Berat) with presentation of long list, joint selection of short-listed measures.	
June 2023	Start elaboration Process of MECAP	
June 2023?	Kick-off Meeting external Consultant and local administration	
July 15, 2023	First Draft of MECAP prepared	
Weekly online meetings and monthly meetings with MEMU	Data collection and presentation of update to municipalities by SEMP team	
August 30, 23	Revised Draft of MECAP prepared	
September 30, 23	Review of the First Draft of MECAP prepared	
October 20, 2023	Final Draft of MECAP prepared	
12.11.2023	Final Draft submitted to municipal administration and AEE	
	MECAP submitted to Municipal Council for Approval	Approved by: Mayor: Mr. Ervin DEMO

Acknowledgements

This Municipal Energy and Climate Action Plan (MECAP) was prepared in collaboration between the Municipality of Berat and the Smart Energy Municipalities Project (SEMP). From the side of the Municipality of Berat, the process was accompanied by the Municipal Energy Management Unit (MEMU), consisting of Mr. Luciano Bojaxhiu, Ms. Etleva Dhima, Mr. Pelivan Sinaj, Mr. Arnold Merko, Mr. Frenci Ceca, Mrs. Besijana Kokoshi, Mrs. and Mrs. Jorida Papa. The MEMU ensured that the various departments of the Berat Municipality provided the necessary data as a basis for this MECAP and assisted the SEMP experts in setting energy and climate targets, formulating an appropriate strategy and selecting suitable measures for the Municipality to achieve these targets.

The SEMP consortium technical experts conducted a detailed analysis of available data to determine the current energy and climate situation in the municipality of Berat, to identify energy efficiency potentials and possibilities for switching to renewable energy sources.

SEMP technical experts included (in alphabetical order): Mr. Behnke Rainer, Dr. Islami Besim, Ms. Kornmann Maren, Dr. Meier Thomas, Mr. Pfaeffli Valentin, Mr. Goxha Aris, Mr. Islami Samel, and Mr. Struga Meivis.

About SEMP



The **Smart Energy Municipalities Project (SEMP)** supports Albanian municipalities to implement the national energy policy. The focus of the project is on the development of an **energy management system** inspired by the European Energy Award in pilot municipalities and the **strengthening of institutional capacities** to implement the national energy policy and to better **plan and realize Energy Efficiency (EE) & Renewable Energy Sources (RES) infrastructure measures**. Pilot municipalities are: **Shkodër, Korçë, Përmet, and Berat**.

The project is implemented by the **SEMP Consortium** consisting of the following international and national companies: GFA Consulting Group GmbH, Germany (lead), ENCO Energy Consulting AG, Switzerland, EECG Energy and Environmental Consulting Group sh.p.k, Albania; EBP Schweiz AG, Switzerland.



SEMP is a project of the **Swiss State Secretariat for Economic Affairs (SECO)** implemented in partnership with the **Ministry of Infrastructure and Energy (MoIE)** and the **National Agency for Energy Efficiency (AEE)** acting as national Project Management Unit (PMU).

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Disclaimer:

This report has been created in cooperation with the Municipality of Berat and the SEMP Consortium. The views and conclusions contained here do not necessarily reflect those of the Swiss Government or the State Secretariat for Economic Affairs (SECO) or the Albanian Government or the Ministry of Infrastructure and Energy (MoIE). The data used for the calculations was supplied by the municipality of Berat, and calibrated by SEMP to the best knowledge.

Foreword by the Mayor of Berat

As the Mayor of the World Heritage Municipality of Berat, together with all the experts who have worked to prepare the Municipal Energy and Climate Action Plan (MECAP), we are proud to lead the green transition for Berat Municipality which is in full convergence with the National Energy and Climate Action Plan as well as the EU Directives related to Energy and Climate. Representing Berat Municipality, we have come together to set out our shared vision in this strategy. Given Berat's strong history in economic and social development, we are excited to work hand in hand across the municipality to continue to lead the way towards green development, which will contribute in energy savings, increase penetration of solar, wind and hydro energy sources and reduce carbon dioxide (CO₂) emissions.

The Government of Albania adopted the first version of the NECP on December 29, 2021. Implementing the Berat MECAP will contribute to the achievement of NECP targets, in line with EU accession objectives, set until 2030, including Green House Gas (GHG) emissions reductions of 18.7%, a final energy consumption reduction of 8.4%, and a renewable energy share in final energy demand of 54.4%. We are committed to move faster than the national average, learning from other European municipalities and with the indispensable support of the Albanian Energy Management System – based on the European Energy Award - on our journey.

This MECAP sets the vision for where we need to be in 2030 and 2040 based on a sound analysis and strategy. We would like to thank our colleagues from the Smart Energy Municipality Project (SEMP), which is supported by the Swiss State Secretariat for Economic Affairs (SECO) and the Municipal Energy Management Unit (MEMU) for their assistance in the review and analysis of evidence for Berat Municipality. We recognise that achieving our vision will not be easy given Berat's specific challenges for the energy transition.

Berat is known for its architecture, historical, cultural, artistic and religious values. Berat is listed as UNESCO World Cultural Heritage with its well preserved traditional neighbourhoods, such as Mangalem, Gorica, the Castle, the National Museum of Iconography "Onufri" and other galleries, museums, churches, mosques. Its 2400-year history makes Berat one of the oldest cities of Europe. In the realm of energy, there are well-established markets and broader forces that support current systems reliant on fossil fuels and consumption. It is imperative that we demonstrate strong leadership to generate opportunities for every citizen and business to thrive in the transition to a green economy, ensuring that the associated costs are equitably distributed. We are presented with an exciting prospect to tackle the challenges of energy efficiency, significantly increase the integration of large renewable energy sources in the Berat municipality, address climate change, and simultaneously enhance energy efficiency and renewable energy systems across all municipal sectors (public buildings, water and wastewater facilities, public street lighting, waste collection and management, public transport), as well as indirect sectors (residential, tourism, private commercial services, industry, agriculture, and private transport). This approach aims to reduce inequalities, foster the creation of a municipality with more green spaces, provide additional open areas for children to play, promote cleaner air, generate more job opportunities, and create a more inclusive environment for everyone.

Recognizing that neither a single organization nor the entire municipal staff can achieve the necessary scale and pace of change outlined in this document. The MECAP is therefore considered a call to action for collective effort involving citizens and enterprises and the administration facilitating a green transition for our municipality. We urge all residents, workers, visitors, and investors in Berat Municipality to join us in this transformative decade. In our pursuit of the ambitions outlined in this strategy, we commit to extensive engagement, seeking input on how we can collaboratively work together. However, this doesn't imply that any organization or individual should delay action. Achieving the goals of Berat MECAP requires the collaboration of multiple partners throughout the entire municipality, and we encourage proactive involvement from all stakeholders.

Finally, I am very happy to thank our partners - SECO, the Ministry of Infrastructure and Energy (MoIE) and the National Agency for Energy Efficiency (AEE), as well as the SEMP and MEMU experts, for their support to the Berat Municipality in the preparation of this very valuable MECAP.

Mayor: Mr. Ervin DEMO

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Abbreviations

AC	Air Conditioning
AEE	National Agency for Energy Efficiency
AFOLU	Agriculture, Forestry and Other Land Use
ALL	Albanian Lekë
BAU	Business As Usual
CFL	Compact Fluorescent Lamps
CH ₄	Methane
CHF	Swiss Francs
CO ₂	Carbon Dioxide
COM	Council of Ministers
DC	Direct Current
DCM	Decision of Council of Ministers
DED	Detailed Engineering Design
DHW	Domestic Hot Water
EC	European Commission
EE	Energy Efficiency
EEA	European Energy Award
EED	Energy Efficiency Directive
EM	Energy Management
EMS	Energy Management System
EMT	Energy Management-Tool
EPB	Energy Performance in Buildings
EPBD	Energy Performance in Buildings Directive
eqv	equivalent
ERE	The Energy Regulatory Authority
ESCO	Energy Service Company
ESMAP	Energy Sector Management Assistance Programme
EU	European Union
EUR	Euro
FEC	Final Energy Consumption
GDP	Gross Domestic Product
GHG	Greenhouse gases
GPS	Global Positioning System
GWh	Gigawatt hour
HFCs	Hydrofluorocarbons
HH	Household
HP	Horsepower
HPS	High Pressure Sodium light
IC	Implementation Contractor
INSTAT	Institute of Statistics of Albania
IPCC	Intergovernmental Panel on Climate Change
KfW	Kreditanstalt für Wiederaufbau
KPI	Key Performance Indicator
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
kWp	Kilowatt peak
LED	Light Emitting Diode
LFO	Light Fuel Oil

SECTION A: MUNICIPAL ENERGY AND CLIMATE ACTION PLAN

LP	Light Point
LPG	Liquefied Petroleum Gas
LUCF	Land Use Change and Forestry
MAB	Multi Apartment Building
MECAP	Municipal Energy and Climate Action Plan
MEMU	Municipal Energy Management Unit
MEuro	Million Euro
MJ	Megajoule
MoFE	Ministry of Finance and Economy
MoIE	Ministry of Infrastructure and Energy
MoU	Memorandum of Understanding
MPB	Municipal Public Buildings
MV	Megavolt
MW	Megawatt
N ₂ O	Nitrous oxide
NAPRES	National Action Plans for Renewable Energy Sources
NDC	National Determined Contribution
NECP	National Energy and Climate Plan
NEEAP	National Energy Efficiency Action Plan
NZEB	Near Zero Energy Buildings
OGP	Open Government Partnership
OSHEE	Electricity Distribution System Operator
PB	Public Building
PMU	Project Management Unit
PPP	Purchasing Power Parity
PT	Public Transport
PV	Photovoltaic
PW	Potable Water
RB	Residential Buildings
RES	Renewable Energy Sources
RSPV	Roof-top solar PV
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SECO	Swiss State Secretariat for Economic Affairs
SEMP	Smart Energy Municipalities Project
SEMP Consortium	Name of SEMP Implementation Consultant consisting of GFA Consulting Group, ENCO, EEGG, and EBP
SHPP	Small Hydro Power Plant
SHW	Solar Hot Water
SL	Street Lighting
SME	Small Medium Enterprise
SO ₂	Sulphur dioxide
SW	Solid Waste
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VAT	Valued Added Tax
WAM	With Additional Measures
WEM	With Existing Measures
WW	Waste water
WWTP	Waste Water Treatment Plant

SECTION A: MUNICIPAL ENERGY AND CLIMATE PLAN

Executive Summary

About Berat

The municipality of Berat is located in the south of Albania. It is surrounded by mountains and hills, including Tomorr (2,416 m) that was declared a national park. According to the 2011 Census, the municipality had a population of 60,031 inhabitants (99,793 according to the civil registry office). The municipality covers an area of 379.98 km² and consists of five administrative units. Berat is one of the country's most important cultural centers. Due to its thousand-year history, the city has a unique architectural style with influences from various civilizations and was therefore added to the UNESCO World Heritage List in 2008.

Legal requirements for municipalities

According to the Albanian Energy Efficiency (EE) Law, municipalities are considered large energy consumers and are therefore required to establish an **Energy Management System (EMS)**, prepare a **Municipal Energy and Climate Action Plan (MECAP)**, maintain an energy consumption database, and submit an annual report to the National Agency for Energy Efficiency (AEE) on measures implemented and savings achieved.

International best practice Energy Management System

Since 2019, Berat is a Pilot municipality of the **Smart Energy Municipality Project (SEMP)**, a Swiss project implemented in partnership with the Albanian Government. The project helps Albanian municipalities to comply with these legal requirements, by implementing an EMS, which is inspired by the **European Energy Award** (www.european-energy-award.org). The EMS has been adapted to the Albanian context and incorporates 30 years of experience and international best practices and standards for effective energy management and climate protection at municipal level. Methodically, the EMS is divided into six areas that address all relevant aspects of municipal energy management and climate protection.

Preparation of the MECAP

The present MECAP of Berat is a key outcome of this Energy Management System. The MECAP is a strategy by Berat's municipal administration to enhance sustainable energy management and address climate change impacts. The MECAP encompasses the timeframe spanning from 2023 to 2040 and will be revised every 5 years. It aligns with national targets for energy savings, renewable energy expansion, and greenhouse gas reduction. The MECAP covers both direct and indirect sectors, focusing on areas where the municipality has the most influence. The EMS relies on tools like **EnerCoach** as Energy Database and the **EEA-Management-Tool** for monitoring and evaluation.

The approval process of the MECAP included consultation with AEE, Ministry of Infrastructure and Energy (MoIE), relevant agencies, local stakeholders, and civil society representatives. The Municipal Council approves the MECAP, marking the commencement of its implementation and monitoring.

Municipal Vision, Targets and Energy Situation

Berat's Vision 2030 By 2030, Berat envisions making substantial progress towards a more sustainable energy supply, a reduced carbon footprint, and increased climate resilience. The municipality is committed to taking steps that integrate various actions aimed at achieving a moderately fair and somewhat inclusive transition across its services. This transition may result in new employment opportunities, investment growth (green investments), enhancements in health and education, and improved overall well-being, contributing to a healthier environment for the population.

Energy and Climate Targets The objectives of Albania's National Energy and Climate Plan (NECP) for the period up to 2030 encompass a reduction of 18.7% in greenhouse gas emissions, an 8.4% decrease in final energy consumption, and an increased share of 54.4% of renewable energy in the energy mix, which is in line with EU accession objectives.

Trends and Challenges addressed in the MECAP The supply of energy in Albania is in many sectors below basic standards compared to the rest of Europe. In addition, 37% of all households suffer from energy poverty. Thus, in combination with steady economic growth and increasing prosperity, there is a trend towards increasing energy consumption if Albania continues on its path to catch up with Europe.

On the other hand, most rural areas in Albania have a declining population, which, in combination with increasing energy efficiency, is slowing down the growth in energy consumption.

These trends were taken into account when prioritizing the measures for the MECAP. In summary, the municipality of Berat aims to align with national goals, address demographic changes, combat energy poverty and plan sustainable energy management to achieve its vision for 2030.

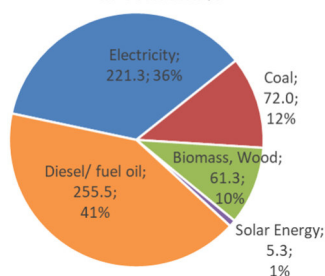
Municipal Energy and Greenhouse Gas Situation Berat's municipal final energy consumption in 2021 was 615 GWh per year. The per capita consumption was 6,386 kWh per year which is very low compared to the EU Average of 36,129 kWh per capita per year.¹ The breakdown in GWh per year and the percentage shares of the energy sources show that coal and diesel/fuel oil account to 41% of total consumption, thus there is a big potential for fuel switch to renewable energy sources².

¹ <https://ourworldindata.org/grapher/per-capita-energy-use?tab=table>

² Electricity supply in Albania is composed by small, medium, large hydro plant, PV plants (about 60-70% of total country demand) and the remaining part is imported (30-35%) from these countries: Kosova, BiH, Bulgaria and Serbia - based on coal power generation. Based on UNDP/UNCCC Project emission factor for the Albanian Power System is 0.38-0.42 tons CO₂eqv/MWh and for all calculation under this plan it is considered 0.38 tons CO₂eqv/MWh.

The sectoral breakdown of final energy consumption shows that the municipal sectors only account for 13.88 GWh or 2% of total consumption,

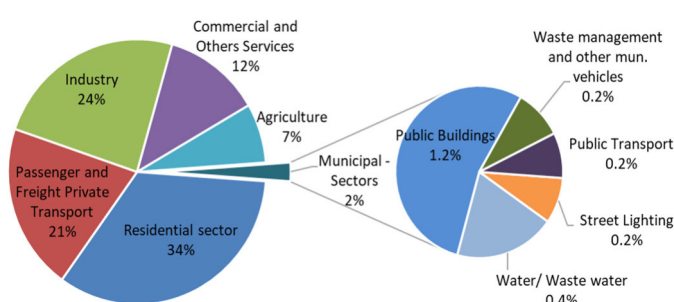
Final Energy Consumption in Berat in GWh and %



with public buildings accounting for the largest share. Thus, the municipality can only directly influence a small part of total final energy consumption. The other sectors can only be influenced indirectly by national and municipal regulations and programs offering incentives for investments or behavioral change. Therefore, the municipal sectors are called “direct sectors” throughout this MECAP and all

the other sectors “indirect sectors”.

Final Energy Consumption in Berat according to Sectors



The total balance of greenhouse gas emissions amounts to 184 kt CO₂eq in 2021 for all direct and indirect sectors in

the municipality of Berat. This means that Berat emits 1.85 tons of CO₂ equivalents per inhabitant per year. Without any additional measures the energy consumption and GHG emissions are projected to grow significantly in the years to come:

- 11% increase in energy consumption by 2030 and a 49% increase by 2040 (equivalent to 310 GWh), compared to the baseline year 2021.
- 14% rise in CO₂ emissions by 2030 and a 54% increase by 2040 (equivalent to 101 kt CO₂eq), compared to the baseline year 2021.

The measures, specified in this MECAP, are intended to counteract these escalations, and mitigate their negative impact.

Expenditures for Energy

Berat's annual municipal budget for 2021 amounted to EUR 10.76 million. Of this, a significant 15.6% was allocated to annual energy expenditures of EUR 1.69 million. 43 % of this expenditure is related to the energy supply of municipal buildings.

Although energy consumption in municipal sectors accounts for only 2% of total municipal energy consumption, it is important to highlight effective measures in these sectors. Such efforts serve to raise citizens' awareness of potential opportunities and promote understanding of the resulting benefits. In addition, energy savings in these sectors contribute directly to reducing energy costs, thereby easing the burden on the municipal budget and reducing the need for government subsidies.

Action Plan

Based on comprehensive analyses and prioritizations, a total of 89 measures have been identified to be implemented in the Municipality of Berat during the period 2023 to 2040. The list includes measures that are already in progress or planned (BAU Scenario) and additional measures that should be undertaken (Active Scenario). The list also includes measures for which the Municipality of Shkodra is not directly responsible, but which relate to existing national programs or measures of other organizations.

If all 89 measures were implemented, the energy savings plus additional generated renewable energy would amount to 218 GWh annually. Investments of around 310 million euros, or 19.4 million euros per year, are required for this. The projected energy cost savings for the municipal budget is approximately 2.04 million EUR according to the active scenario in 2040. The potential for emissions reduction amounts to 151,614 tCO₂ in 2040 including direct and indirect sectors.

Figure E-1 shows that the energy consumption would significantly increase by 2040 without additional measures. With additional measures, it will be possible to keep the energy consumption stable, despite increasing comfort for the population, and even slightly reduce it compared to 2021.

Figure E-1: BAU and Active (EE/RES/CO₂) scenarios

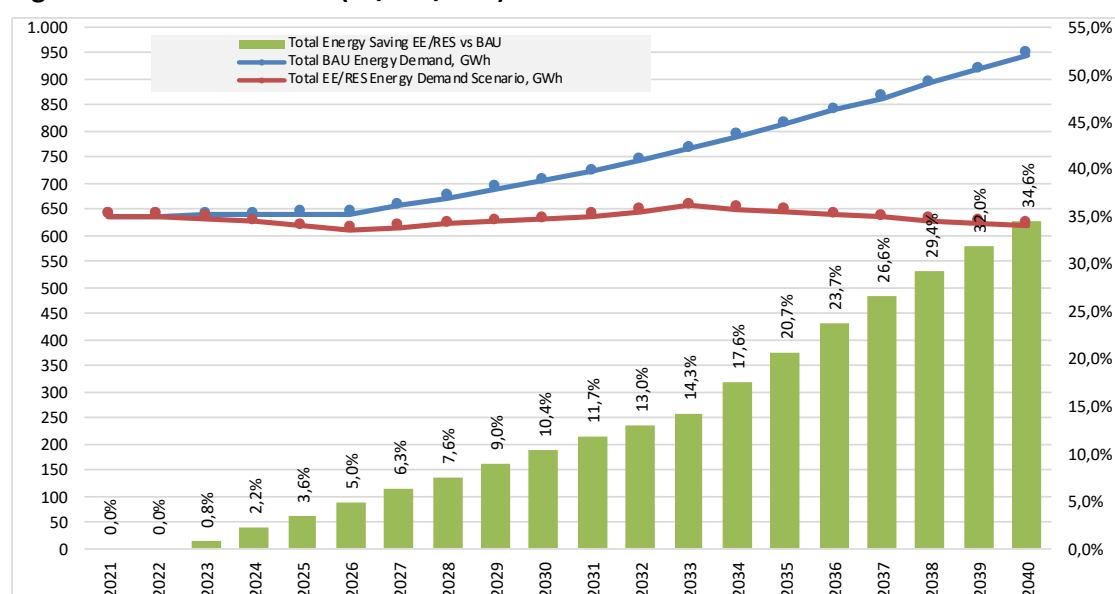


Table E-2 provides an overview of the planned measures in various sectors and groups of similar measures. In each sector, both investment measures and accompanying measures are envisaged. The latter typically involve "soft measures" such as capacity building, awareness raising, studies for the preparation of investments, development of policies and regulations, and the organization of events.

In line with the European Energy Award, the list also includes measures for internal organization and communication, ensuring that municipal energy management is continued in a long-term and sustainable manner, allowing the revision of the MECAP every 5 years by the Municipal Energy Management Unit (MEMU) of Berat until 2040.

Table E-2: Overview of proposed measures, costs, and savings

Number of measures	Scope of measure IN: Investment measure, AM: Accompanying measure	Energy saving +RE generation [GWh/year]	Total Cost [EUR]	Energy Cost savings [EUR/year]
89	Total of all 89 measures	218.34	310'294'000	30'415'700
Energy Refurbishment of public buildings				
4	IN: Improvement of building envelope	2.4	2'544'000	204'700
1	IN: Solar hot water for kindergartens	0.2	173'000	41'300
1	IN: Rooftop solar PV on 50% of all public buildings	0.3	190'000	63'900
2	IN: Replacement of electric boilers and electrical appliances in 75% of all public buildings	0.9	442'000	68'400
9	AM: Building management, capacity building, investment preparation, awareness raising		391'000	
Public Lighting				
1	IN: Street Lighting Program with LED, 2140 light points	0.7	856'000	167'000
1	IN: PV Street lighting for remote areas, 2250 light points	0.2	900'000	36'000
1	IN: Replacement of 2 service vehicles	0.1	100'000	21'000
4	AM: Energy management, capacity building, investment preparation, regulation development		68'000	
Residential sector				
4	IN: Financing mechanism and incentives for investments in residential buildings retrofits, Rooftop PV, LED lighting, efficient heating	70	137'088'000	8'076'000
1	AM: Strict application of energy performance codes	20.2	80'000	2'038'000
1	AM: Promotion and support of advanced efficient heating systems by parallel permission procedure (chimneysweep service) ; combined with information and support (HP, pellet boilers integrated with solar hot water systems), ban coal and inefficient wood (all buildings, costs ~200 EUR)	36.2	4'277'000	3'662'000
1	AM: Energy audit support program		838'000	
Service Industry and agricultural sectors				
1	IN: National investment Program: Support for EE in industry, SME	53	32'382'000	8'000'000
5	AM: Capacity building, awareness raising, regulation enforcement	1	736'000	224'000
Other central public buildings				
3	AM: Obligatory energy audits and energy management systems	0.4	457'000	30'000
Energy Supply				
3	IN: Network upgrade, smart metering program, non-technical loss reduction program	15.9	65'471'000	3'531'100
3	AM: Feasibility studies, Solar Map, power consumption monitoring		1'640'000	

Water supply and wastewater				
4	IN: Increase performance of water distribution networks, leak detection, water efficient fittings	1.07	17'791'000	759'200
2	IN: Solar PV at pumping stations and wastewater treatment plant	5.05	3'700'000	1147'800
4	IN: Improve sewer network, extension of WWTP incl. Biogas unit	0.82	31'500'000	348'000
4	AM: Feasibility studies, auditing, and educational measures		285'000	
Solid waste management				
3	IN: 1 cleaning vehicle, waste sorting plant, PV plant at landfill site	3.6	3'350'000	1'026'200
4	AM: Awareness raising, O&M, regulatory measures		321'000	
Public transport				
2	IN: 20 hybrid or electric busses, 2 shuttle buses to touristic sites	0.6	2'400'000	157'200
2	IN: Extension of 2 bus lines, 2 mobility stations	1.6	560'000	448'300
2	AM: Mobility concept, policy development		150'000	
Private transport				
1	IN: 20 Electric Vehicle Charging Infrastructure	3.3	600'000	144'600
1	AM: Development of P+R facilities		400'000	
Non-motorized Transport				
1	Development of 10 km bike lanes	0.8	500'000	221'000
1	AM: Awareness raising		100'000	
Internal organization				
5	AM: Preparation of MECAP, institutionalization of MEMU, Eco-behavior guidelines		in-kind	
Communication				
3	AM: Communication action plan, internal communication concept, concept for citizen and council involvement		in-kind	
2	AM: Experience exchange with other municipalities, set-up inter municipal communication task force		in-kind	
2	AM: Organization of events for promoting EE & RE, and an energy day in Shkodra		4'000	

1 OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1 Background of the Municipality

The municipality of Berat is laid out in the Mountain Region of Southern Albania and partly in the Western area on both sides of the middle and lower flows of the Osum River, which passes through the city of Berat.

The extent in these two different physical-geographical regions affects the variability of the relief of the territory, of the physical-geographical conditions from west to east and from north to south of the geographical landscapes.

The municipality of Berat is bordered to the north by the municipalities of Kuçova and Ura Vajgurore (Dimal), to the east by the municipalities of Gramsh and Skrapar, to the south by the municipality of Poliçan, and to the west by the municipality of Mallakastër. The capital of the municipality is the city of Berat. In 2021, the population of Berat Municipality was 99,793 inhabitants. The largest concentration of population is in the city of Berat with 64% of the population (63,408 inhabitants). Berat municipality has an area of 379.98 km². This municipality comprises four administrative units, including one city and fifty villages under its jurisdiction. The city of Berat, due to its thousand-year history as a residential area, carries rare historical and architectural values, thus being included in 2008 and in the list of museum cities protected by UNESCO. The historical values, but also the natural beauty of the city lying along the Osum River and at the foot of Mount Tomorr, are always attracting more and more tourists throughout all seasons, prompting many of the residents to turn their characteristic houses into guest houses for tourists and thus adding their income from tourism. The city of Berat currently generates income primarily through tourism, the fashion business, as well as the production and trading of canned products. Following the territorial reform, the new municipality of Berat now includes not only the city but also four rural administrative units. Two of them, Velabisht and Otllak, are mainly plain and fertile areas, where the main income is provided by the production of vegetables, olives and viticulture. While the other two administrative units, Rroshnik and Sinjë, have a hilly-mountainous relief and their income is provided by orchards and livestock.

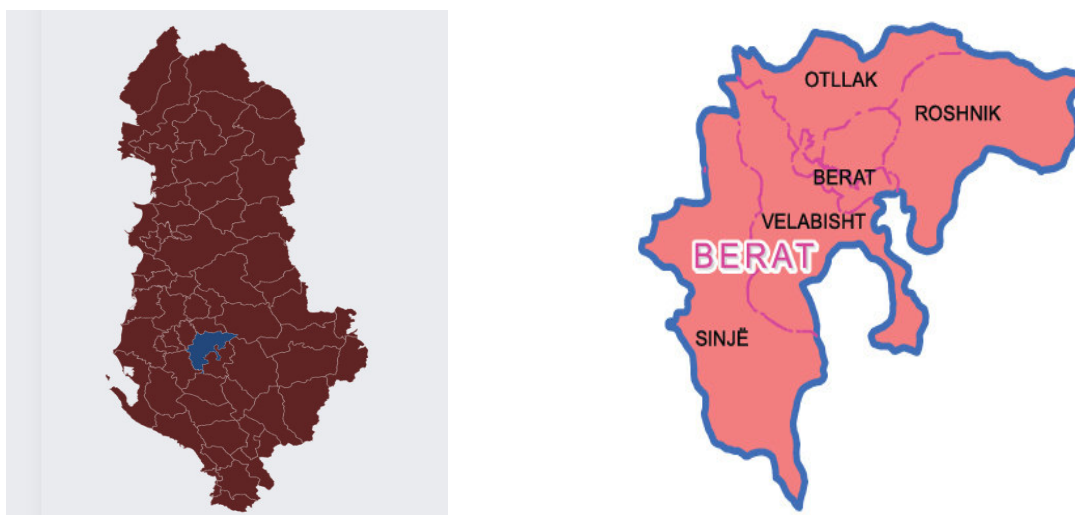


Figure 1-1 Location of Berat Municipality and its Administrative Units

1.2 National context and regulatory framework

During the last years, several national efforts have been made in Albania to meet the commitments of EU standards and legislation as regards energy efficiency (EE) and renewable energy (RE) implementation. Annex A provides an overview of the relevant laws and the secondary legislation on EE and RE consisting of various Decisions of the Council of Ministers. Most important for this MECAP are:

- **Law on Energy Efficiency** (Law No. 124/2015 amended in No. 28/2021)
- **Law on Energy Performance of Buildings** (Law no.116/2016)
- **Law on Renewable Energy Sources** (Law no.7/2017)
- **National Energy and Climate Plan (NECP)** (adopted in Dec. 2021)
- **Urban Law and Municipal Urbanistic Plan**
- **Waste Management Plan (adopted on October 2018)**
- **World Heritage Plan (adopted on December 2013)**

The NECP is the most recent strategic document, defining the energy targets for 2030 which serve as an orientation for the MECAPs.

The 2030 targets are an intermediate step towards Europe's long-term commitment to a climate-neutral continent by 2050. In order to meet the EU's energy and climate targets for 2030, Member States and Members of the Energy Community were required to establish a 10-year NECP for the period from 2021 to 2030. The concept of the NECP phases out sectoral strategies such as National Energy Efficiency Action Plans (NEEAP) or National Renewable Energy Action Plans (NREAP) in order to ensure an integrated planning.

The Government of Albania (GoA) adopted the first version of the NECP on December 29, 2021. The national targets set until 2030, include **GHG emissions savings of 18.7%, a final energy consumption reduction of 8.4%, and a renewable energy share in final energy demand of 54.4%.**

The NECP does not set specific targets for individual municipalities or prefectures. This MECAP assumes that the national targets in the NECP apply proportionately to all 61 municipalities. Consequently, this MECAP refers to the NECP when describing the municipal strategy and goals (Chapter 2). During the last years, several national efforts have been made in Albania to meet the commitments of EU standards and legislation as regards energy efficiency (EE) and renewable energy (RE) implementation. Annex A provides an overview of the relevant laws and the secondary legislation on EE and RE consisting of various Decisions of the Council of Ministers. Most important for this MECAP are:

Regulatory competence: In Albania, laws and regulations are drafted at national level, and implemented at municipal level. Thus, the municipal administration has very limited influence on shaping the regulatory framework.

Enforcement of regulations: The Municipal Urban Development Plan is currently the only binding planning instrument at the municipal level that exists in all 61 municipalities in Albania. However, Municipal Urban Development primarily emphasize spatial planning, with limited attention to energy management and climate protection. Other municipal plans that are required by the law, such as a social economic strategy, a municipal waste plan, a water and waste management plan and a mobility plan are in place in certain municipalities. The municipality of Berat has established the following policy framework:

- **Strategic Policy Document on Waste/Management Plan**, covering the period of 2020-2035, exposing the policy of the government in the field of municipal, non-municipal and hazardous waste. This new document is in accordance with the guidelines of the Framework Directive 2008/98/EC.
- **Municipal Waste Management Concept** (2020-2025), in line with the National Waste Management Programme dealing with residual waste, organic waste and landfill gas.
- **Draft Transport Plan** (2017-2025).
- **Mid Term Budget Plan** for the period 2023-2025.

1.3 Structure of the Municipality and Energy Management System

According to the Albanian EE Law, municipalities are considered large energy consumers (> 1 mil. kWh total energy per year) and are therefore required to:

1. Hire an energy manager and take measures to improve energy management (Art. 10)
2. Prepare a MECAP as well as establish and maintain a database for energy consumption to monitor the implementation of the MECAP (Art. 9/1)
3. Submit an annual report to the AEE on measures implemented and savings achieved (Art. 13)

To comply with these legal requirements, the municipality of Berat follows a systemic approach to analyze, plan, implement, monitor all aspects related to energy performance and climate protection, the so-called Energy Management System (EMS) which is inspired by the European Energy Award. The EMS supports cities setting and achieving energy and climate targets effectively:

- **Energy Efficiency:** The EMS aims to help municipalities reduce their energy consumption and GHG emissions by implementing sustainable energy measures and strategies.
- **Renewable Energy:** The EMS encourages the adoption of renewable energy sources and technologies, such as solar, wind, and biomass, to diversify energy sources and promote cleaner energy generation.
- **Climate Protection:** By implementing energy-efficient measures and promoting RES, the EMS contributes to climate protection and the reduction of local carbon footprints.
- **Quality of Life:** The program aims to enhance the overall quality of life in cities and regions by promoting cleaner air, water and soil, reduced noise pollution, and improved urban planning through sustainable energy policies.
- **Network and Knowledge Sharing:** The EMS provides a platform for cities and regions to share best practices, experiences, and innovative solutions related to energy efficiency and sustainability.
- **Local Economy:** The adoption of energy-efficient technologies and practices often stimulates local economic development, job creation, and innovation in the energy sector.

The Energy Management System, introduced to Berat Municipality, is based on the European Energy Award (www.european-energy-award.org), which has been adapted to the Albanian context and incorporates 30 years of experience and international best practices and standards for effective energy management and climate protection at municipal level. The EMS is divided into six areas that summarize all relevant aspects of energy management and climate protection. These six EMS areas cover all direct and indirect sectors that need to be managed by municipal authorities in Albania. The following table shows how these EMS areas fit to the sectors

EMS Area	Description of Area	Direct Sectors	Indirect Sectors
Area 1	Development & spatial planning strategy: MECAP including, energy and climate targets and strategies, Municipal Urban Development Plan		<ul style="list-style-type: none"> • Residential sector
Area 2	Public buildings & facilities: operation and maintenance of public buildings street lighting, energy performance of buildings, rehabilitation concept for public buildings	<ul style="list-style-type: none"> • Municipal public buildings • Public street lighting 	<ul style="list-style-type: none"> • Other central public building within the borders of the Municipality

Area 3	Supply & disposal: electricity and gas supply, water supply and waste water management, solid waste management	<ul style="list-style-type: none"> • Water supply & waste water treatment • Waste management 	
Area 4	Mobility: mobility in administration, public transport, non-motorized traffic (e.g. bicycle), traffic calming, parking	<ul style="list-style-type: none"> • Municipality fleet & public transport 	<ul style="list-style-type: none"> • Private passenger & freight transport
Area 5	Internal organisation: EMS System, MEMU, capacity building, green procurement, budgeting and financing		
Area 6	Communication, Cooperation: communication strategy, awareness raising, cooperation and support to residential sector, service sector and industry, organizations, other municipalities		<ul style="list-style-type: none"> • Residential sector • Service/commercial sector • Industrial sector • Agriculture sector • Other sectors

The key strategy to manage all aspects, related to energy and climate protections, is MECAP. Please refer to chapter 1.4 that explains the MECAP in detail, and to chapter 1.5 outlining the elaboration process.

EMS Consultant: Since 2019, Berat is a Pilot municipality of the Smart Energy Municipality Project (SEMP)ⁱ that establishes the EMS for Albanian municipalities. Through this project, the municipality is supported by EMS Consultants that accompany the municipality intensively in the preparation and implementation of a MECAP, as well as in its implementation and monitoring. EMS Consultants cooperate closely with the MEMU and provide technical expertise as energy and climate protection experts. The focus of the EMS is to support the municipal administration to:

- Establish an energy database (e.g. for all public buildings)
- Draft a MECAP
- Operationalize the MECAP and implement key measures
- Realize investment, as for example efficient public lighting
- Prepare bankable projects and find suitable finance
- Improve capacities in all energy and climate related topics at the municipal level
- Monitor the implementation of MECAP and its measures

EMS Tools: The EMS utilizes two primary tools to evaluate advancements in enhancing energy management, promoting climate protection, and, consequently, the implementation progress of the MECAP.

- **EnerCoach:** EnerCoach is a cloud-based energy accounting software for public buildings and street lighting. In the mid-term, all other direct sectors will be added to EnerCoach. Energy accounting with EnerCoach shows the energy status of facilities and how consumption, emissions and costs develop over time. At the same time, EnerCoach enables the municipality to plan renovation measures and subsequently monitor their success.
- **EMS-Management-Tool (EMT):** The EMT is a cloud-based tool to collect all information on specific energy and climate performance for all six areas of the EMS. It helps to understand the current situation (initial energy assessment), derive measures, elaborate and action plan and monitor the implementation of the MECAP. More information on the monitoring process is provided in chapter 3.6.

Organization at local level: In the daily implementation of the EMS, many, if not all of the above outlined areas and sectors concern various departments and directorates of the municipal administration, and even

multiple municipal enterprises some of which have a great deal of autonomy (e.g. public water utility). To fully address the complex and multi-disciplinary aspects of energy management, the municipality has established the Municipal Energy Management Unit (MEMU). Please see chapter 7.1 that explains the organization at local level and in particular the MEMU in detail.

1.4 Purpose and scope of MECAP

MECAP – Definition and Scope: The Municipal Energy and Climate Action Plan (MECAP) is a comprehensive strategy developed by the municipal administration to improve energy management sustainably and help mitigate the impacts of climate change in its jurisdiction. The MECAP encompasses the timeframe spanning from 2023 to 2040 and will be revised every 5 years. It shows the municipality's contribution to the national targets for energy savings, the expansion of clean renewable energy and the reduction of greenhouse gas emissions. In accordance with the EE Law (Art. 9), the MECAP contains policies and measures to achieve national targets in all sectors at municipal level:

- I) **Direct sectors:** 1) municipal public buildings; 2) public street lighting; 3) water supply & waste water treatment; 4) municipality fleet & public transport; 5) waste management; and 6) all other municipality services.
- II) **Indirect sectors:** 1) residential sector; 2) industry; private service/commercial; 3) industry; 4) private passenger & freight transport; 5) agriculture and 6) others sectors within the borders of municipality.

MECAP Structure: Being the key document of the EMS, the MECAP follows the same structure of the EMS covering all direct and indirect sectors, as outlined in chapter 1.3. The MECAP relies on both qualitative and quantitative analyses for each of these sectors, which are detailed in Section B (comprising chapters 4 to 8). Chapters 1 and 2 provide an overview of the municipal context and relevant targets, while Chapter 3 outlines the Action Plan, specifying the necessary measures to attain the sector-specific targets. Chapter 1.5 explains the development process of the MECAP at hand.

MECAP Scenarios: The MECAP is based on a quantitative analysis and modelling of two scenarios:

- I) **Baseline Scenario** (WEM as per NECAP): This scenario represents a projection of future conditions in the municipality that assumes no significant changes or deviations from the current or existing practices, policies, or trends. The Baseline Scenario assumes that things will continue to operate in the same way they have been without any major alterations, disruptions, or interventions. Thus, the prevailing measures remain mostly unimplemented. In this scenario the challenges within the energy sector will not improve significantly, impeding progress in the water, waste, and mobility sectors.
- II) **Active Scenario** (WAM within NECAP): This scenario projects a development that diverges from the existing practices, policies, and trends. The Active Scenario explores the future development in which the proposed measures (long list) are implemented fostering energy efficiency, switch to RES, and CO₂ reduction to achieve targets. These actions will transform the municipalities energy system, supporting economic growth and well-being.

In Section B of this MECAP, each sector is assessed, considering these scenarios. The Action Plan (Chapter 3) outlines all measures that must be implemented in order to follow a development representing the Active Scenario.

Limitations of MECAP: The MECAP, following the EMS structure, focuses mainly on the direct sectors where the local government's influence is greatest. The indirect sectors can be influenced by the municipalities primarily through consultation, information, promotion or cooperation projects. This is taken into account in Chapter 8. Please note that the MECAP considers climate change adaptation, to a very limited extent in the qualitative analysis, but not in the quantitative analysis (e.g. increased water use due to lack of water in agriculture) or action planning. Furthermore, the infrastructure on the territory of Berat that is under the

control of the central government, such as hospitals or military infrastructure, national roads, are not considered in the MECAP.

1.5 Process for preparation and approval of MECAP

Since 2022, Albanian municipalities have been required by law to create and submit MECAPs to the AEE, taking into account national policies and objectives. As detailed in chapter 1.3, Berat follows the EMS and drafts in this context the MECAP serving as the pivotal document with EMS Consultants who play a crucial role in its development, as described in the subsequent chapter. Figure 1-2 shows the elaboration process of the MECAP that followed 9 Steps.

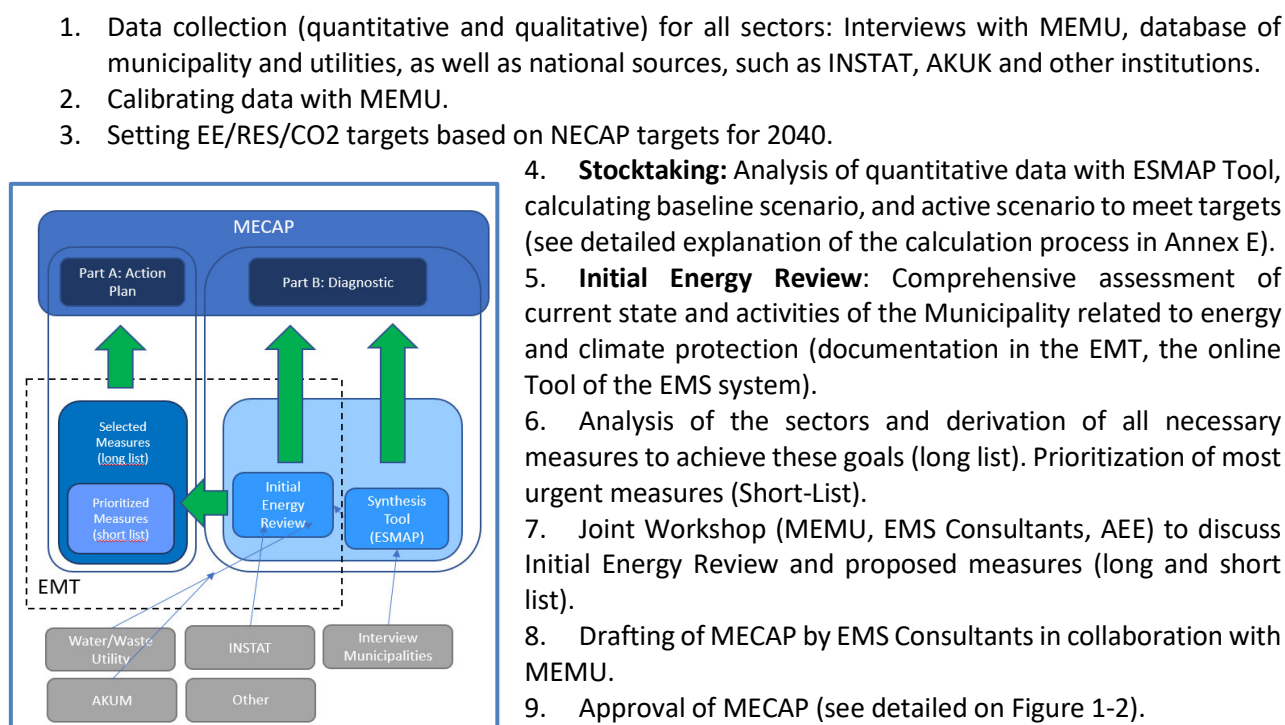


Figure 1-2: Elaboration process of the MECAP that followed 9 Steps.

MECAP Approval Process: Once finalized, the MECAP follows the approval process outlined in Figure 1-3.

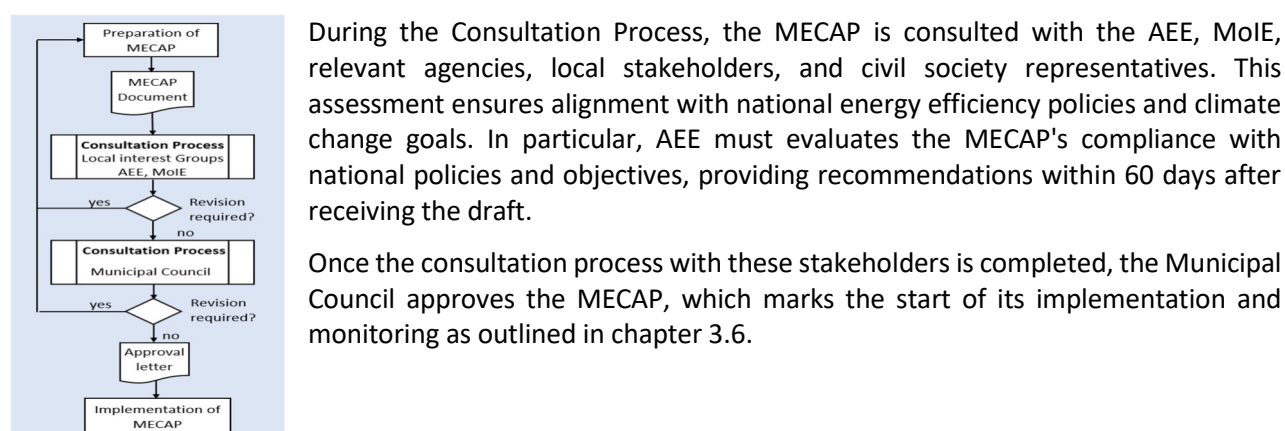


Figure 1-3: Approval process of MECAP

2 MUNICIPAL TARGETS AND STRATEGY

2.1 Energy and Climate Targets

2.1.1 Energy and Climate Policy Vision

Global warming has already led to significant impacts on both natural and human systems. These impacts include increased flooding, devastating wildfires, storms, loss of biodiversity, and extreme drought. Climate-related risks are becoming more pronounced, affecting various aspects such as the environment, health, livelihoods, food security, raw materials, water supply, and economic growth. Even if efforts are made to limit global temperature rise to 1.5°C, these risks will persist and vary across different regions, including Berat Municipality. The populations most vulnerable to these risks are those that are marginalized, disadvantaged, and vulnerable. To tackle these challenges, Berat Municipality has adopted a collaborative and comprehensive approach. The municipality aims to drive transformational change that aligns with its vision for 2030.

Vision 2030: By 2030, Berat envisions making substantial progress towards a more sustainable energy supply, a reduced carbon footprint, and increased climate resilience. The municipality is committed to taking steps that integrate various actions aimed at achieving a moderately fair and somewhat inclusive transition across its services. This transition may result in new employment opportunities, investment growth (green investments), enhancements in health and education, and improved overall well-being, contributing to a healthier environment for the population.

2.1.2 Energy and climate targets

To meet the energy and climate targets set by the EU for the year 2030, both Member States and members of the Energy Community were required to establish a 10-year National Energy and Climate Plan (NECP) spanning from 2021 to 2030. The NECP supersedes sectoral strategies such as the National Energy Efficiency Action Plans (NEEAP) and National Renewable Energy Action Plans (NREAP). The 2030 targets represent an intermediate milestone on the path to Europe's ultimate commitment of achieving a climate-neutral continent by 2050.

As stipulated in the Energy Efficiency Law, the MECAP must be aligned with the NECP and include specific targets for energy savings, renewable energy contribution, and CO₂ reduction for each direct sector. These direct sectors consist of public buildings, public street lighting, solid waste collection and management, water supply, wastewater treatment, public transport, and all other municipal services. Additionally, the MECAP should encompass indirect sectors within the municipality's jurisdiction, including residential, industrial, agricultural, private services, and other sectors.

Annex F presents the national targets for energy efficiency, renewable energy, and CO₂ reduction, which are based on the NECAP document approved by the Albanian Council of Ministers.

Energy and Climate Goals for Berat: Berat Municipality has aligned its energy efficiency, renewable energy, and CO₂ reduction goals with those set in the NECP. These targets entail a reduction of 18.7% in greenhouse gas emissions, an 8.4% decline in final energy consumption, and a 54.4% share of renewable energy in final energy demand by 2030. The municipality has the flexibility to devise a strategy to attain these targets, including determining sector-specific contributions. Refer to Annex D for a visual representation of the role of Berat in meeting national targets.

2.2 Implications of demographic and economic trends on energy demand

2.2.1 National and local demographic trends

Albania's population has decreased at an average rate of -0.24% per year in the period 2011 to 2021. The speed of population decline has slowed down considerably compared to the period 2001 to 2011, when the average annual decline was -0.55%. In the period 2011 to 2021, the population decreased from 2,904,779 to **2,829,741** inhabitants (INSTAT, 2015 and 2022). The main reasons for the decrease are a combination of emigration and a decrease in the number of births. Population trends vary across the country as shown in Figure 2-1. While most prefectures showed annual decreases between 1.2% and 2.7% from 2011 to 2021, the prefectures of Tirana and Durrës showed annual growth rates of 1.7% and 0.7%, respectively. Thus, there is a substantial internal migration from rural areas to urban areas. There are no signs of a change in the trend, which is why population figures are expected to continue to decline (figure 2-1).

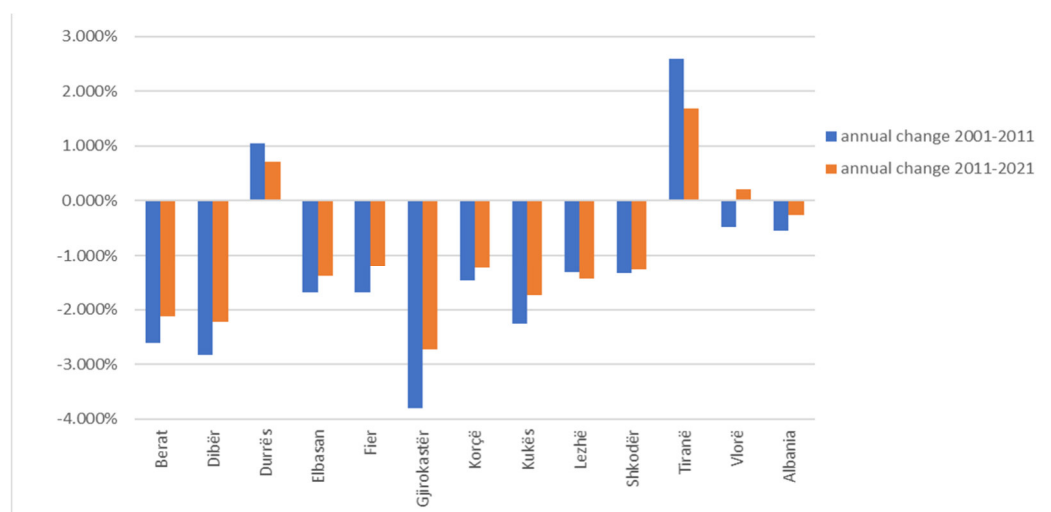


Figure 2-1: Average annual population change in Albanian Prefectures

Source: own diagram based on INSTAT (2011, 2015 and 2022)

Note: According to the civil registry of Albanian citizens, Albania's population is approximately 4.3 million, while the actual number of Albanian residents according to INSTAT is 2.83 million as of January 2021. The difference is due to the fact that the emigration and internal migration of Albanian citizens has not been comprehensively registered in the civil registry of Albanian nationals (OGP 2017). For the purpose of energy planning, the population data of INSTAT will therefore be used throughout this document. For the forecast, the estimations based on the feedback and calculations of the Municipality of Berat were used.

According to the 2011 Census, the municipality of Berat including all five administrative units had a population of 60,031 inhabitants. According to the civil registry office the population is 99,793. According to INSTAT projections, it is estimated that the population of the municipality of Berat will be reduced. However, the declining population trend is expected to be less pronounced in Berat Municipality compared to the average of the country.

The population of the city of Berat is homogeneous with a population which has generally had internal demographic movements, i.e. from the rural areas towards the city of Berat, concentrating on the new residential areas created after the 90s. Berat achieved the most significant population growth after 1960, as a result of natural growth, as well as during the 90s as a result of the movement from the villages to the city. The average population density for Berat Municipality about 3,845 inhabitants/km².

Several factors are anticipated to persist in shaping the demographic landscape in the coming years. Notably, migration stands out as a significant determinant, with a continuous outflow of young individuals from the agricultural sector. This phenomenon is exacerbated by the trend of students migrating and subsequently opting for a prolonged stay beyond their academic pursuits. The overall low birth rate further contributes to the diminishing population, as does the enduring influence of patriarchal norms in family formation. The latter continues to play a pivotal role, particularly in fostering a high rate of migration among young females.

In essence, the forecasted decline in population can be attributed to a combination of factors, prominently featuring migration patterns, changing demographics within the agricultural sector, student migrations evolving into long-term residencies, and the enduring impact of traditional norms on family dynamics.

2.2.2 Energy poverty situation and related targets

In south-east Europe, the definition of energy poverty commonly used is Boardman's (1991), which states that a household is energy poor if it has to spend more than 10% of its income on energy costs to keep the home adequately warm. According to a recent study financed by the Energy Community, at least 37% of Albanians are suffering from energy poverty which is reflected on heating only one room, heated only 6-8 hours per day, which is far above the European average of 9.3%³. This drives them to use wood to heat their homes which mostly do not have any insulation, and single-glazed windows. Hot water is often produced with electric boilers. As a result, energy costs consume a significant portion of their budget. Energy poverty is addressed in the NECP under P&M EM-P1. Unfortunately, the measure lacks concrete budget and actions to address energy poverty. Table 2-1 presents main energy and PPP (Purchase Power Parity) per capita indicators of Albania, Berat municipality and EU average.

Table 2-1: Main energy and GDP per capita indicators of Berat, Albania, and EU average in 2021

No.	Energy and GDP per capita indicators	EU countries average	Albania average	as Berat Municipality
1	GDP per capita, Euro/capita	47,000 ⁴	14,410 ⁵	14,370
2	Total energy consumption per capita (kWh/capita*year)	38,056 ⁶	7,860	6,167
3	Total electricity consumption per capita (kWh/capita*year)	4,421	2,699	2,499
4	Overall annual GHG emission (CO ₂), (tons/capita*year)	7.78	3.33	1.85
5	Energy intensity (kWh/1000 GDP Euro)	88	129	129
6	Energy Poverty Ratio (%)	7% ⁷	37%	37%

³ https://energy.ec.europa.eu/news/commission-publishes-recommendations-tackle-energy-poverty-across-eu-2023-10-23_en

⁴ <https://tradingeconomics.com/country-list/gdp-per-capita-ppp?continent=europe>

⁵ <https://worldbank/knoema.com/atlas/Albania/GDP-per-capita-based-on-PPP> value for 2021 equal to 15,995 USD and an average exchange rate equal to 1.11 is used between Euro to USD for 2021; There are no values for Berat Municipality so the Albanian value is used for it as well.

⁶ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview#Final_energy_consumption

⁷ <https://www.bing.com/search?q=EU%20Energy%20Poverty%20ratio%2C%20%25&form=SWAU2>

2.2.3 Economic Trends

The trend assumed in Albania in general and Shkodra municipality in particular towards 2030 and 2040 is an increase in economic activities probably reducing the gap to other EU countries. This leads to an increased energy consumption. However, considering the improvements in EE by reducing energy intensity, strong penetration of RES to reduce energy dependence will lead to a reduction of CO₂ emission. At the same time, these steps will help to improve comfort level related to energy (e.g. housing comfort) of its citizens and reduce energy poverty.

Albania possesses the resources necessary for development by focusing on strong improvements in energy efficiency across all sectors, robust penetration of RES in every sector. Implementing these measures will directly contribute to the reduction of GHG emissions and, significantly, aid in alleviating energy poverty. These key aspects remain central to the design of the MECAP for the Berat Municipality.

Berat is a city of world cultural heritage, with a unified and consolidated structure, urban and rural, with a high quality of life, well connected to the central areas of Albania through a modern infrastructure, as a powerful tourist destination and gateway to a rich natural region. The proposed concept for the development of Berat aims to harmonize the economic, infrastructural and spatial development with the protection of natural resources, the mitigation of social inequalities and the promotion of the intellectual development of society. These are strong foundations, which guarantee that the whole community benefits today, while bequeathing to future generations a healthy and self-renewing territory and environment, along with sustainable economic and social development.

Urbanization is a dynamic process, but controlled and with gradual growth in Berat. It focuses on the strengthening and consolidation of existing centres, as well as the fair use of public spaces and orientation towards urban poles of development. In this way, services are brought closer to the community, efficiently from an economic point of view, and above all, a healthy climate for business is created, in favour of sustainable long-term economic development. By strengthening its rural economy, Berat Municipality aims to consolidate its profile as a regional pole of tourism economic development, becoming competitive at the country level and beyond. Based on the principles of subsidiarity, the aim is to strengthen a network of multi-centres in the territory, decentralized as poles of economic and administrative development. These centres, consisting of quality residences and complementary economic activities within the network, culminate in the city of Berat, where the majority of urban activities and public and community services are focused. These services are offered with the same standard for all residents, throughout the territory of the municipality, with the aim of reducing the urban-rural gap in terms of providing physical infrastructure, education, health services, as well as opportunities for the development of economic activities in urban and rural areas.

One of the most valuable assets of the Municipality of Berat are its citizens, so a special importance is given to promoting the qualification of human capital, in order to increase the integration of all active citizens in the labour market. The mission of the municipality in function of this development vision is to intelligently make available all financial and human resources for the harmonization of public and private interests, for economic and social development in the entire territory of Berat Municipality".

Based on this future vision of development, the information analyzed in the previous chapters and the priorities of the public administration and residents, the Strategic Objectives of the development of the territory of the Municipality of Berat are defined below.

Strategic objective 1: Sustainable economic development through diversification, decentralization of the economy and increasing the competitiveness of Berat at the regional and country level.

Strategic Objective 2: Preservation and regeneration of natural and cultural assets, as a basic indicator of social and economic development and well-being through natural and cultural tourism.

Strategic Objective 3: Improving the road infrastructure in order to better connect the units within the municipality as well as the municipality with the other countries of the region.

Strategic Objective 4: Supporting the agriculture and livestock sector, as key sectors for the development of the local rural economy and employment growth.

Strategic objective 5: Mitigation of social inequalities through the improvement of the education and health systems as well as comprehensive social housing policies.

The city of Berat is well studied due to its international cultural importance. It has numerous studies on its historic neighbourhoods and urban center. At the district level, there are plans for tourism development and regional economic and social development. However, there is a lack of detailed plans for the surrounding administrative units, which make up 95% of the territory of the municipality after the territorial reform.

2.2.4 Implications for energy planning

Despite the decreasing population, energy planning for Albanian municipalities must assume that energy consumption will increase in the short to medium term, because there is still widespread energy poverty particularly in rural areas often expressed in under-heating of residential dwellings. Improving the access to adequate energy services will lead to an increase in energy consumption of the beneficiaries.

In the long term, it must be expected that potential revenues from energy sales will decrease due to the decreasing population. This aspect must be considered when planning expensive infrastructures such as district heating networks. These should be concentrated in densely populated residential and business districts only so that they can be amortized in the long term.

The specific challenges and their cause need to be understood and addressed in the course of formulation of interventions and targets of the MECAP. The following table summarize the challenges of the municipality in terms of services, energy and environment which will be addressed by the MECAP (Table 2-2).

Table 2-2: Summary of municipal energy challenges

Economic and demographic challenges	Overall municipal level energy challenges	Sector specific challenges
<ul style="list-style-type: none"> ➤ Decreasing Population ➤ Slow Economic Growth ➤ Increasing tourism ➤ Increasing demand for energy leading to emissions ➤ Increasing demand for municipal services and comfort ➤ Increasing costs for maintenance ➤ Limitations of municipal budget spending 	<ul style="list-style-type: none"> ❖ High specific energy consumption of municipal public services (buildings, lighting) ❖ Widespread energy poverty ❖ High costs for maintenance and repair ❖ High and escalating budget spending for energy supply due to increasing energy tariffs ❖ Limitations in investment funds for retrofit or extension of infrastructure 	Municipal public buildings <ul style="list-style-type: none"> - High specific energy consumption compared - High and escalating budget spending for energy supply - Requirement for in-depth analysis and energy audits
		Street lighting <ul style="list-style-type: none"> - Insufficient lighting for streets with conventional, inefficient, old bulbs - High costs for replacement and maintenance - Demand for improvement of illumination of historic city districts
		Water and waste water <ul style="list-style-type: none"> - High water consumption patterns - High level of losses and non-revenue water - High specific power consumption due to outworn equipment - High river pollution due to no waste water treatment
Limitations in: <ul style="list-style-type: none"> ➤ Funds for investments ➤ Performance of facilities ➤ Energy and water supply (shortages) ➤ Incentives to invest in energy efficient technologies ➤ Awareness of energy efficiency 	<ul style="list-style-type: none"> ❖ Out-dated, inefficient and partly or worn-out equipment and facilities ❖ Decreasing availability of facilities and unreliable supply, such as electricity and water supply ❖ Limited capacities on preparation and implementation of energy 	

Economic and demographic challenges	Overall municipal level energy challenges	Sector specific challenges
<p>Other influences</p> <p>Weak energy efficiency policy implementation</p> <p>Transport planning needs to be urgently included under the strategy of Municipality development plan</p>	<p>saving and retrofit measures</p> <ul style="list-style-type: none"> ❖ Limited capacities of human capital: municipal staff does not have the right skills or for enforcement of energy performance regulation ❖ Generally low awareness of energy efficiency opportunities and behaviour 	<p>Solid waste</p> <ul style="list-style-type: none"> - High and increasing fuel costs for waste fleet - Low rate of recycling and energetic use - Demand for environmentally conform landfill site
	<ul style="list-style-type: none"> ❖ Municipal staff does not have the right skills for preparing the proposer transport plan taking into consideration technical, financial and environmental benefits 	<p>Public transport</p> <ul style="list-style-type: none"> - Extremely low share of public transport versus total transport, - Low quality comfort from public transport, - Absence of rail and water public transport, - High specific fuel consumption from public transport fleet. <p>Private transport:</p> <ul style="list-style-type: none"> - Very old fleet of private transport, - High specific fuel consumption from private transport fleet. - Not proper transport planning

2.3 Overview on energy and GHG situation

This chapter focuses on the energy and greenhouse gas situation in the municipality of Berat. Annex F provides additional information about the national energy sector, stakeholders involved, and targets of the National Energy and Climate Plan (NECP) until 2030.

2.3.1 Municipal energy and GHG situation

To comprehensively assess the initial energy and GHG emission⁸ status of Berat Municipality, a thorough analysis was carried out by the EMS Consultants with the baseline year of 2021.

The **Final Energy Consumption (FEC) balance** comprise the consumption in GWh in 2021 disaggregated by type of energy and sector of consumption, and is in full line with Eurostat standard and NACE codes⁹. Based on that, a **Primary Energy Consumption (PEC) balance** has been established, comprising transformation and distribution losses of different types of energy. The GHG emission balance indicates the CO₂ emissions, in ton CO₂eq in 2021, which enables to identify sectors of highest emissions with respective reduction potential.

Overview energy carriers in the Primary Energy Consumption (PEC): In 2021, the total primary energy consumed in Berat was 648.8 GWh of which liquid fossil fuels (diesel, LPG, gasoline and fuel oil) is the biggest consumption with about 39%, followed by electricity with 38% and then coal, biomass and solar energy, with 11%, 9% and 2% respectively, while gas and other fuels are not available or with insignificant use. Energy transformation and distribution losses account for 3% of PEC, mainly due to losses at the power distribution system.

Overview energy carriers in Final Energy Consumption (FEC): The energy flow of Berat in the baseline year 2021 is presented as a Sankey diagram, summing up the municipal wide **final energy consumption of 615.39 GWh**. The largest use of the FEC are fossil fuels (42%), in form of car fuels as well as LPG and fuel oil, followed by electricity holding 41% of FEC, coal for industrial applications with 12%, biomass for heating purposes in form of fire wood and pellets with 10%, and then solar energy with 2%.

Overview sectors: The residential sector consumes annually 206.6 GWh, representing 34% of FEC. Local industry consumes annually 147.8 GWh representing 24% of FEC, services (commercial, trade) consume annually 74.8 GWh representing 12% of FEC, and agricultural sector consumes annually 44.3 GWh representing 7% of FEC. Energy consumption of individual and commercial transportation summarise to about 124.5 GWh, or 20% of FEC. Figure 2-2 presents the energy Balance for Berat Municipality.

⁸ The following process of data collection, aggregation, calculations and balancing has been applied:

- Expert team aggregation of data collected from municipality
- For direct municipality sectors: collecting of data from the municipality and municipal service providers, through a questionnaire and follow-up calibration through interviews of municipal stakeholders
- For indirect municipality sectors (according to the NECAP and INSTAT/Eurostat are: residential, service, industry, transport, agriculture): downscaling from the Energy Balance of Albania for the data for Berat, based on the population and GDP of Municipality versus National values
- Emission factors are used for municipal climate planning as they are used in GHG IPCC Inventory-UNCCC (same like 1st, 2ndA, 3rd, 4th GHG Inventory of Albania)
- Energy prices declared for each energy commodity by Municipalities and taking into consideration also increase of 2022

⁹ The NACE codes are a classification system used to categorize economic activities in the European Union. The acronym stands for “Nomenclature statistique des activités économiques dans la Communauté européenne”

SECTION A: MUNICIPAL ENERGY AND CLIMATE ACTION PLAN

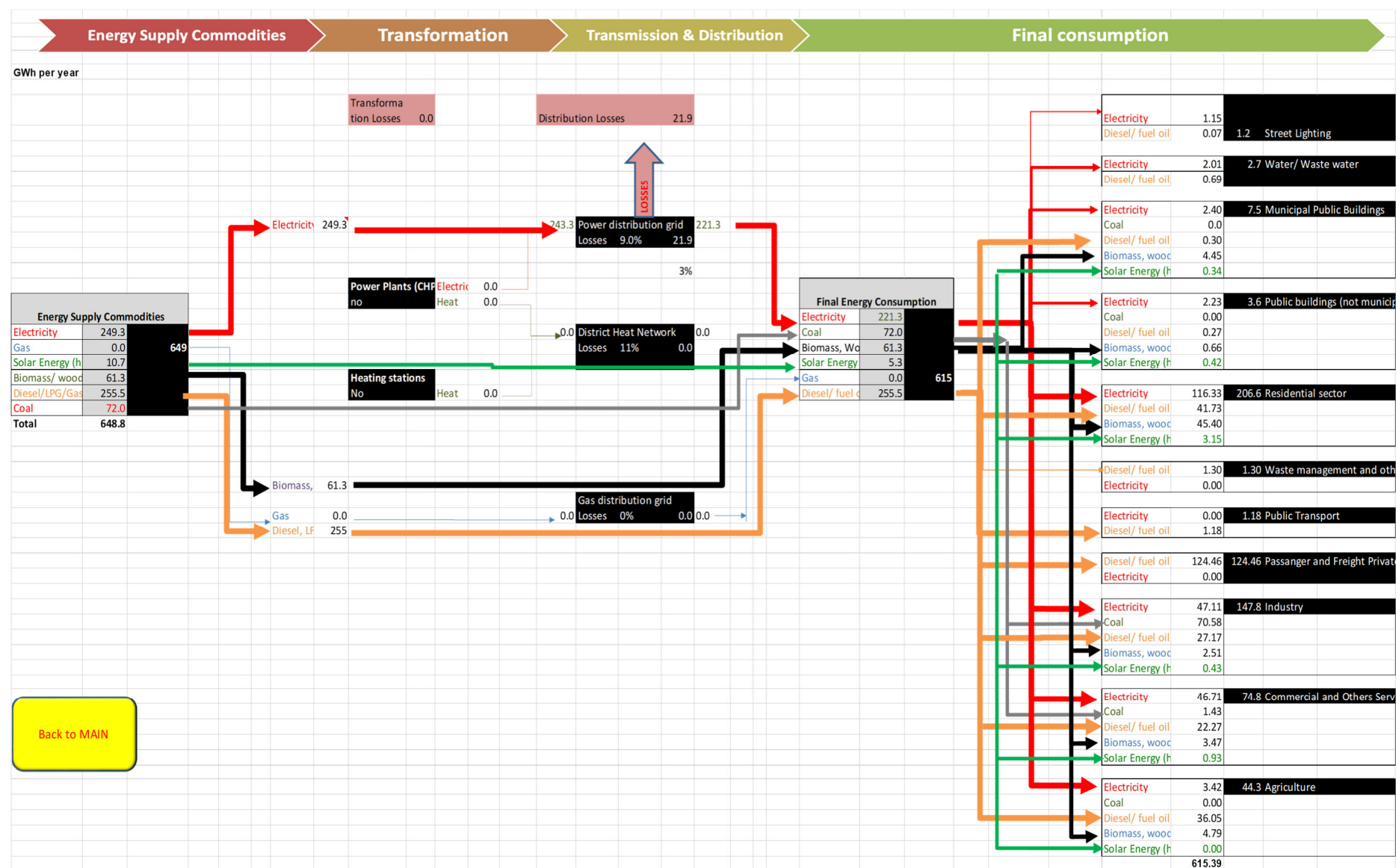


Figure 2-2: Energy Balance for Berat Municipality (year 2021)

Municipal sectors: The FEC of municipal sectors is at 13.88 GWh, representing only 2% of the municipal wide FEC. Among that 54% are used in municipal public building consuming 7.5 GWh per year, of which fire wood and pellets dominate the consumption. Notably, the dominant energy sources for this consumption are firewood and pellets (Figures 2-3 and 2-4).

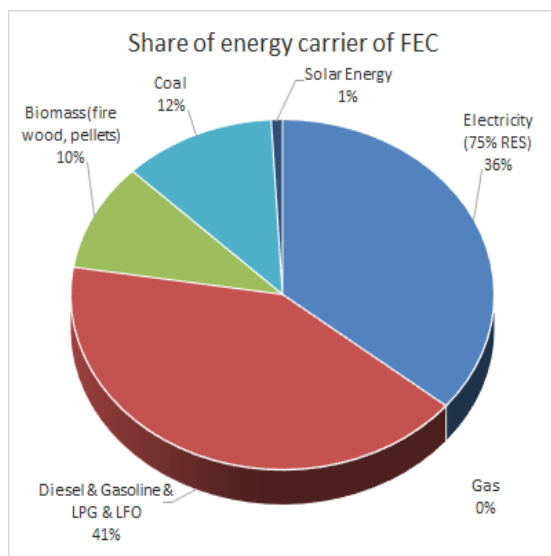


Figure 2-3: Share of energy commodities of the final energy consumption

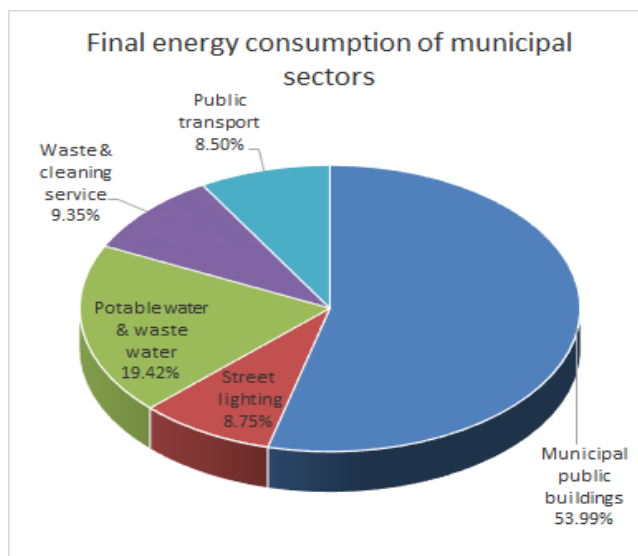


Figure 2-4: Final energy consumption of municipal sectors

Interpretation of Energy performance:

To enable the comparison of the energy performance of Berat with peer cities, Key Performance Indicators (KPI) have been established for (i) municipal wide developments and (ii) for each sector . Table 2-2 provides a summary of the most relevant sectoral KPIs.

Table 2-2: Summary benchmarking of KPIs of Berat by sector

Sector	Selected KPI	Values	Comparison with other regions	Saving potential
Municipal-wide KPIs	Annual primary energy consumption per capita	6,386 kWh/capita/annum	EU average: 36,129 kWh/capita ¹⁰	
	Primary electricity consumption per capita	3,836 kWh/capita/annum	Germany 2022: 6,670 kWh/capita ¹¹	
	Annual GHG emission (CO ₂ eq) per capita	1.85 t CO ₂ eq./cap	EU average: 6 t CO ₂ eq./capita ¹²	
	Municipal budget expenditure of energy per capita	17 EUR/cap		

¹⁰ <https://ourworldindata.org/grapher/per-capita-energy-use?tab=table>

¹¹ <https://www.statista.com/statistics/1262218/per-capita-electricity-consumption-europe-by-country/>

¹² <https://ourworldindata.org/grapher/co-emissions-per-capita?tab=table>

Solid waste	Annual waste generation	121 kg/capita	EU average 527 kg/capita ¹³	10-20%
	Solid waste recycled	9 %	Low performance	10-20%
Water supply and waste water	Energy density of potable water production	0.16 kWh _e /m ³	EU average ca. 0.2 kWh _e /m ³ ¹⁴	20-25%
	Percentage of non-revenue water	60%	low performance	40-50%
Street lighting	Annual electricity consumed per lit road	20 kWh _e /m	EU average 22 kWh _e /m ¹⁵ Medium performance	30%
Municipal public buildings	Annual energy consumption	177 kWh _{th} /m ² 18 kWh _{el} /m ²	EU average: 280 kWh/m ² (thermal and electric) ¹⁶ medium performance with high savings potential	40-50%
Municipal public transport	Public transport energy consumption	0.2 MJ/pass km	EU average: Bus: 0.8 MJ/pass km ¹⁷ High performance	10-20%

Interpretation of Energy Performance: The comparison of primary energy consumption per capita with peer cities shows a lower level of performance, indicating a higher specific energy consumption per resident and year. While the specific energy consumption is relatively elevated, a direct comparison with other municipalities places Berat in the lower performance category. This is attributed to the balanced provision of services and a moderate GDP per capita, rather than the adoption of highly efficient energy technologies at an elevated energy service level. Consequently, the Municipality of Berat ranks unfavourably in terms of specific energy consumption per capita.

Energy Trends: The benchmark indicates a theoretical potential for energy savings and shows the Relative Energy Intensity (REI). In addition, the benchmarking demonstrates that the majority of performance indicators ranks low (unfavourable) in terms of specific energy consumption, in particular for the sectors:

- Specific energy consumption in public buildings of 195 kWh/m² is representing low performance;
- Energy density for potable water production of 0.16 kWh/m³ is a high value due to high commercial and technical network losses.

Interpretation of GHG Emissions: Considering the consumed fuel types across various sectors, the total emissions balance aggregates to approximately 185 kt CO₂eq in the year 2021 for all direct and indirect

¹³ [EU: waste generation per capita | Statista](#)

¹⁴ [Europe's Water in Figures An overview of the European drinking water and waste water sectors](#)

¹⁵ [Lighting is used on more than 1.6 million km of roads in EU28 countries, accounting for some 35 TWh of electricity consumption \(1.3% of total electricity consumption\) and costing public authorities almost €4000 million each year \(Traverso et al., 2017\).](#)

¹⁶ Buildings Performance Institute Europe (BPIE, 2011:6)

¹⁷ Energy consumption in transport — European Environment Agency (europa.eu)

sectors in Berat municipality. The emission factor for electricity in Albania counts for 0.38 t CO₂/MWh and combines a large portion of domestically 'green' generated power from hydropower, but also a significant share of imported electricity from neighboring countries, which is generated by coal. Thus, the high share of electricity of PEC, and considering the distribution losses drives electricity of the PEC to the lead emission source with 93 kt CO₂eq, or 50% of total GHG emissions; among the emissions from electricity system losses and sector cluster commercial/trade/tertiary are highest.

An expert estimated projection of a business-as-usual scenario for energy and GHG emission shows:

- An increase of PEC by 11% in 2030 and by 49% in 2040 (310 GWh), compared to the baseline year 2021.
- An increase of CO₂ emissions by 14% in 2030 and by 54% in 2040 (101 kt CO₂eq), compared to the baseline year 2021.

The measures of MECAP will counteract that escalations resulting from increasing the comfort level for the all residential families and all services carried out from the Berat Municipality under their direct jurisdiction.

2.3.2 Expenditures for energy

Municipal Energy Expenditure and Budget Overview: The annual municipal budget amounted to EUR 10.76 million in 2021. The existing budget amount includes all funding sources and expenditures. The revenue structure of Berat Municipality for 2021 included:

- Local government revenues (local financing): Generated through local government sources to cover operational and capital expenses, including local taxes and fees¹⁸;
- Grant/unconditional transfer (transfer from the central government to local governments);
- Conditional transfers (from central government to local government thru the line ministries).

Revenues from collection of local taxes and levies are about 3.47 million EUR. Almost 50% of the current expenses are used for operation and maintenance. Unconditional governmental transfers were about 7.29 million EUR of which the municipality is obliged to spend 40% on investments. Unconditional transfers are allocated based on a social-economic formula defined by the Ministry of Finance and Economy.

The municipal budget of Berat is forecasted to reach 12.86 million EUR in 2030 (due to accrued savings and outstanding receivables). For the next years an annual growth of the municipal budget of 3-5% is expected mainly due to increase of collection for local tax and fees.

The municipality is entrusted with the operation of the public facilities (public buildings, street lighting, public transport, cleaning/waste management, water supply and waste water) within the municipal boundaries. This comprises payment of energy bills, maintenance and investments in retrofit and extension. The operation costs are included in the overall municipal budget and are covered partly from municipal revenues and central government transfers. The level of transfer from central government to the municipality is calculated based on a fixed formula of socio-economic factors. The municipality has the discretion to reallocate funds according to demand and availability, i.e. reduced spending in one sector – like energy expenditures - will not lead to a reduction of from central budget transfers but funds can be utilized for other tasks at the discretion of the municipality.

¹⁸ Two of the local taxes, the tax on registration of vehicles and the tax on immovable property transfer, are legally defined as local taxes in the Law on Local Government Tax System. However, local governments have no discretion over the tax rate, the decision to levy the tax or not, and they do not collect it. Instead, the rate is set by the national Parliament and the tax is collected by the national government and thereafter transferred to the local government (less a fee for collection).

Tax collection efficiency by the municipality is reported to be 95%. The municipal budget (costs/ revenues) is balanced and the municipality reports no debts or credits. Berat is ranked as a category I (highest) creditor for creditworthiness and financial performance by the Ministry of Finance.

Main municipal budget expenditures are staff, investments and municipal services, such as funerals, lighting, cleaning, waste management, public buildings. The municipal services for water supply and cleaning include waste disposal and are contracted out to municipal subsidiary companies. The municipality reports that the revenues for those services are cost covering, which means that no municipal subsidies are necessary to balance deficits at the end of the year. The public transport services are licensed, and operated covering costs fully.

The municipality is responsible for managing public facilities within its boundaries, covering areas such as public buildings, street lighting, public transport, cleaning/waste management, water supply, and waste water. This entails energy bill payments, maintenance, retrofitting, and extensions. Operational costs are covered by a combination of municipal revenues and central government transfers. The level of transfer from the central government is determined by a fixed formula based on socio-economic factors. The municipality has the flexibility to reallocate funds based on demand and availability, ensuring that reduced spending in one area, such as energy, does not directly impact central budget transfers. Tax collection efficiency by the municipality is reported to be 90%. However it is important to be mentioned that current local tax per capita is very low 34.73 Euro/capita. So, in the upcoming years local taxes need to be increased in order to cover all investment and operational costs for municipal services. The municipality maintains a balanced budget with no reported debts or credits. Berat holds the highest Category I ranking for creditworthiness and financial performance according to the Ministry of Finance and Economy.

Energy costs and municipal consumption: Key expenditures from the municipal budget encompass staff, investments, and energy expenditures for municipal services such as lighting, cleaning, waste management, and public buildings. Municipal services related to water supply and cleaning are outsourced to subsidiary companies, with revenues covering costs, eliminating the need for municipal subsidies to address year-end deficits. Public transport services are licensed and operated on a fully cost-covering basis (Table 2-3).

Table 2-3: Municipal energy spending

Energy spending (for sectors: municipal public transport, municipal buildings, street lighting, waste, water and waste water services) in 2021	1.687 million EUR
Of which energy spending for municipal buildings	0.734 million EUR
Energy spending as percentage of annual budget	15.59%

As shown in Figure 2-5, 43% of this expenditure is related to the energy supply of municipal buildings. The expenses per unit of energy (kWh) for public entities exhibit significant variation, contingent on the energy type and quality. For instance, the cost per kWh for gasoline fuel is three times higher compared to the cost per kWh from wood.

Although energy consumption in sectors under direct municipal control accounts around 2% of total municipal energy consumption, it is important to highlight effective measures in these sectors. Such efforts serve to raise citizens' awareness of potential opportunities and promote understanding of the resulting benefits. In addition, energy savings in these sectors directly contribute to reducing energy costs, thereby relieving the municipal budget and reducing the need for government subsidies.



Figure 2-5: Costs for energy of municipal sectors, 2021

3 POLICIES AND MEASURES

3.1 Conclusion from Diagnostic: Prioritization

The analysis of the energy situation in Berat was based on data queries and evaluations, interviews and workshops with the responsible persons in the MEMU following the process of the European Energy Award Management Tool (EMT).

An initial energy review with the EMT was carried out in 2022 for Berat municipality. The evaluation span all 6 areas in which the municipality is active in terms of energy policy (see Chapter 1.3).

The municipality achieved the best implementation quality in the areas of internal organisation and mobility, followed by energy supply and municipal buildings (average rating). The highest potential still exists in the areas of planning principles and strategies as well as communication and cooperation.

The latter two areas are particularly important to address, as they are very relevant for influencing the indirect sectors. In particular, the planning principles and strategies provide basic guidelines for the entire municipal area. Communication and cooperation with third parties is important in order to draw interest from other stakeholders such as residents, trade, industry, etc. in the topic of energy efficiency and RES. An integral component of the municipal energy diagnostic process involves assessing the extent of authority or control that the municipality can wield over municipal energy stakeholders.

The analysis of energy consumption data on the municipal territory shows the different energy saving potentials. However, this analysis confirms that the sectors with the highest savings potentials are not under the municipal administration's direct control (Figure 3-1).

Scope of Influence: As a result of diverse legal and regulatory frameworks, the municipality possesses varying degrees of influence and control over utilities and end-consumers. Different forms of ownership of energy-consuming facilities across various sectors either constrain or enhance budgetary control and enforcement authority. The municipality has full control over the sectors of municipal public buildings, street lighting, water supply and wastewater, waste management, and to a lesser extent public transport. Those areas are congruent with Area 2 (Municipal Building and Facilities), Area 3 (Supply and Disposal), and Area 4 (Mobility) of the European Energy Award. This shows that the European Energy Award is a practical approach that already includes sector prioritization for municipal energy management. The EMS adapted to Albania is based on the European Energy Award, which allows municipalities to start implementing municipal energy management very quickly.

A critical requirement for successful implementation of the MECAP is to build institutional capacities within the municipal administration to ensure that program activities are effectively prepared and implemented and communicated. These aspects are covered in Area 5 (Internal organization) and Area 6 (Communication) of the European Energy Award.

3.2 Action Plan

The action plan developed with this MECAP considers the already started and implemented activities of the municipality. Within the qualitative assessment in 2022, the status of implementation has been documented and based on this assessment gaps and potentials have been identified. As an example, the municipality of Berat was able in the past to develop infrastructure investment projects and acquire funding from international donors. With financial support of international donors and International Financing Institutions (IFIs) from SECO; EU and KfW the Water Supply and Wastewater Project is under way in the municipality. After completion of the project on water supply and wastewater treatment plant (WWTP) in 2027, this will result into reduction of the energy consumption in the water sector, thus it will be listed in the MECAP to consider its results in the future energy balance, compared to the baseline year 2021.

3.2.1 Intervention strategy and types of measures

The MECAP action plan is based on two types of interventions, namely investments and non-investment measures.

- A) **INVESTMENT MEASURES:** They comprise a pipeline of direct EE investment projects that can generate physical energy savings with co-benefits in the form of increase of services and comfort at end-users, in addition to reducing Operational & Maintenance (O&M) costs¹⁹. The investments should be prioritized based on:
- 1) **Reduction of energy demand and consumption** for end-users;
 - 2) **Reduction of energy losses** for power distribution;
 - 3) **Reduction of GHG emissions;** and
 - 4) **Use of clean renewable energy sources (RES)**, whenever these are technically and economically feasible to substitute fossil fuels.
- B) **ACCOMPANYING MEASURES LIKE ADDITIONAL NON-INVESTMENT MEASURES AND POLICIES AT MUNICIPAL LEVEL:** These are requirements and prerequisites for:
- 1) **Municipal Policy & Regulation:** To develop, streamline and implement strategies and planning tools regarding energy policy, to adjust the regulatory framework to stimulate, support and enforce EE initiatives;
 - 2) **Investment Preparation:** to enable the investment program implementation by investment preparation and development of delivery mechanisms;
 - 3) **Training, Capacity Building & Information:** to develop local staff and institutional capacity, and to raise public awareness on EE;
 - 4) **O&M management and monitoring:** to guarantee the efficient and effective operation and management of services.

The investment and non-investment measures of the MECAP have been developed during a complex process that comprised (i) interviews with relevant stakeholders of the municipality of Berat, (ii) available investment plans from utilities and service suppliers, (iii) analysis of existing and previous EE and urban

¹⁹ Investments for the extension of urban infrastructure and performance increase of utilities are not listed in the EE plan, since those measures will not have a direct saving effect compare to the baseline energy consumption of the year 2021, they are not an inherent part of the MECAP.

development plans, (iv) recommendations from the assessment with the EEA tools, and (v) expert recommendations on relevant EE measures, based on experience and best practices.

A crucial requirement for the successful preparation and the implementation of a MECAP is the ownership and commitment of all municipal stakeholders and the MEMU, in particular. In order to trigger this ownership, a structured sector analysis to define challenges and necessary measures along with an understanding of the associated co-benefits, needs to be developed and communicated to relevant stakeholders. A critical requirement for successful MECAP implementation is to build up institutional capacities and to create a focal point for energy efficiency, RES development and climate mitigation and adaptation investments in the municipality, for instance by establishing a dedicated municipal unit within the municipality, which is nominated as MEMU.

3.2.2 Implementation Roadmap

Beside a sound diagnostic, this MECAP sets a clear focus on implementation of the MECAP and its measures. Annex B contains a "Long-List" of all 89 measures that need to be implemented to achieve the goals by 2030 and 2040.

To facilitate effective planning, the measures have been prioritized based on their urgency, resulting in a "Short-List" which is provided in Annex C. The short list contains 61 measures that should be started within the next two years. This includes 15 measures with priority 1, which should be implemented in the next budgeting period. The "Short-List" will be reviewed annually, with the possibility of adding new measures. See also Chapter 3.8 for more details on the monitoring process.

When selecting annual priority measures, it is recommended to define a realistic, implementable choice of activities, considering the available financial and budgetary constraints and funding opportunities for investment measures but also considering the necessary operation and maintenance efforts as well as accompanying non-investment measures.

3.3 Projections with existing and planned measures

3.3.1 Energy savings by sector

Implementation of the MECAP comprising 89 measures (29 investment measures and 60 accompanying, non-investment measures) has the potential to save up to 134 GWh/year final energy (equal to 20% of total baseline energy demand) and generate clean renewable energy up to 84 GWh/year in the target year 2040 which is equivalent to 13% of the municipal wide final energy consumption of the baseline 2021 (615 GWh/year).

According to the BAU scenario without implementation of EE/RE measures the FEC will reach 947 GWh in the year 2040, which is justified by the following assumed drivers of development if the municipality over the next 15 years:

- 1-1.5% annual growth of population (from the year 2030) with linked growth of regional economy;
- Improved of comfort, in particular in residential sector, as well as increasing demand of mobility which leads to higher energy consumption;
- Extension of public infrastructure, water, electricity, transport; and
- Improvement of municipal services, such as water supply, public buildings.

The achievable energy savings by implementing MECAP can steer against this trend and reduce the energy intensity drastically, as it is presented in the following graph. Compared to the baseline FEC, **combined energy savings and RE production in the active scenario will amount to 218 GWh/year**, representing 33% saving ratio. The interim targets for 2030 can be achieved as (i) 20% GHG emission saving and (ii) 44% share of RES.

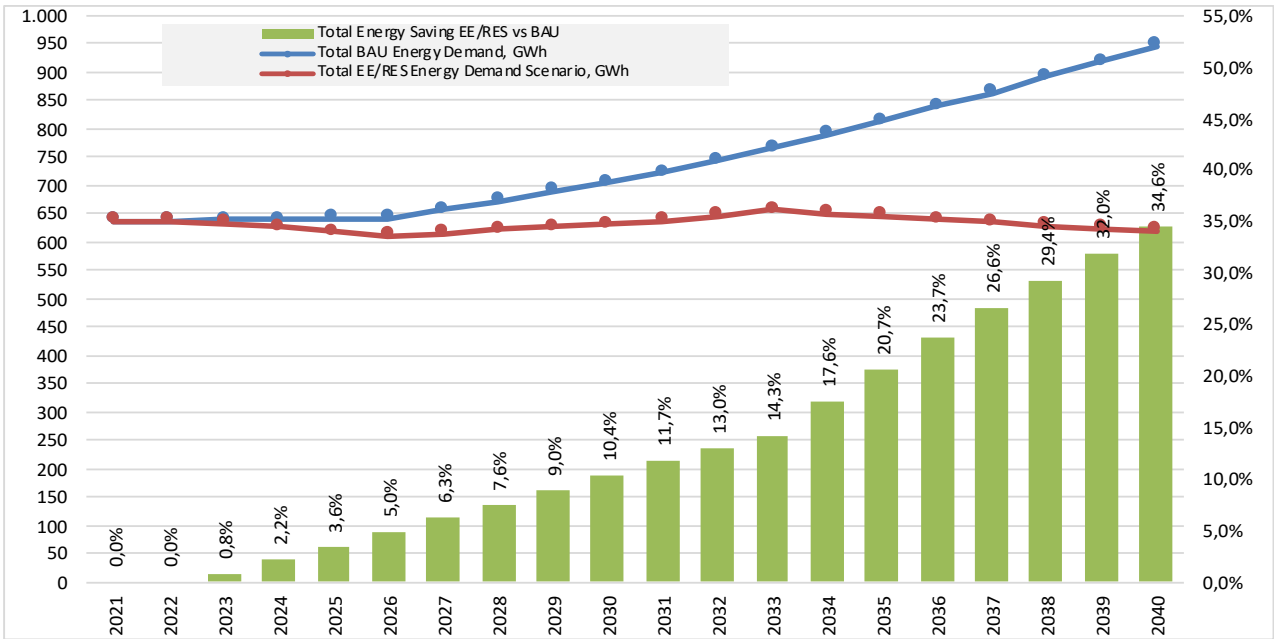


Figure 3-1: BAU and Active) scenarios

Out of the long-list of 89 measures, 51 measures are related to municipal energy sectors (street lighting, water/waste water, municipal buildings, waste management, public transport) and have an energy saving potential of 16.2 GWh/year, versus baseline scenario.

In the active scenario, the highest energy savings can be achieved in the sector of municipal building with saving potential of 45-50%, 4 GWh/year, while the boosted utilization of renewable energies in sectors water and waste management can deliver up to 9.3 GWh annually for active scenario for the year 2040.

In non-municipal sectors the implementation of measures in residential and commercial sector have the potential to deliver 230 GWh of annual savings as shown in the Figures below.

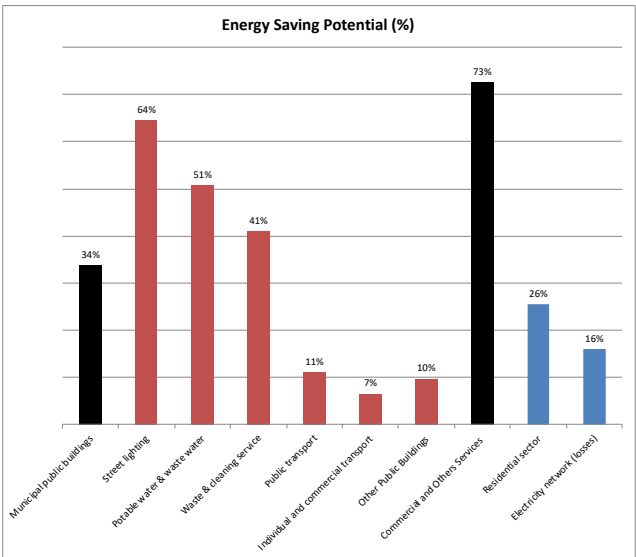


Figure 3-3: Energy saving ratio by sector

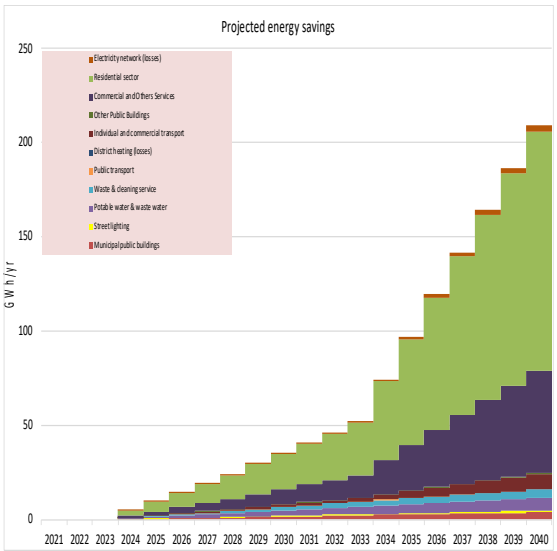


Figure 3-4: Projected energy savings compared to baseline 2021

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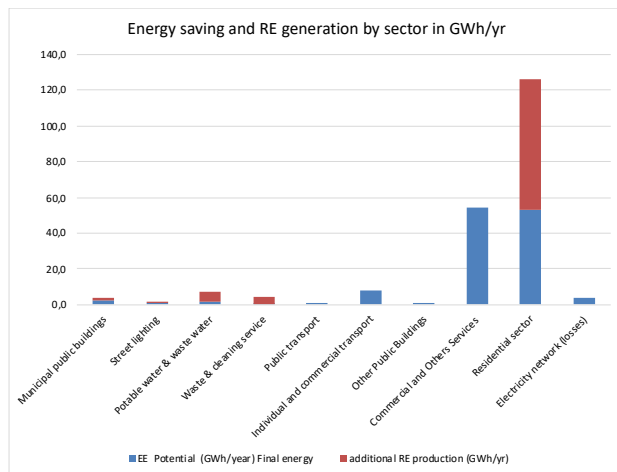


Figure 3-5: Energy savings and RES by 2040

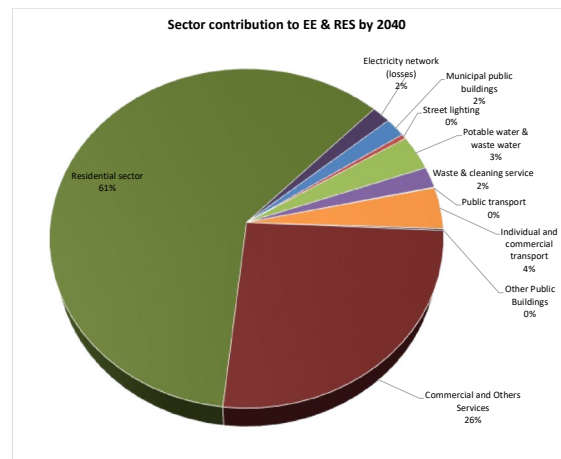


Figure 3-6: Sector contribution to EE & RES by 2040

Certainly, direct investment measures will deliver the highest energy savings, while it will not be possible to implement them without the linked accompanying measures, which are curtail for project preparation, generation of commitment, support and fund raising as well as capacity building.

The total achievable **cumulative energy savings** by implementation of the MECAP **over the period of 2024 to 2040** will amount to 1,979 GWh, resulting into a specific energy saving of 4.88 kWh per EUR investment or a specific investment demand of 0.205 EUR per saved kWh (equal to 17.56 ALL/kWh). This represents approximately the same level the projected average energy costs for the next 20 years. This is calculated under the consideration the energy cost escalation scenario of annually 2% for the period 2022 to 2040.

Focus on municipal service sectors

Total energy savings by implementing 28 measures in the municipal service sectors will amount to 5.3 GWh energy savings and 10.8 GWh additional RES production per year in the target year 2040, which represent a saving ratio of almost 100 %. The projected energy cost savings for the municipal budget of approximately 3.8 million EUR comparing baseline and the active scenario in the year 2040.

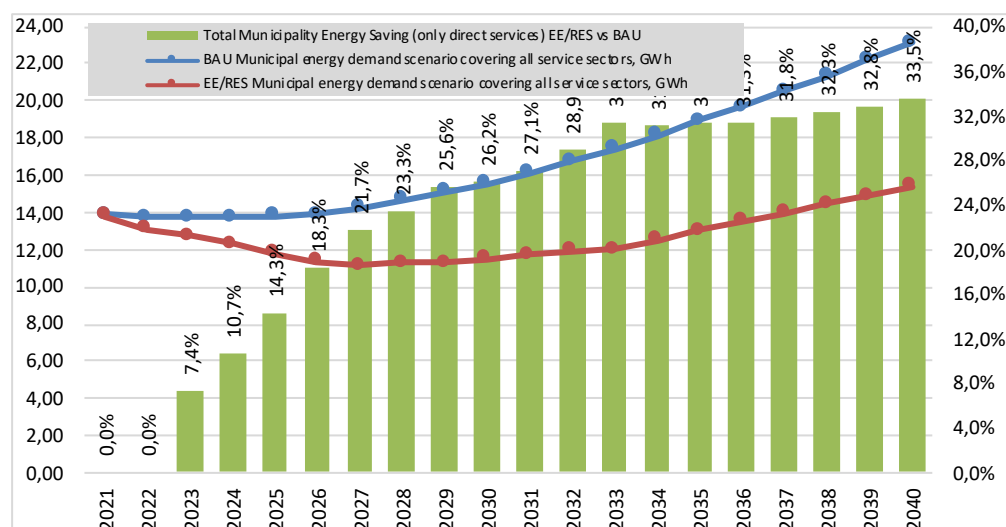


Figure 3-7: Projection of BAU and EE/RES Energy Demand Scenarios in direct municipal service sectors (municipal public buildings, street lighting, water & WW, public transport and waste management)

3.3.2 Emission savings

Based on the energy balance of Berat, the CO₂ emissions associated with the use of primary energy carriers (electricity, wood, and gasoline) amounted to 184,000 tons in the baseline year of 2021, and 285,000 to CO₂ in the year 2040 under BAU scenario. The largest contributor to greenhouse gas emissions at present is the commercial and residential sector, accounting for 50% of all CO₂ emissions. The potential for emissions reduction amounts annually for all direct and indirect sectors to 41,869 tons of CO₂ equivalent per year in the year 2030 and annually 151,614 tones of CO₂ equivalent in the year 2040. That represents an emission reduction ratio in 2030 of 20% and in 2040 of 53%, both in line with the target values of the government.

The high contribution to the reduction of greenhouse gas emissions in the water, wastewater, and municipal waste sectors is attributable to planned investments in renewable energy, particularly solar PV systems (Figure 3-8).

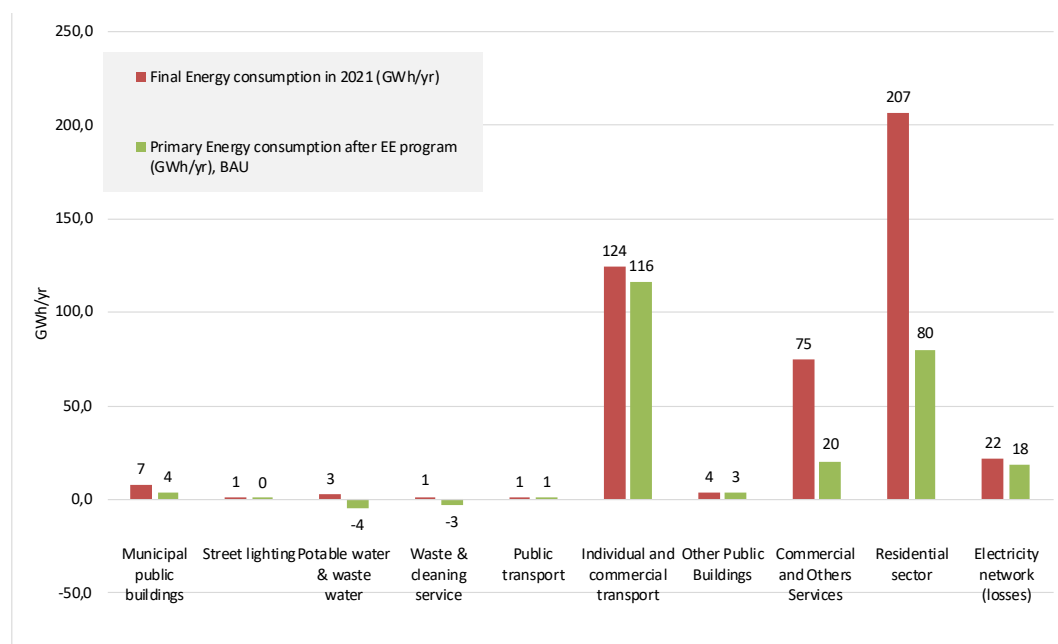


Figure 3-8: Comparison of energy consumption 2021 versus 2040

3.3.3 Profitability of investment packages

The payback time for each measure varies depending on the investment and the monetary benefits, spanning from **2 to more than 30 years**. In certain sectors, like water supply and public buildings, it is essential to factor in short-term socioeconomic and environmental needs and benefits within the cost-benefit analysis.

The overall specific primary energy savings amount to **0.5 kWh per year per EUR invested**. The profitability analysis of these investments hinges on several factors:

- The energy savings ratio in comparison to the baseline consumption of the facility and potential suppressed demand.
- The saved energy costs, taking into account specific energy tariff levels and their forecasted cost trends.
- The investment costs associated with the energy efficiency measures (Figure 3-9).

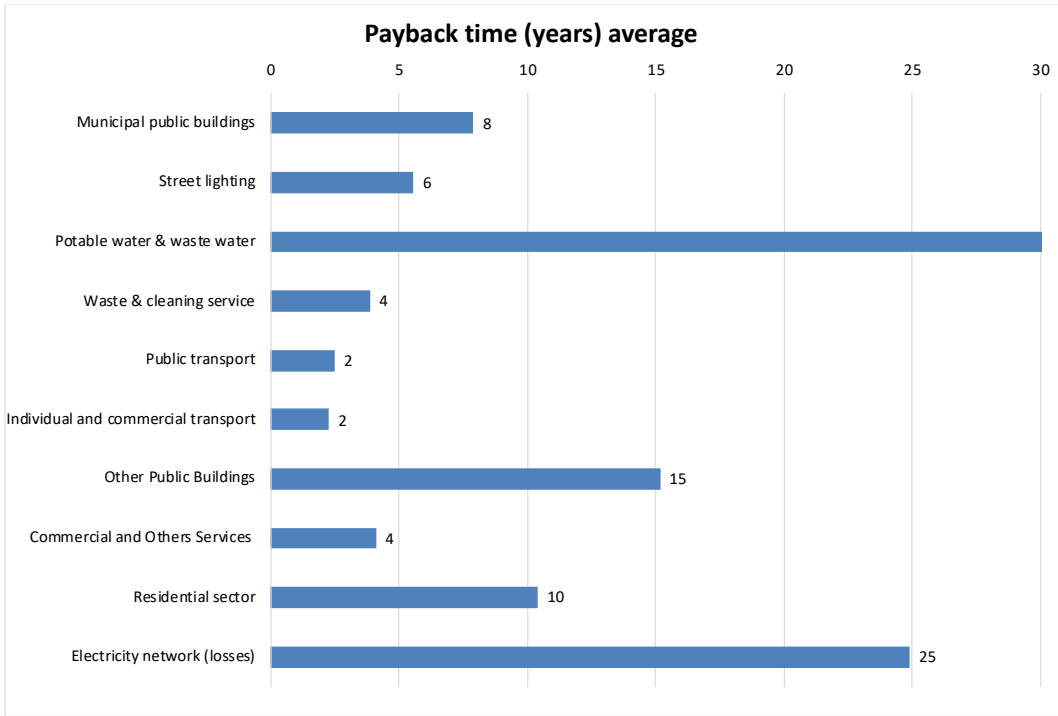


Figure 3-9: Average profitability of investment packages

It is important to note that evaluating the benefits of energy efficiency must consider that the current baseline energy consumption does not adhere to operational norms and standards due to energy shortages or budget constraints. For example, municipal public buildings are typically under-heated, public streets are inadequately lit, and access to potable water is limited to around 13 hours per day. While energy retrofits can indeed enhance service and comfort levels, the current energy and budget savings may be lower than one might typically expect. If we were to consider a baseline with energy consumption aligned with normative comfort levels, the theoretical energy savings could reach up to 80%, substantially reducing the payback time. Additionally, investment measures in the municipal waste management and wastewater sector generate additional urban environmental benefits that are challenging to quantify in monetary terms. Taking these factors into account could significantly shorten the payback time. Nearly 50% of investments are associated with the potable water supply and wastewater sector and which may be less profitable from an energy cost-saving perspective, they offer substantial social, economic, sanitary, and environmental benefits.

3.4 Investment costs, financing demand and financing strategy of the action plan

3.4.1 Investment costs calculation

Overall investments required for implementation of the 89 energy efficiency measures amounts **to 310 million EUR million until 2040 or 19.3 million EUR per year**. Please refer to annex E for assumptions of the financial assessment; costs or energy, costs for investments (Figure 3-10).

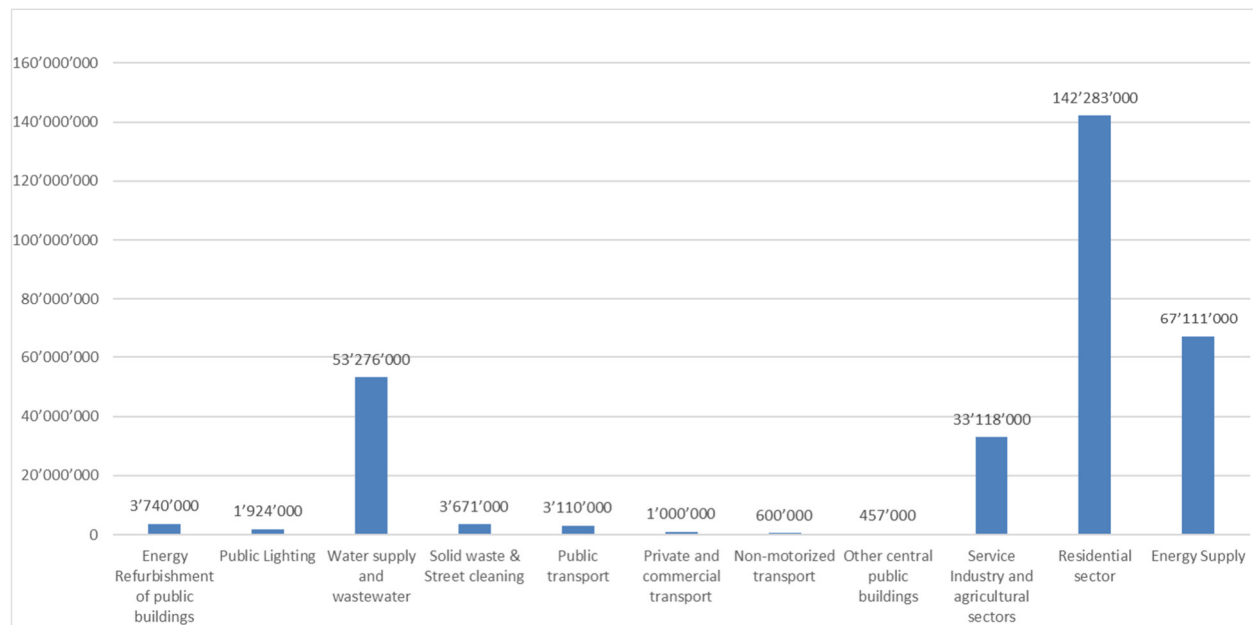


Figure 3-10: Investment costs of EE/RES measures for all sectors

The costs for municipal service sectors alone amount to 65.7 million EUR. Within this, the water and wastewater sector investments account for 81%. The comprehensive analysis comparing the baseline scenario with the active scenario yields two critical and compelling conclusions:

1. The share of Energy Costs for all Direct & Indirect Sectors relative to the Total Yearly GDP generated within Berat Municipality will be at the level 17% for the baseline scenario, but it will be reduced to 11 % for the active scenario. This difference represents substantial financial benefits for the municipality, is citizens, and businesses, in addition to environmental improvements and higher standards across all municipal direct and indirect sectors.
2. The share of Energy Costs for all Direct & Indirect Sectors compared to the Forecasted Total Yearly Municipality Budget for direct municipal service sectors will remain at 16% for the baseline scenario, but it will be reduced to 12% for the active scenario (see Figures 3-11 and 3-12). This difference translates into significant financial advantages for the municipality, accompanied by environmental enhancements and higher standards for all municipal direct and indirect sectors.

SECTION A: MUNICIPAL ENERGY AND CLIMATE ACTION PLAN

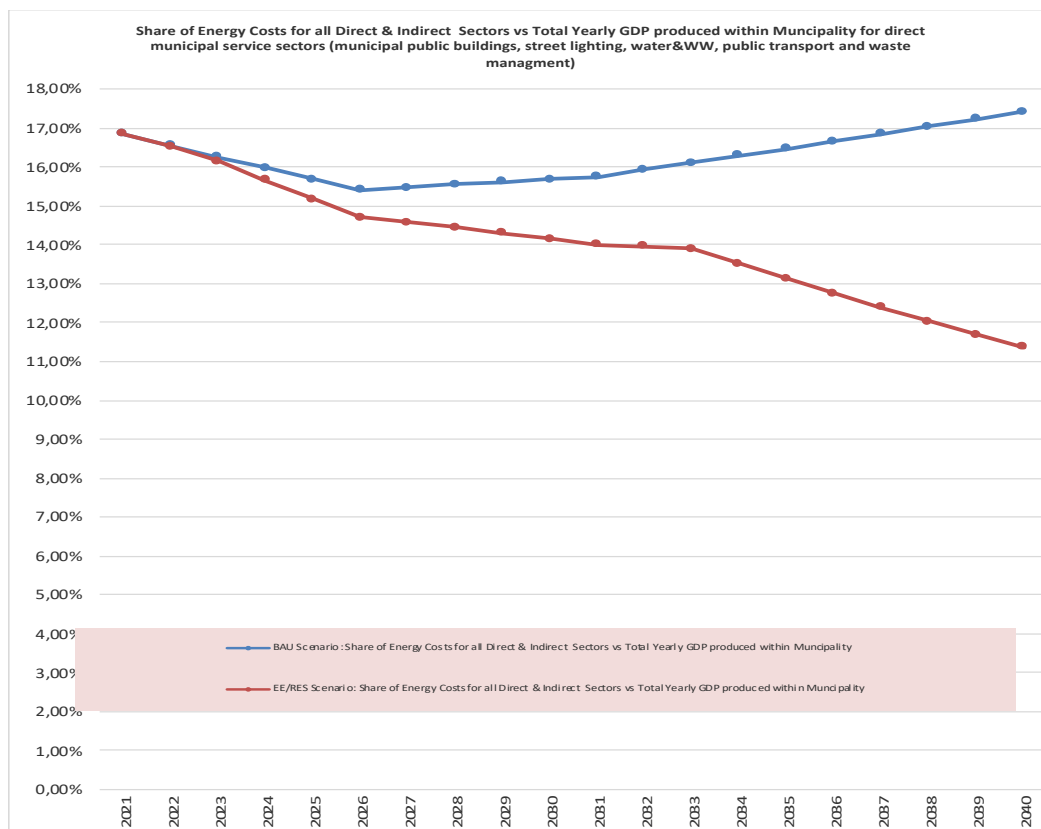


Figure 3-11: Share of Energy Costs for all Direct & Indirect Sectors vs Total Yearly GDP produced within Berat Municipality for both scenarios

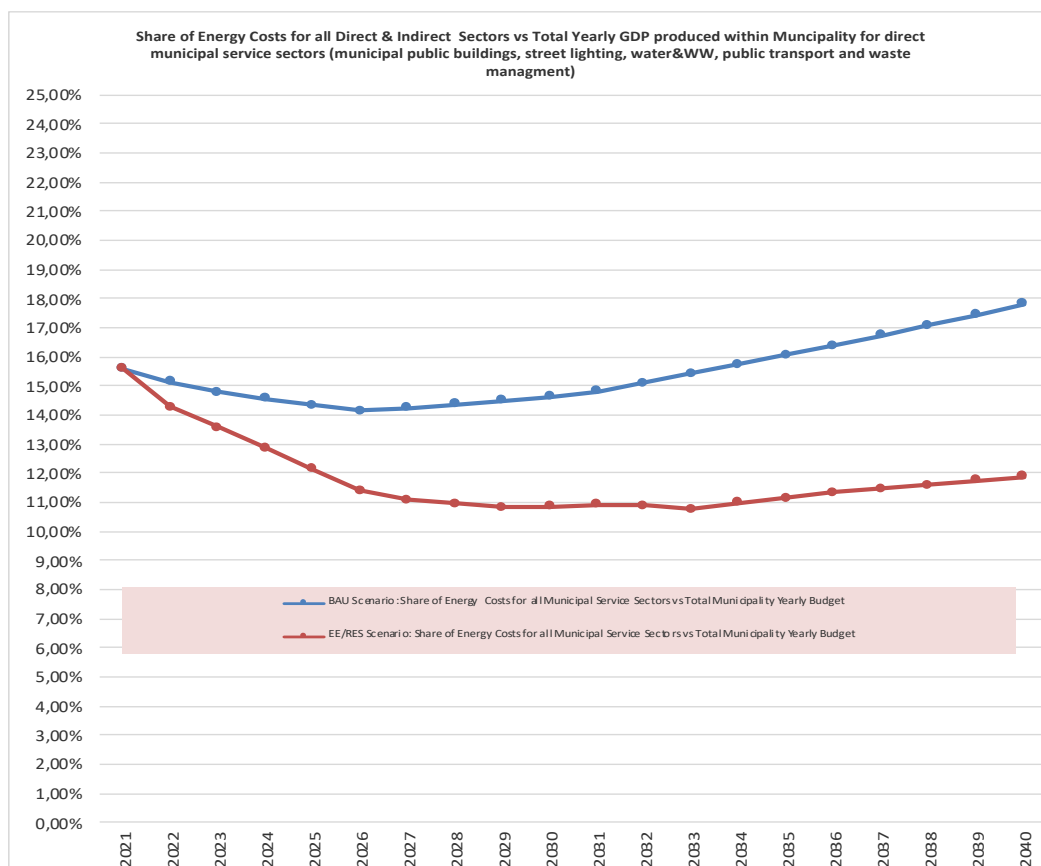


Figure 3-12: Share of Share of Energy Costs for municipal services vs Forecasted Total Yearly Municipality Budget

Based on this preliminary analysis, two key conclusions can be drawn:

- (i) It appears that the financial contribution from the municipality may be feasible, requiring a share of approximately 30% of the annual energy expenditure, which should not excessively strain the budget.
- (ii) Co-financing in energy efficiency and renewable energy measures is viable and could yield annual cost savings of up to 5.5 million EUR by the year 2040 for active scenario versus baseline scenario. The crucial elements for success will include securing external funding from donors and government programs, as well as incentivizing financial contributions from utilities through relevant business models.

3.4.2 Financing strategy for action plan

It is recommended to implement the EE program in 3 phases:

- Start in 2024 → priority 1 measures, incl. project preparation and capacity building measures, pilot and most profitable projects until 2028 (share of 20% of total costs)
- Intensive implementation phase during 2028-2034 (share of 25-30% of total costs)
- Remaining long-term projects during 2034-2040 (share of 50% of total costs)

Among the sectors there is a diverse responsibility, ownership of facilities, control by the municipality and expected benefits as described in the above sector analysis. Thus, different stakeholders shall be approached to contribute to the financing of the municipal EE program. Key stakeholders and consequently sources of financing are presented at Table 3-1.

Table 3-1: Potential financing sources for EE measures

Stakeholder	Main related sectors or projects	Financing source and type	Total expected financing for MECAP
Municipality of Berat	Municipal Public buildings, street lighting, waste, water, partly residential buildings	Municipal budget (grants)	16 million EUR, 5% of total
Central and regional governments and state owned utilities/ supply companies	Utilities: power, water, transport, waste	Central Governmental programs (grants or loans)	136 million EUR, 44% of total
Commercial entities (service suppliers), international donors and individuals	Public transport, power and water utility, resident buildings, commercial	Commercial funding (equity or loans), own contribution	158 million EUR, 51% of total

Considering the assumed speed of implementation and share of financial contribution by stakeholder groups **the demand for financing by the municipal budget will be in the range of 0.6 to 1.8 million EUR per year. That represents about 5-12% of the municipal budget.**

The calculated investment demand of 16 million EUR (over 16 years) exceeds the municipality's ability to deliver on the identified energy efficiency needs. At the same time, it is unlikely that Berat municipality will be able to obtain governmental grants or subsidized international funding to finance all of these measures. Consequently, alternative financing mechanisms need to be developed which should involve the private sector. Examples could be the initiation of the Public-Private-Partnership (PPP) or the initiation of Energy Performance Contracting (EPC), e.g. for energy efficient street lighting investment.

Box 3-1: Strategies for overcoming financing constraints

Despite the large potential for energy savings and reduction in operating expenses, there are a number of barriers to the implementation of MECAP measures, including:

- Insufficient cost-benefit analysis and feasibility studies in the project preparation process lead to inadequate results of public procurement for equipment and services;
- Constrained one-year budget appropriations limiting funding of capital upgrades.

Financing of municipal energy efficiency projects can be particularly challenging since municipalities are often locked into a vicious cycle of budget constraints for new investments while reliance on outworn infrastructure forces the municipality into the inefficient use of costly energy resources.

Measures for reducing energy consumption in the public sector will ultimately help curbing energy costs, thereby creating fiscal space for other municipal expenditures (e.g. social services, infrastructure investments, etc.). However, implementation of energy efficiency programs has been constrained, even in developed economies, by insufficient feasibility and technical analysis, by accounting rules, rigid public sector procurement practices and limited access to budget or project financing. For instance, without cost-benefit analysis and feasibility studies accurate technical specifications for sound EE requirements for e.g. energy efficiency building retrofits cannot be established. Materials and equipment of higher quality and better energy performance will have slightly higher initial costs but achieve higher energy costs savings during their life-time.

Of particular importance to achieve long-term energy saving benefits in infrastructure projects is the application of high professional construction and installation standards. The cheapest offer for installation/ construction works bears the risk of not using best practice by experienced installers. Consequently, public procurement procedures shall be adjusted - to the extent possible – to select those combinations of equipment and works performance with the optimum of cost and life-time benefits. For this purpose, the quality requirements in the technical specification of the tender documents must be precise and the evaluation process shall reflect this approach.

Investments in EE in municipal assets will help make municipal services affordable for consumers, while increasing fiscal space for municipal economic and social development activities.

However, it remains very challenging for infrastructure project financing due to limitations in municipal borrowing and the nascent development alternative financing instruments, such as private energy service companies (ESCOs). While the absolute energy savings potential in the municipal sector is small compared with those of the commercial and residential sectors, delays in shoring up financing for municipal EE improvements could significantly aggravate municipal budget stress and impair municipal services, thus weakening municipal governments' ability to effectively serve local populations.

The most critical element of government support for municipal EE financing is to help create and foster the development of sustainable financing and delivery mechanisms. In the short term, this would enable public funds to revolve, thus multiplying the impact of the initial funding. In the long term, it would attract and leverage commercial financing while maximizing private sector participation.

Dedicated governmental grant programs are currently rare, while grants from international sources are limited for medium and large-scale projects. Nevertheless, piloting EE financing is important to reduce market risk.

Going beyond all-grant financing, various countries have implemented a wide range of financing and delivery mechanisms, either to enhance the financial leverage of public funds or to gain access to commercial funding for municipal EE projects. These include:

- Budget financing with capital recovery;
- Direct lending by IFIs to municipal utilities (case of KfW and EU/SECO funding for water and wastewater sector);
- EE credit line for municipalities through existing financial institutions, such as a development bank or commercial banks (currently the EBRD GEFF focus on EE lending for residential and SME sector only).

3.5 Monitoring Process of MECAP Implementation

The Council of Ministers Decisions 189 date 5.4.2023 defines that Municipalities, through appointment of the energy manager/s (who will be part of the Municipal Energy Management Unit (MEMU)), regularly monitor the implementation of the MECAP and the achievement of energy savings and CO2 reduction objectives. For this purpose, in accordance with this article, it is required to be established a database by each municipality in order to record and maintain the energy consumption figures for all municipal services: public buildings, public streets lighting, collection and management of the municipality solid waste, water supply, sewage water treatment, public transport and all other municipal services.

The MECAP respective progress report should be prepared every year for implementation according to the format approved by the Ministry of Infrastructure and Energy no later than 12 months after the entry into force of this law.

The monitoring process is designed along the logic of the EMS system and the preparation of the MECAP in the first place. Data of the municipal sectors will be collected with the available supporting tool (EnerCoach). In parallel, the status of implementation of activities will be documented and evaluated in the EMT (European Energy Award Management Tool). Based on this analysis, next steps will be defined, the annual action plan will be drafted (as a sub-set of the long list), taking into account already implemented activities and current achievement of interim targets.

The findings will be described in the evaluation report and submitted by the end of March of the respective year to the AEE for approval. A full update of the MECAP is due every 5 years and includes also the update of the baseline emission inventory with the synthesis tool (Figure 3-13).

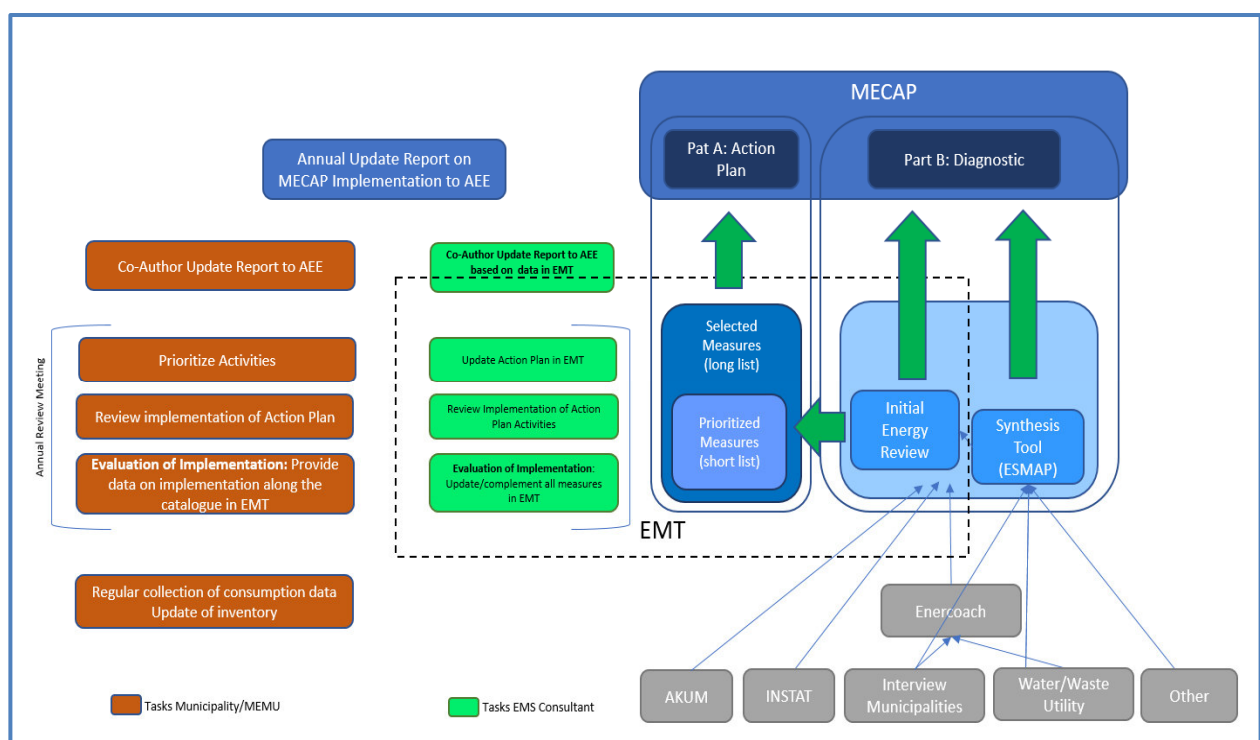


Figure 3-13: MECAP establishment process

SECTION B: DETAILED ASSESSMENT OF ENERGY AND CLIMATE SITUATION AND POTENTIALS

4 MUNICIPAL BUILDINGS & FACILITIES

4.1 Management, construction and refurbishment of public buildings

4.1.1 Legislative and regulatory framework

The key EU Directives and policies which are highly relevant for EE/RES/Green measures in the central and **municipal public buildings in SEMP Municipalities** in particular include: Directive 2012/27/EC on Energy Efficiency (EED); Directive 2010/31/EC on Energy Performance of Buildings (EPBD); Directive 2009/125/EC on Eco-design and Regulation (EU) 2017/1369 on Energy Labelling and delegated regulations and RES EU Directive. Albania is transposing and implementing the EU *acquis communautaire* and also adopted the EU Green Deal for the Western Balkans, adopted in November 2020, among others. In line with its obligations as a Contracting Party to the Energy Community and as part of Albania's strategic objective to accede to the EU, the government has aligned legislation with the legal framework (*acquis*) and the relevant Albanian primary legislation related to the improvement of EE/RES/Green measures in the central and municipal public buildings, including the following: Energy Efficiency Law No. 124/2015 and the updated March 2022 version; Law on EPB - No. 116/2016; RES Law No. 8/2017 and the updated March 2023 version; and Law No. 68/2012 on Information of the Consumption of Energy and Other Resources Products.

Albania has prepared a stand-alone law transposing the EU's EPBD. This includes the requirements under the directive that new buildings occupied and owned by public authorities must meet the NZEB definition after 31 December 2018. For buildings owned by a public authority with a total useful floor area exceeding 250 m² and which are frequented by the public, an energy performance certificate must be visibly displayed to all users. The Albanian law is in line with EU Directives. It distinguishes the Minimum Performance Requirements of Buildings (approved with No. 537 dated 8.7.2020) between different categories, such as renovated, new buildings, technical systems to be installed for heating, cooling etc. Albanian Government prepared the Energy Strategy which was approved on 8 August 2018. In line with this, Albania also approved the National Energy and Climate Plan (NECP) focusing, among other aspects, also on the renovation of central and municipal public buildings in the service sector.

EPBD and the Law on the Energy Performance in Buildings transposes parts of the Energy Performance in Buildings Directive and its key provisions are summarized below: Starting from 1 April 2022, 2% of the total area of the stock of municipal public buildings must be renovated every year to meet the minimum requirements for energy performance. The Building Renovation Strategy for residential, commercial, and public sector, is prepared and adopted in 2022. The Strategy provides the national building stock and identify cost-effective approaches to renovations relevant to the building type, climatic zone, and policies and measures to stimulate cost-effective renovations of buildings.

4.1.2 Initial Situation

The municipality of Berat is responsible for the operation and maintenance of the buildings located within its borders, including local administrative buildings, schools, kindergartens, local museums, bookstores, etc. The energy consumption of Municipal buildings is measured every month and it is reported to the Municipal department for the budget. The annual supply of fossil fuels such as gasoline/diesel is decided

by the Municipality based on the historical data and the available budget. However, the real energy demand is usually not met due to large losses.

Schools and kindergartens are operated by the Department of Education. In total, the Municipality operates 76 public buildings with a total area of 37,117 m², of which 39 are educational buildings, 21 kindergartens, with a total respective area of 28,000 m².

Most of the existing stock of public buildings was built between the years 1960 and 2000. The buildings exhibit large energy losses through their envelopes and single-glazed windows, thus requiring a large amount of energy spent on space heating. The heating supply is insufficient to ensure a normative heating. The municipality operates with a special brigade for the maintenance of 76 buildings, to preserve the structures and good performance of schools and kindergartens. However, the Municipality lacks funds for capital repairs or major energy efficiency measures. Municipal buildings are categorised into four main building typologies, as follows at Table 4-1:

Table 4-1: Public building stock of Berat Municipality

No.	Category of Municipality Public Buildings	Number	Floor Area (m ²)
1	Elementary and higher education buildings	39	20,248
2	Municipal day care and kindergarten buildings	21	7,740
3	Municipal administrative buildings	9	3,291
4	Social and community buildings	4	2,927
	TOTAL	76	37,117

Public municipal buildings are part of the service sector under Albanian Energy Balance. The Service Sector is divided into two branches, Public and Private. Space heating, domestic hot water and lighting for all sub-sectors generally achieves desired comfort levels, though there is an issue of old energy infrastructure in the public service institutions. Public building categories are broken down between the central public building stock (all central governmental and respective agencies) and municipal public buildings.

Municipal public building stock is owned and managed by different directorates in Berat Municipality (e.g. school buildings by the educational department etc.). All energy invoices and all operation and maintenance are run by the economic and financial directorate. Municipality based on the yearly budget is rehabilitating some public buildings according to the urgency needs regarding maintenance. Also, municipality is trying every year to get support from Ministry of Education and different donors to rehabilitate as much as possible different buildings.

The Municipality has some experience with EE/RES/Green refurbishments. In the last 6 years, Berat Municipality has rehabilitated 2 day-care centres, 2 kindergartens, 3 schools, 2 social buildings and 2 administrative buildings. However, the rehabilitation was carried out with a small number of EE/RES measures, i.e. without meeting minimum requirements for energy performance.

4.1.3 Energy performance and GHG emissions baseline and forecast (active scenario)

In order to assess the energy consumption performance of public buildings it is necessary to categorize them (A) by type of use, such as education and administration, (B) their energy services demand for space heating, cooling, sanitary hot water, lighting, cooking and electrical appliances, and (C) the sources of energy which are used for space heating, such as fire wood, electricity, LFO.

The indicator of energy performance, expressed in specific energy consumption per heated floor area, averages over all **municipal public buildings at 195 kWh/m²**, according to the collected and aggregated real consumption figures. About 10% of energy consumption is electricity for lighting and appliances (WB study “Refurbishment of Public Stock of Albania”). All kindergartens/ children day care facilities have highest specific consumption, due to demand of higher indoor comfort and sanitary hot water (Figure 4-1).

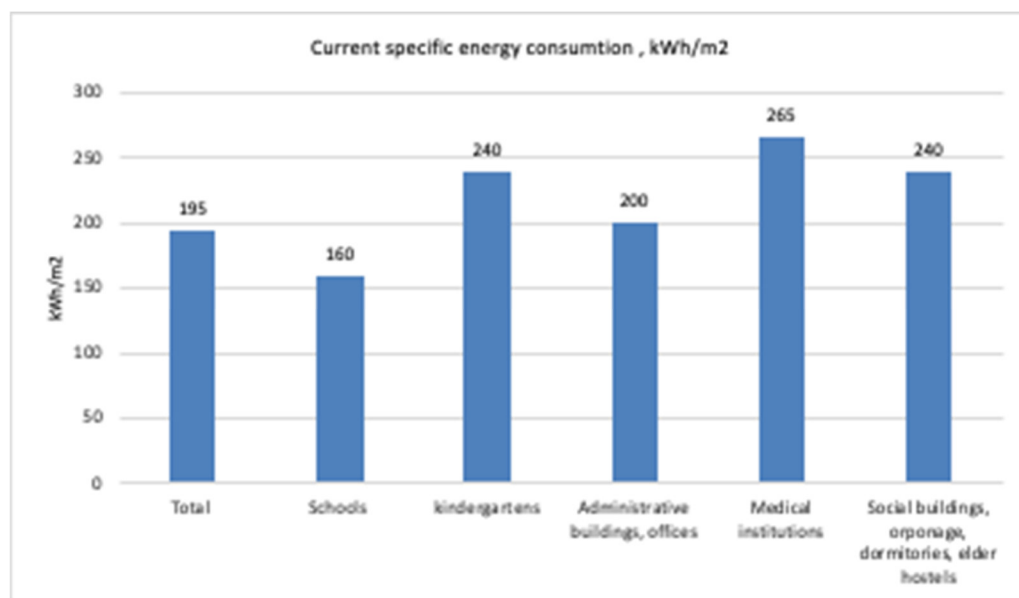


Figure 4-1: Energy performance of municipal public buildings (heat and electricity)

A benchmark of building performance with the national public building stock²⁰ shows that the consumption of Berat buildings is about **100% above energy demand for buildings in climate zone 1**. That can be explained by (i) the low conditions and heat losses of buildings require high fuel energy input to achieve comfortable indoor temperatures, and (ii) the municipal administration always dedicates the necessary funds for comfortable (or even extensive) heating and electricity. Awareness of ecological behaviour among the municipal staff is still low, which results in unnecessary spending.

Inefficiency is caused by **several main issues** in public buildings, as follows:

Inadequate insulation: Most of the buildings are not insulated on the outside walls, roof/terraces, and ground floors. Most of them are with single glass windows (some rehabilitated ones have introduced double glass windows). Outside doors are not hermetic and efficient and maintenance is at medium level.

Inefficient use of electrical appliances: Individual electric heaters and fans, AC units, AC split units are mainly used in central administration and education buildings. Buildings which are heated with electricity usually provide low levels of heating comfort.

Inefficient and hazardous heating systems: Wood at individual or at central heating systems with fuel boilers is mainly used in education as well as health / social buildings. The walk-through energy audits

²⁰ World Bank: *Assessment of energy saving potential of public buildings- building consumption profiles; 2019*

carried out the specific findings on building characteristic for different types of heating systems which are briefly outlined as follows: i) efficiency of decentral units (usually room based) is high but only when heat pump ACs are used; ii) low losses for heat distribution occur; iii) most AC units are used for heating and cooling according to indoor temperature demand. In most of the buildings stoves only exist in populated rooms, corridors etc. remain unheated. The efficiency of heat generation by stoves is low (50-60%) with high effort for manual heating. Smoke from stoves causes air pollution in the rooms with consequent hazards for health. The monetary costs of fire wood are low, thus attractive for the building user. The efficiency of diesel heat generation at the boilers is low to medium (60-80%) due to low maintenance and there are most of the time high losses of heat distribution due to unbalanced heating systems and lack of temperature control in rooms.

Figure 4-2 presents total yearly energy consumption based on data collection from MEMU for the year 2021 (base year). **Wood is the largest energy commodity with 62% of total consumption, followed by electricity with 33% of consumption.** Figure 4-3 presents total yearly expenditures for energy considering the respective energy prices for each energy commodity according to data collection from MEMU for the year 2021 (base year). Analysis shows clearly that cost of fuel wood and electricity are dominating by 46% of total expenses each (Figure 4-2 and 4-3).

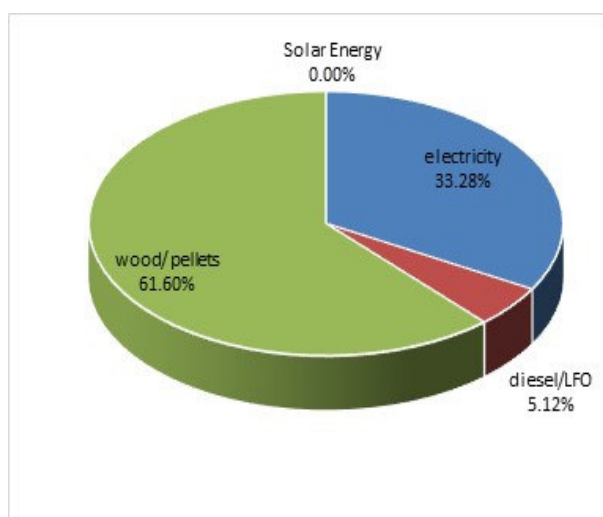


Figure 4-2: Yearly energy consumption based on data collection from MEMU for the year 2021 (base year)

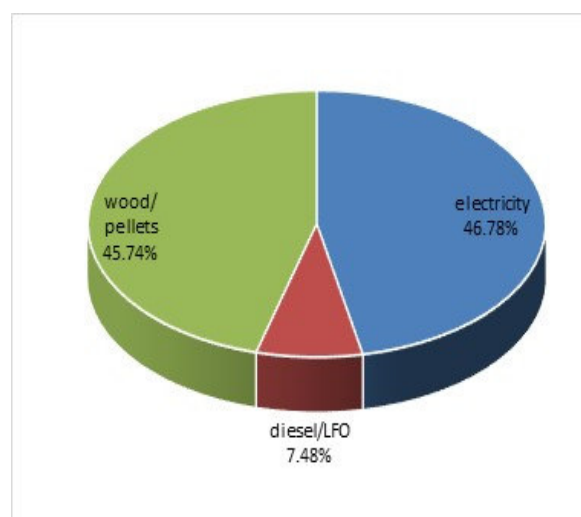


Figure 4-3: Yearly energy expenses based on data collection from MEMU for the year 2021 (base year)

Electricity consumption comprises electricity for all services (cooling, water heating, lighting, cooking, electric appliances) and electricity for heating and it is important to be mentioned that approximately 45% is used for heating according to the WB study “Refurbishment of Public Stock of Albania”.

Baseline scenario (BAU) energy demand forecast for all public building stock has been taking into consideration existing and increased building stock, actual energy intensities, actual fuel composition and improvement of comfort conditions, without taking into consideration energy efficiency improvements.

Figure 4-4 presents total yearly energy demand for baseline scenario for the period 2021-2040.

Meanwhile, Figure 4-5 presents GHG emissions forecast scenario expressed in CO₂eqv based on IPCC tier 1 approach emission factor for each energy commodity.

Active scenario (BAU) energy demand forecast for all municipal public building stock has been taking into consideration existing and increased building stock, actual energy intensities and their reduction by

introduction of all EE/RES measures which are financially viable for Berat conditions, actual fuel composition and improvement of comfort conditions.

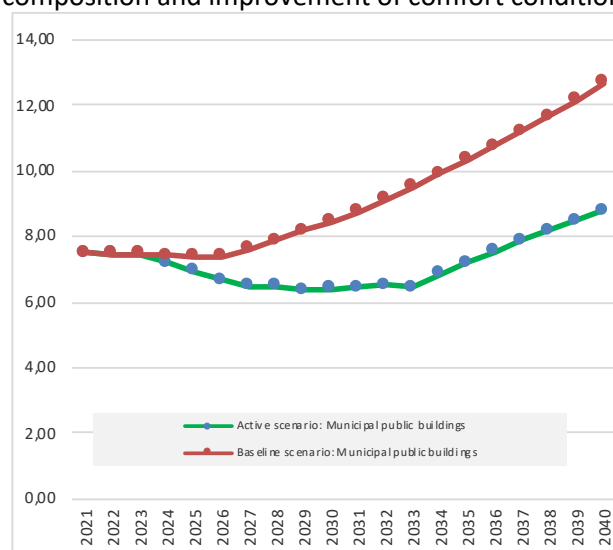


Figure 4-4: BAU & Active energy demand forecast for all public building stock for the period 2021-2040 (GWh/year)

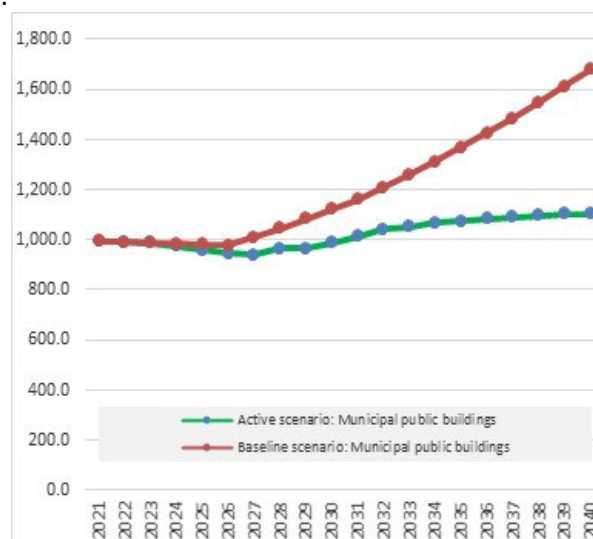


Figure 4-5: BAU & Active GHG emission forecast for all public building stock for the period 2021-2040 (tons of CO₂eqv/year)

4.1.4 Intervention strategy

The Municipality should carry out public building retrofits based on minimum energy requirements according to secondary legislation and with a much higher number of municipal buildings per year to reach their MECAP respective targets. A **refurbishment concept** shall be established including the thermal rehabilitation of buildings based on the EE & RES concept for heating and cooling, solar hot water system as well as PV auto producer systems. Introduction of EE&RES measures will meet comfort requirements and reduce annual energy demand to approximately 70-75 kWh/m²year, thus bring a reduction of over 42% compared with the estimated baseline scenario.

Based on the above mentioned analysis, the main objectives for the rehabilitation of the municipality public buildings will be:

- 1) Introducing the minimum energy performance standards or nearly zero energy requirements for all respective municipal public buildings by end of 2020;
- 2) Reducing energy consumption by 30% of municipal public buildings versus baseline scenario;
- 3) Reducing energy costs for public buildings;
- 4) Reducing maintenance cost of public buildings;
- 5) Improving comfort for users of public buildings, thus reducing risk of heat and cold stress;
- 6) Increasing share of renewable energy sources for municipal public buildings.

Quantitative analysis is carried out the potential for energy savings for the most common technologies and energy-using equipment in EE/RES improvement measure or programs:

- Refurbishment measures in existing municipal public building (MPBs) stock (walls, roofs);
- Substitution of existing windows in the MPBs with double/triple glass windows;
- Introducing central heating supply equipment based on Heat Pumps in MPBs;
- Replacement of old inefficient wood boiler stoves with highly efficient briquette/pellets individual or central biomass heating supply equipment in MPBs;
- Replacement of old electric water boilers with A+ (or more) electric boiler in MPBs;
- Replacement of old electric heating equipment with Solar Water System in MPBs;

- Introducing Solar PV Autoproducers in MPBs;
- Replacement of old air conditioning split and central systems with new efficient ones for MPBs;
- Replacement of electrical appliances (cold appliances, washing machines, dishwashers, televisions, etc.) with new ones A+ (or more) in MPBs;
- Replacement of office equipment in MPBs;
- Replacement of lighting in MPBs with new LED ones; and
- New building constructed according to energy building codes in new MPBs.

4.1.5 Recommended measures

The recommended set of measures for municipal public buildings comprise 8 investment measures and 8 accompanying measures, as follow are presented at Table 4-2.

Table 4-2: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs ²¹	
			('000 EUR)	Specific costs
MPB-01	EE rehabilitation of the schools including: a) Retrofit of building envelop, b) modernization of heating system	– 15,200 m ² (75% ²² of the building stock)	1,519	100 €/m ² floor area
MPB-02	EE rehabilitation of the kindergartens including: a) Retrofit of building envelop, b) Modernization of heating	– 5,800 m ² (75% of the building stock)	581	100 €/m ² floor area
MPB-03	EE rehabilitation of the administrative buildings including retrofit of building envelop and modernization of heating	– 1,975 m ² (60%)	197	100 €/m ² floor area
MPB-04	EE rehabilitation of social buildings Retrofit Program (dormitories, elder houses, etc.)	– 2,500 m ² (85% of social buildings)	247	100 €/m ² floor area
MPB-05	Solar Hot Water Program for social and kindergarten facilities, including storage tank (based on the respective hot water energy demand), control and piping systems	– 19 units (of 20 m ² average)	173	9,000 € per unit
MPB-06	Program on energy-efficient electric appliances: computers, kitchen equipment, etc.	– In 38 facilities, average 20 units	61	1,600 € per facility
MPB-07	Public building wood boiler (or electrical heaters) replacement by pellet program	– In 75% of facilities	381	15 €/m ²
MPB-08	Public buildings rooftop solar PV program, PV auto producer with	– In 50% of facilities,	190	5,000 €/unit

²¹ Initial costs estimate on the basis of 2021; including material, equipment, installation and VAT.

²² 25% of Buildings are already rehabilitated according the legal requirement according to data of the municipality.

Code	Energy Saving Measures	Details of applications	Estimated investment costs ²¹	
			('000 EUR)	Specific costs
	installed capacity based on the 70-100% of covering the demand and integrated with the distribution network	average 5 kWp unit		

In addition, the following accompanying measures are recommended (Table 4-3).

Table 4-3: Accompanying measures for public buildings

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
MPB-09	Up-date of municipal public buildings inventory, energy consumption monitoring, reporting and evaluation	O&M management & monitoring	23
MPB-10	Capacity building program of EE retrofit, concept of Minimum Thermal Requirements, NZEB (including RES)	Capacity building	76
MPB-11	Pipeline of EE/RES municipal public buildings retrofit audits and application at national financing mechanism	Investment preparation	171
MPB-12	Support local production and distribution of wood pellets	Investment preparation	60
MPB-13	Municipal Energy Management Unit dealing with municipal public buildings	Capacity building	1
MPB-14	Establishment of municipal public buildings renovation concept Database and Benchmarking Program	Municipal policy & regulation	8
MPB-15	EE awareness program in schools	Information / awareness	38
MPB-16	Training of building caretakers/ energy managers	Capacity building	12
MPB-17	Development of spatial heating/cooling plan	Municipal policy & regulation	2

Further details, if priority measures are described in measures sheets, as presented in Annex C.

Total costs for 17 EE measures in municipal public buildings would require 3.74 million EUR, of which 90% are allocated for investments (8 measures). The preliminary economic analysis of energy saving benefits for investment measures is as follow are presented at Table 4-4.

Table 4-4: Preliminary economic analysis of energy saving benefits for public buildings

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year) ²³	Simple Payback time (years) ²⁴
MPB-01	PB: EE Schools	55% of heating energy	1.2	103.0	11.4
MPB-02	PB: EE Kindergartens	55% of heating energy	0.7	59.0	8.4

²³ Assumption of energy cost increase of 1.5-2% per year

²⁴ Considering (i) energy cost savings and (ii) estimated cost savings for O&M

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year) ²³	Simple Payback time (years) ²⁴
MPB-03	PB: Administration	50% of heating energy	0,2	15.2	7.8
MPB-04	PB: EE social	60% of heating energy	0,3	27.5	6.6
MPB-05	PB: Solar hot water program	60% of power for SHW	0,2	41.3	4.2
MPB-06	PB: Appliances	40% of power for appliances	0,0	5.9	5.6
MPB-07	PB: Pellet boiler	20% of wood fuel	0.9	62.5	4.6
MPB-08	PB: RSPV	100% use of PV power	0,3	63.9	3.0

If all these investment measures would be implemented, Berat municipality could save annually 2.5 GWh/year of energy in public buildings and produce 1.9 GWh renewable energy. That represents 56% less than the 2021 consumption. The specific annual primary energy savings per each invested EUR could reach 1.6 kWh, according to experts, is a high ratio for such investments. Highest savings are triggered by EE building retrofit of education facilities, while most profitable are the measure utilizing renewable energy and substituting conventional energy (Table 4-5).

Table 4-5: Main analysis of EE/RES active scenario for the Public Building Stock of Berat Municipality

	Number	Rehabilitated area (m ²)	Baseline energy demand, GWh/year	Energy savings, GWh/year	RES contribution, GWh/year	CO ₂ e required, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL Municipality Public Buildings	55-60	25-28,000	5.6	2.5	1.9	370	3.74	8

Analysis shows that the actual fuel consumption (2020) fell short in meeting 'comfort conditions. Analysis carried out under this report and especially the analysis under the World Bank "Improvement of the EE/RES for the Albanian central and municipal public buildings (2016-2019)", have clearly shown that in general comfort conditions are not fulfilled. Fuel poverty (partly due to shortage of the municipality budget) and the security of supply have meant lower consumption (with less being available in the first place) to meet final energy demand to fulfil comfort conditions for all energy services. Therefore, as it will be described in the following sections, EE/RES/GREEN interventions will not only help reduce the final energy demand, it will in parallel reduce the required supply for corresponding fuel consumption to reach comfort conditions, therefore making it more affordable and accessible to more users. The knock-on benefit of energy saving from lower final energy demand will contribute to financial and economic savings as well as reduction in greenhouse and acid rain-causing gases. Furthermore, increased comfort for children and teachers can reduce sickness and improve social outcomes. These benefits are significant additions of EE/RES/Green investments and should be prime drivers for Municipal managers in order to continue improving minimum energy performance requirements.

4.2 Public lighting

4.2.1 Legislative and regulatory framework

The norm for road lighting EN 13201-2 together with the Technical Report CEN/TR 13201-1 published by the European Committee for Standardization gives guidelines on how to select the required lighting levels for different types of roads, e.g. roads with medium to high driving speeds or residential roads. Currently in the design of public lighting in Albania there is standard SSH EN 13201-2:2015. This standard refers to the European Standard EN 13201-2. Public lighting is an integral and very important part of the administrative management of the territory of the municipality of Berat and beyond. On the one hand this is a service offered to the community and society. Meanwhile this type of service promotes economic development, and improves civic security. The public lighting service provides stability and psychological and emotional security for pedestrians on city streets and residents in other public spaces such as squares, parks, block of flats, etc. Meanwhile this service improves the comfort of living and the environment.

Public lighting is an ideal starting point for an energy saving policy, because the quality of service is immediately visible to citizens and can contribute in a concrete way to improving the environmental sustainability of our lifestyle. According to data, public lighting consumes 14% of all electricity in the European Union and 19% worldwide (Source: International Energy Agency 2014). About 2/3 of all light sources currently installed in the European Union are based on technology developed before 1970, with low energy efficiency.

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4.2.2 Initial Situation

The public lighting of the city of Berat, part of the municipality of Berat, consists of:

- Public lighting of primary, secondary or tertiary streets;
- Lighting of public squares of the city;
- Lighting of parks and gardens;
- Lighting is realized at an annual average of 10.5 hours per day throughout the year.

In the urban territory of the city there are 3 types of poles:

- Decorative: which are found in pedestrian areas and some of the city parks;
- Steel: almost all galvanized, make up the dominant part of the poles that serve for city lighting;

- Concrete: the poles belong to OSHEE, but the luminaires belong to the Municipality.

Maintenance of the electrical network in function of street lighting, which are planned every year, based on the estimates of the respective needs presented by the municipal enterprise of Berat and approved in the annual budget of the Municipality..

Street lighting in Berat is mainly based on high pressure sodium lamps (HPS) with a significant number of LEDs (776) installed in the last 3 years in the city center, e.g. in the pedestrian zone. The following table lists the distribution of lamp technology for street lighting in Berat as reported by MEMU for the end of 2021. (table 4-6).

Table 4-6: Public Street Lighting main figures for Berat Municipality at the end of the year 2021

Composition of light bulbs/ luminaries	Share of working lamps per technology	Number of Light points, pcs.	Average capacity per luminaire, W
Energy Saving CFL	4%	99	80
High pressure sodium / natrium bulbs	59%	1.469	150
High pressure mercury bulbs	4%	110	250
Light emitting diode (LED)	33%	815	60
Total	100%	2.493	122

Street lighting in Berat by 2021 is mainly based on high pressure sodium (HPS) technology with 250W and 150W lamps, and a third with Light Emitting Diode (LED) luminaries. Before 2018 all street lights were with HPS of CFL lamps. In July 2018 new LED luminaires were installed, starting with the main boulevard entrance, park areas and in the pedestrian zone in front of the municipality, and in tertiary streets in the city

4.2.3 Energy performance and GHG emissions baseline and forecast (active scenario)

In order to assess the energy consumption of public streets lighting it is necessary to take into consideration the luminaire stock characteristics, actual composition, actual capacities, expansion plans for the areas which will be lighted especially in the outskirts of city and all villages and keeping the same structure of luminaires stock from now until 2040. Baseline scenario (BAU) energy demand forecast for public streets lighting has been taking into consideration all above mentioned aspects without taking into consideration energy efficiency improvements. Figure 4-6 presents total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 4-7 presents the GHG emissions forecast scenario expressed in CO₂eq based on the Albanian Emission Factor for the Power Sector.

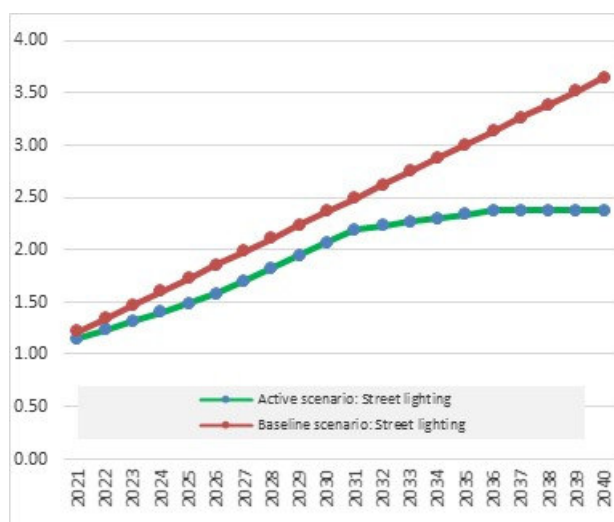


Figure 4-6: BAU & Active energy demand forecast for public streets lighting for the period 2021-2040 (GWh/year)

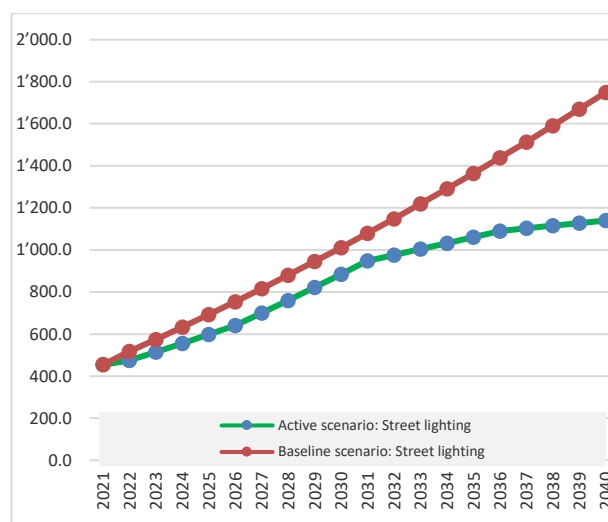


Figure 4-7: BAU & Active GHG emission forecast for public streets lighting for the period 2021-2040 (tons of CO₂eqv/year)

The Municipality has experience with EE LED street lighting and it is worth mentioning that the SECO/SEMP project has rehabilitated the four the most important streets of Berat by carrying out comprehensive Energy Audits, Detail Engineering Designs, Technical Specification, Standard Tender Documents, Supervision and Monitoring during the period January 2021 - December 2023. Based on the above mentioned gathered experience, the main objectives for the rehabilitation and extension of EE street lightings have been possible with establishment of active scenario considering: 1) Introducing EE LED technologies for all rehabilitated streets and for new ones to be lighted every year until 2040; 2) Reducing energy consumption by 50-60% of municipal public active scenario versus baseline scenario; 3) Reducing energy costs for street lighting; 4) Reducing maintenance cost of street lighting due to the long life of EE LED technology; 5) Improving comfort for users, thus reducing risk; and 6) Increasing aesthetics of the city and villages and improving the standard of life for all citizens. Figure 4-6 presents total yearly energy demand for active scenario for the period 2021-2040. Meanwhile, Figure 4-7 presents GHG emissions forecast scenario expressed in CO₂eq.

4.2.4 Intervention strategy

When modernizing street lighting systems, the first step is to replace the current light sources with more efficient technologies. This measure will result in energy savings and also in improved lighting quality. The second step has to be taken when the light quality in the current system is poor because of high distances between street lighting poles. In this case, the required light quality cannot be achieved, even if the new lights have high efficient light sources and good light distribution. Therefore, additional light points in between the existing ones have to be installed.

The third step is to extend the current system in areas/streets in which no street lighting exists. These three steps are reflected by three modernization levels in this study:

- **Step 1:**
All existing luminaires will be replaced by efficient high-quality LED luminaires on a luminaire to luminaire basis. Positions of luminaires will stay as they are and no additional light points will be installed. Where necessary, existing outworn poles are replaced by new ones.
- **Step 2:**
In addition to level 1, light quality is improved through the installation of additional light points in streets where dark spots are observed due to the high distance between existing light points.

- Step 3:

In addition to level 2, the street lighting system will be extended in streets without street lighting.

4.2.5 Recommended measures

The recommended set of measures for municipal public lighting comprise 3 investment measures and 4 accompanying measures, as follow are presented at table 4-7.

Table 4-7: Investment measures

Code	Energy Saving Measures	Details applications of	Estimated investment costs	
			('000 EUR)	Specific costs
SL-01	Street + Public Space LED Lighting Program, including Replacement and adaptation of power supply network for advanced LED street lighting: retrofit, voltage stabilization, wiring, timing, diming	– 2.140 light points	856	400 €/LP
SL-02	Solar PV for new, remote SL, auto producer units with power storage (40W, only PV component)	– Up to 2.250 light points mainly remote and secondary streets	900	400 €/LP
SL-03	Replacement of SL service maintenance vehicles	– 2 service vehicles	100	Up to 50 k€/vehicle

In addition, the following accompanying measures are recommended are presented at table 4-8.

Table 4-8: Accompanying measures for public street lighting

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
SL-04	Capacity building program of EE lighting retrofit, advanced technologies and maintenance	Capacity building	2
SL-05	Up-date of lighting inventory, energy consumption monitoring, reporting and evaluation	Monitoring	0.1
SL-06	Energy audits, detail engineering design and tender documents	Investment preparation	50
SL-07	Procurement Guide for New Street Light Installations	Municipal policy & regulation	15

Total costs for 7 EE measures in municipal public buildings would require 1.9 million EUR, of which 95% are allocated for investments.

The preliminary economic analysis of energy saving benefits for investment measures is as follow are presented at table 4-9.

Table 4-9: Preliminary economic analysis of energy saving benefits for street lighting

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
SL-01	SL: LED replacement	65% of power	0.7	167.0	5
SL-02	PB: SL PV	100% RE power used	0.2	36.3	6
SL-03	SL: Service vehicles	20-30% fuel for trucks + operation costs	0.1	10.3	4

Table 4-10 presents the main technical and financial parameters of EE/RES active scenario for the introducing EE LED for streets lighting of Berat Municipality.

Table 4-10: Main technical and financial parameters of for introducing EE LED for streets lighting

	Existing lengths of streets lighted, km	Lengths of new streets to be lighted, km	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO ₂ eq reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL Steet lighting	56.4	169	1.1 → 3.6	1.27	608.59	1.92	5.6

Total annual baseline electricity demand for 2021 real consumption scenario is 1.1 GWh/year. For the active EE scenario versus real 2021 baseline the energy saving will be 0.9 GWh/year, saving ratio of 78%.

Total annual baseline electricity demand for BAU scenario including new street illumination is 3.64 GWh/year. For the active EE scenario versus BAU baseline the energy saving will be 1.27 GWh/year, saving ratio of 35%.

The CO₂ eq emissions reduction in relation to the norm baseline are calculated together with other GHG gases (CO₂, CH₄, N₂O) and for all streets selected for Berat municipality will be 608.59 ton CO₂ eq/year.

For all modernization levels introduced for EE LED, the financial indicators are positive, therefore Berat Municipality, supported by SECO, shall implement these projects. The main financial indicator is Discounted Pay Back Period which is between 5 and 6 years. The technology, approval, completion, start-up delay and operational risks can be considered low because Berat Municipality and the Municipal Service Enterprises have experience in introducing EE LED technology.

4.3 Residential Sector

4.3.1 Legislative and regulatory framework

In line with its obligations as a Contracting Party to the Energy Community and as part of Albania's strategic objective to accede to the EU, the government has aligned legislation with the legal framework (acquis) of the EU and aims to establish clear and transparent responsibilities for the implementation of the EU acquis. The relevant primary legislation related to the improvement of EE in the public buildings includes the following:

- Energy Efficiency Law No. 124/2015
- Law on Energy Performance of Buildings No. 116/2016
- Renewable Energy Sources Law No. 8/2017
- Law No. 68/2012 On Information of the Consumption of Energy and Other Resources by Energy-Related Products
- Law No. 8937, dated 12.09.2002 "On Conservation of Thermal Heat in Buildings"

Energy Efficiency Law: This law defines the obligations of government authorities, public and private sectors, residential sector, services, industry, transport, agriculture, and all other sectors on the promotion of efficient energy use and energy saving and for the development of a market for energy services in the EE sector. The law aims to: i) set up and enforce a national policy and rules for the promotion and improvement of EE, with the goal of energy saving and increased energy security as well as to remove the barriers in the energy market; ii) establish the indicative national EE targets; and iii) promote the economic competitiveness. **Law on Energy Performance of Buildings:** Albania has prepared a stand-alone law transposing the EU's Energy Performance in Buildings Directive (EPBD). This includes the requirements under the directive that new buildings occupied and owned by public authorities must meet the NZEB definition after 31 December 2018. The following pieces of secondary legislation directly relevant to the residential building sector, have been approved:

- "National Methodology for Calculating Energy Performance in Buildings" approved by DCM no. 1094, dated 24.12.2020
- Decision no. 537, dated 8.7.2020 on "Minimum Energy Performance Requirements of Buildings"
- Decision no. 256, dated 27.3.2020 "On the Approval of the Methodology for Calculating the Optimal Cost Levels for the Minimum Energy Performance Requirements of Buildings, Units and Elements of Buildings"
- Decision no. 958, dated 2.12.2020 on "Approval of procedures and conditions for certification of energy performance of buildings and the model, content of the conditions for registration of Energy Performance Certificate of buildings"
- Decision no. 934, dated 25.11.2020 on "Approval of Criteria and Procedures for the Manner of Selection and Quantity of Certificates to be Verified, as well as the Process of Supervision of Energy Performance Certificates in Buildings"
- Order no. 5 dated 12.01.2021 on "Regulation of the Energy Audit Format and Energy Auditor Payment"

4.3.2 Initial Situation

The residential sector is the second highest sector for energy consumption in Albania (after transport) representing 25% of the country's final energy consumption. Energy consumption in the residential sector is divided into five parts with different characteristics: space heating, space cooling, domestic hot water and cooking, lighting, and electric appliances. Table 4- shows the breakdown of the Albanian and Berat Municipality Residential Building Stock.

Table 4-11: Albanian and Berat Municipality Residential Building Stock

Residential Building Categories	Number		Area (million m2)	
	2011	2021	2011	2021
Whole Albanian Residential Building Stock				
Single houses	576,096	648,968	42.85	46.73
Multi Apartment Buildings	22,171	27,013	19.20	33.56
Albanian Residential Buildings	598,267	675,981	62.05	80.29
Number of Dwellings (Single houses category)	654,444	707,456	42.85	46.73
Number of Dwellings (Multi Apartment Buildings category)	357,618	530,805	19.20	33.56

SECTION B: DETAILED ASSESSMENT OF ENERGY AND CLIMATE SITUATION AND POTENTIALS

Number of Dwellings (for the whole Albanian Residential Buildings)	1,012,062	1,238,261	62.05	80.29
Whole Berat Municipality Residential Building Stock				
Single houses	23,731	26,733	1.96	2.6
Multi Apartment Buildings	1,005	1,211	1.11	1.37
Berat Residential Buildings	24,731	27,944	3.07	3.97
Number of Dwellings (Single houses category)	27,054	29,245	1.96	2.60
Number of Dwellings (Multi Apartment Buildings category)	14,914	17,971	1.11	1.365796
Number of Dwellings (for the whole Berat Residential Buildings)	41,968	47,216	3.07	3.97

Table 4- shows the number of dwellings belonging to the MAB category is about 27% of the total number of dwellings in 2021. The specific energy consumption per floor area is low, because most heating devices are inefficient, insufficient to deliver comfort indoor temperature in all rooms in winter months, and many HH save energy costs for heating. However, the retrofit of heating residential building envelop and devices has the potential to (i) increase the comfort, (ii) reduce energy costs, and (iii) reduce the effort for heating, in particular for individual wood stoves.

Figure 4-8-4-9 presents total yearly residential energy consumption based on the National Yearly Balance for the year 2021 according to the total area of Berat Municipality versus total area of the Albanian Residential Building Stock. Analysis shows clearly that wood is the largest energy commodity with 83% of total consumption for the single houses followed by electricity with 12% of consumption. Figure 4-10-4-11 presents total yearly energy expenses for the single houses based on energy consumption and the respective energy prices for each energy commodity according to energy commodity data for the year 2021 (base year). Analysis shows clearly that cost of wood / pellets is the largest one for the single houses with 55.34% of total expenses, followed by electricity with 38.10% of expenses.

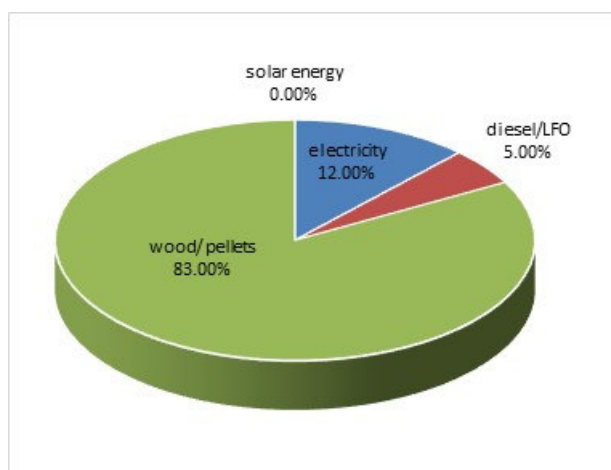


Figure 4-8: Yearly energy consumption for the single houses of the residential building stock for the year 2021 (base year)

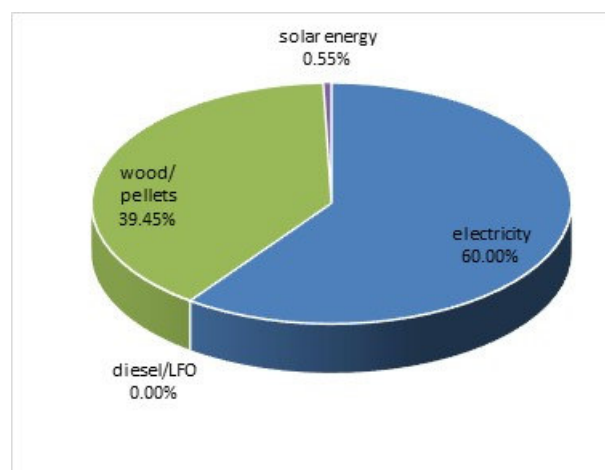


Figure 4-9: Yearly energy expenses for the single houses of the residential building stock for the year 2021 (base year)

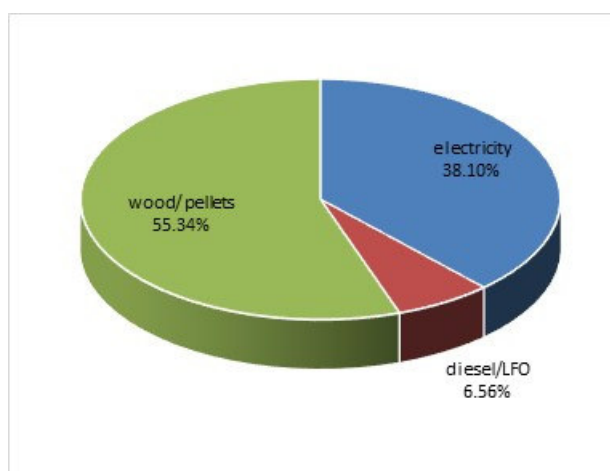


Figure 4-10: Yearly energy consumption for the MABs of the residential building stock for the year 2021 (base year)

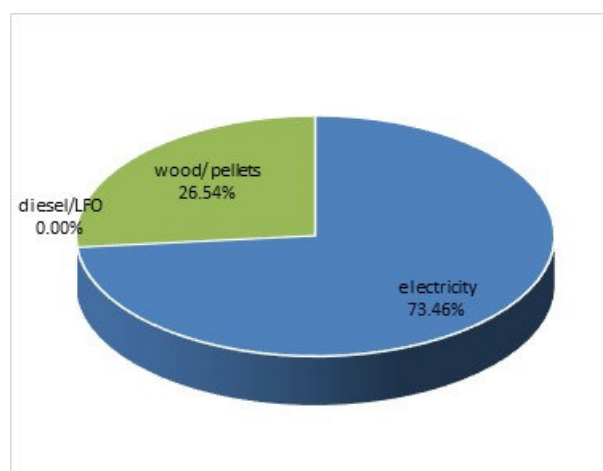


Figure 4-11: Yearly energy expenses for the MABs of the residential building stock for the year 2021 (base year)

Analysis in Figure 4-10 shows that for MAB electricity is the largest energy commodity with 60% of total consumption followed by wood / pellets with 39.5% of consumption. Figure 4-11 presents total yearly energy expenses for the MABs based on energy consumption and the respective energy prices for each energy commodity according to energy commodity data for the year 2021 (base year). Analysis shows that cost of electricity is the largest portion with 73.46% of total expenses, followed by wood / pellets with 19.91% of expenses. Figure 4-12 shows in which areas the largest amounts of electricity are consumed. These are electric heating and cooling (with air conditioners and resistance heaters), water heating, lighting, and electric cooking. These areas account for 80% of electricity consumption.

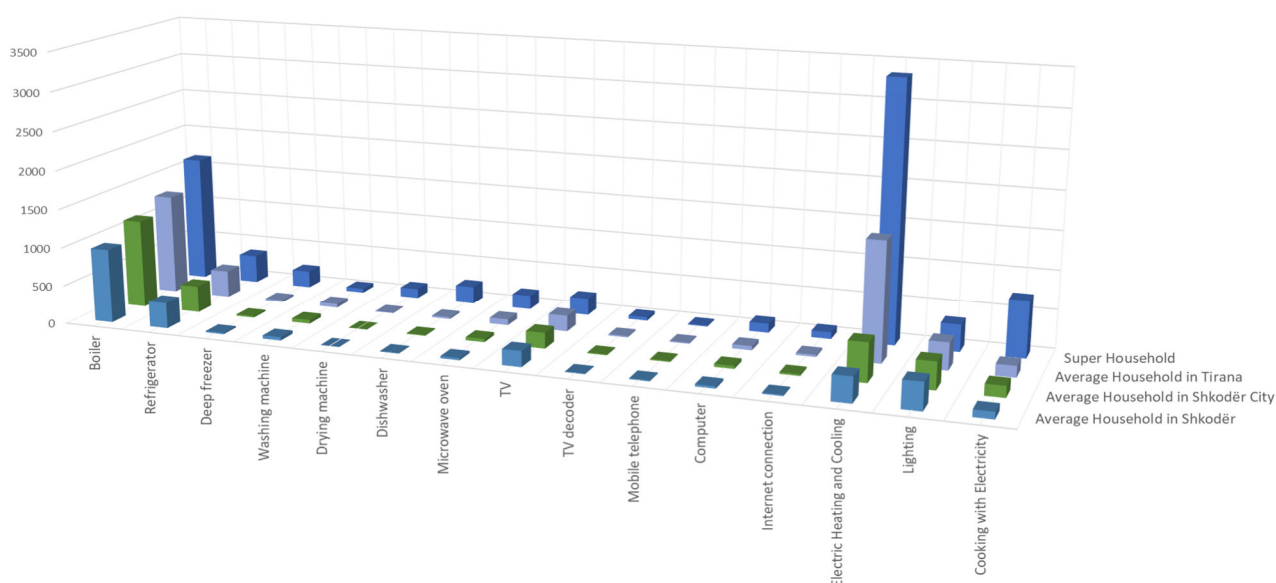


Figure 4-12: Comparison of Household Electricity Consumption Patterns, 2011

An estimation of a thermal conductance useful for energy demand with suitable adjustments for the type of building materials in Albania is used. Houses made with bricks and having walls of thickness typically to the majority of Albanian houses (built in the 1980s), have thermal conductance ranging between 0.872 [W/m³ OK] for large buildings with about 20 apartments and 2.151 [W/m³ OK] for detached single houses. The average estimates for residential buildings constructed in the early 1990s are 1.51 [W/m³ OK] and 2.08 [W/m³ OK], respectively in urban and rural areas, with an average of 1.86 [W/m³ OK] over the whole housings stock. These values, however, do not make allowance for heat losses due to poor maintenance, holes in the walls, broken or inexistent windowpanes especially in the scaffolding part of the stairs, etc.

4.3.3 Energy Performance and GHG emissions and forecast

Berat families are heating most of the time 35-40% of total area of the house/apartment (heating mostly only dining room) and based on the Strategy of Energy document the heating hours are 10-12 hours per day. So, in the future it is considered that Berat families will be heating up to 60-65% of total area of their house/apartment and heating time will be increased up to 16-18 hours. So, baseline scenario (BAU) energy demand forecast for all residential building stock is established based on the assumption above.

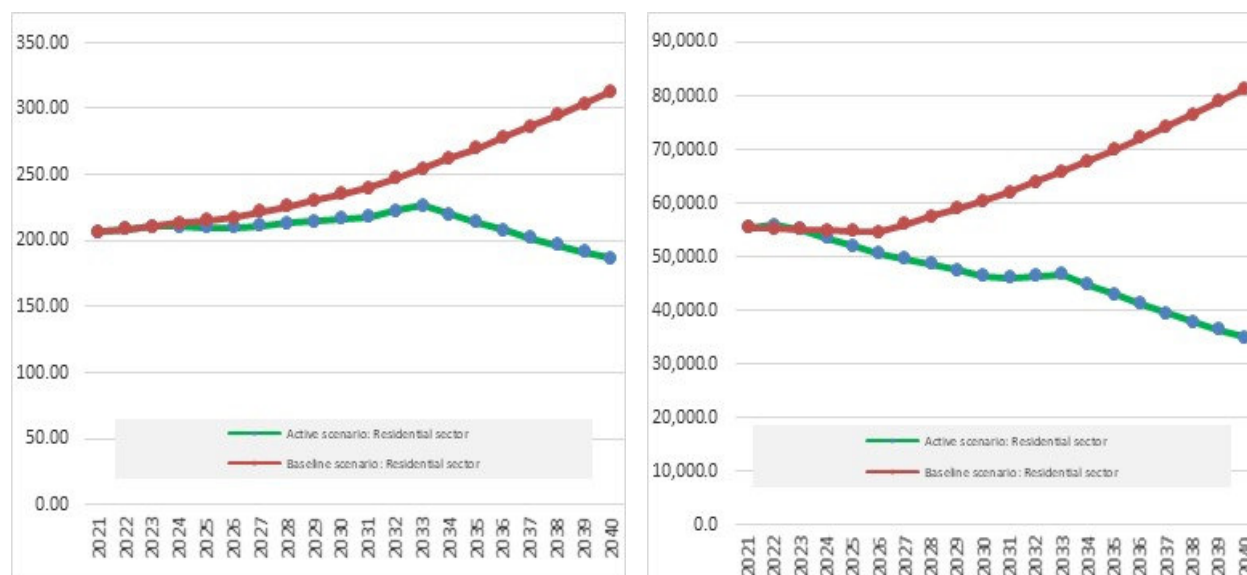


Figure 4-13: BAU & Active energy demand forecast for all residential building stock for the period 2021-2040 (GWh/year and tons of CO₂eqv/year)

4.3.4 Intervention Strategy

Four factors play a significant role in assessing the demand for space heating: the volume of residential buildings (which is known to be influenced by living space and building height), heating degree-days, the thermal conductivity of walls and roofs (including ventilation losses through windows and doors), and the number of hours required for heating. Albania has the smallest per capita living space in comparison to other countries in Central and Southeast Europe. Still, this is experiencing substantial growth in the last two decades. Houses often deviate from existing housing standards regarding ceiling height and surface area utilization, resulting in significantly larger houses than the average figures mentioned earlier. Naturally, larger houses in terms of volume and area lead to an increased demand for heating.

Heating and Cooling: In Albania, usually only a part (one or two rooms) of a household is heated to save energy and costs. Currently, only about 50% of the energy required for a “full heating scenario” is used (see SLED, 2015). However, as the standard of living increases, the heated area increases. In addition, there is a trend to use more and more air conditioners for heating, which results in a huge increase in electricity consumption if no additional measures are taken. In summer, the air conditioners are also used for cooling, which further increases electricity consumption.

Electrical Appliances: As a candidate country for EU accession, Albania must enforce the EU Ecodesign Directive²⁵, which will lead to a steady increase in the energy efficiency of electrical appliances offered for sale, which will have a dampening effect on the increase in electricity consumption. However, rising living

²⁵ Directive 2009/125/EC

standards will lead to households operating more and more appliances, which will partly offset the efficiency gains.

Energy savings in the residential building stock (by rehabilitating approximately 540 single houses every year (2% of the actual total stock) required to reach the MECAP targets up to 2040 and by rehabilitating approximately 20 MABs every year (2% of the actual total stock) required to reach the MECAP targets up to 2040) should be achieved by:

1. New buildings constructed according to energy building codes.
2. Introduction of central heating systems with heat pumps in the household stock.
3. Replacement of old inefficient wood boiler stoves with highly efficient briquette/pellets individual or central biomass heating supply equipment in the household stock.
4. Introduction of solar PV self-producers in the household stock.
5. Replacement of old electric water boilers with A+ (or higher) heat pump boilers or solar thermal systems.
6. Replacement of old electrical appliances (refrigerators, washing machines, dishwashers, televisions, etc.) with new appliances rated A+ (or higher) .
7. Refurbishment of existing residential buildings by
 - i) Replacement of old windows with double/triple glass windows.
 - ii) Replacement of lighting with efficient LED system and control component.
 - iii) Improvement of building insulation (walls, roofs).

4.3.5 Recommended Measures

The recommended set of measures for residential buildings comprise measures, which are addressing development & spatial planning as well as communication and cooperation, to stimulate and support third party investments, such as by private households or financial intermediaries (table 4-12).

Table 4-12: The recommended set of measures for residential buildings

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
RB-01	Efficient lighting in public spaces of multi-apartment residential buildings (staircases & outside , LED & sensors), 20 MAB	Investment	339
RB-02	Municipal support program complementing gov. program for boiler change and EE retrofit of residential multi-apartment buildings (promotion; linking contractors, municipality, gov. agency, banks; complementary municipal grant support), approx. 3.3 million m ² (75% of building stock)	Financing mechanism	131,410
RB-03	Property tax rebates for efficient new construction (200 new construction buildings, over 10 years)	Financing mechanism	100
RB-04	Energy audit support Program (obligatory audit for building retrofit permission), 10% of all buildings	Investment preparation	838
RB-05	Incentivize Rooftop PV (with installed capacity expressed in kWp ~1 kWp based on the actual energy consumption and the respective regulation), 50% grant (approx. 15% of buildings)	Financing mechanism	5,239
RB-06	Promotion and support of advanced efficient heating systems by parallel permission procedure (chimneysweep service) ; combined with information and support (HP, pellet boilers	Municipal policy & regulation	4,277

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
	integrated with solar hot water systems), ban coal and inefficient wood (all buildings, costs ~200 EUR)		
RB-07	Strict application of energy performance codes related to Minimum Thermal Requirements for new residential buildings (approx. 200 new buildings)	Municipal policy & regulation	80

Total costs for 7 EE measures in residential sector would require 142 million EUR, of which 95% are allocated for investments. Funds for rehabilitation of buildings for MAB, following the same logic like Tirana: establishment a community funds for poor households. The preliminary economic analysis of energy saving benefits for investment measures are presented at table 4-13(1).

Table 4-13: The preliminary economic analysis of energy saving benefits for residential buildings

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
RB-01	RB: Outdoor LED lighting	60% of lighting of MAB public space	1.8	411	1
RB-02	RB: Complementary municipal support	75% of HH; 50% fuel for heating	61.9	6,254	21
RB-05	RB: RSPV support SFH	5.000 units 100% RE power	6.3	1,411	4
RB-06	RB: Ban inefficient heating	25% of fuel heating	36.2	3,662	1
RB-07	RB: Building codes	50% EE for 200 new construction x 10 years	20.2	2,038	1

If all these EE measures would be implemented, households in Berat municipality could save annually 53 GWh/year of energy in buildings and produce 73 GWh renewable energy. That represents 61% of the 2021 consumption. The specific annual primary energy savings per each invested EUR could reach 1.0 kWh, according to experts, is a good ratio for such residential building EE investments. Highest savings are triggered by regulatory measures. The average payback period is at 9-10 years.

It is recommended that MEMU together with Urban Directorate carries out an awareness raising campaign to encourage residential owners for the development and implementation of above-mentioned EE/RES retrofit program for their house/apartment. Table 4-14 presents the main analysis of EE/RES active scenario for the residential buildings stock within the borders of Berat Municipality.

Table 4-14: Main analysis of EE/RES active scenario for the residential building stock within the borders of Berat Municipality

Parameters	Number ²⁶	Area (million m ²)	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO ₂ eqv reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL Residential Buildings	28,000	4.5	In 2021 147 GWh With BAU in 2040 313 GWh	126 GWh (40%)	30-40,000	142	9-10

4.4 Service, Industry and Agriculture Sectors

4.4.1 Initial Situation Service Sector

Private service sector is very developed in Berat Municipality and it is main driver of economic development. Main subsectors under private services are hotels, restaurants, touristic museums and other sites. Private service building stock within borders of Berat Municipality accounts for 1,897 buildings with a total floor area of 971,460 m².

4.4.2 Energy performance and GHG emissions and forecast

Figure 4-14 presents total yearly energy consumption based on the National Yearly Balance for the year 2021 according to the total area of Berat Municipality. Analysis shows clearly that electricity is the largest energy commodity with 62.43% of total consumption, followed by diesel / fuel oil with 29.77% of consumption. Figure 4-15 presents total yearly energy expenses based on energy consumption and the respective energy prices for each energy commodity according to energy commodity data for the year 2021 (base year). Analysis shows clearly that cost of electricity is the largest one with 64.73% of total expenses, followed by diesel / fuel oil with 32.10% of expenses.

²⁶ Assumption: increase of dwelling area of 1% per year during 2024-2030, 2% annually 2031-2036, 3% annually after 2036

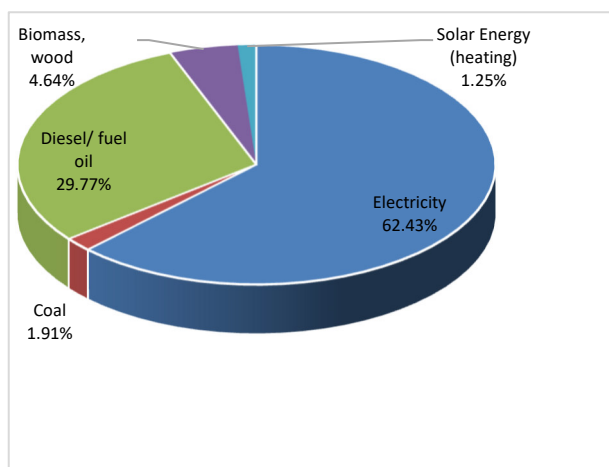


Figure 4-14: Yearly energy consumption for private service buildings for the year 2021 (base year)

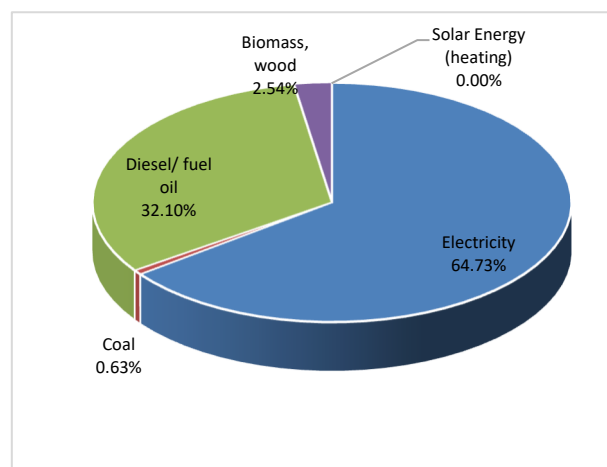


Figure 4-15: Yearly energy expenses for private service buildings for the year 2021 (base year)

Figure 4-16 presents total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 4-17 presents GHG emissions forecast scenario expressed in CO₂eq.

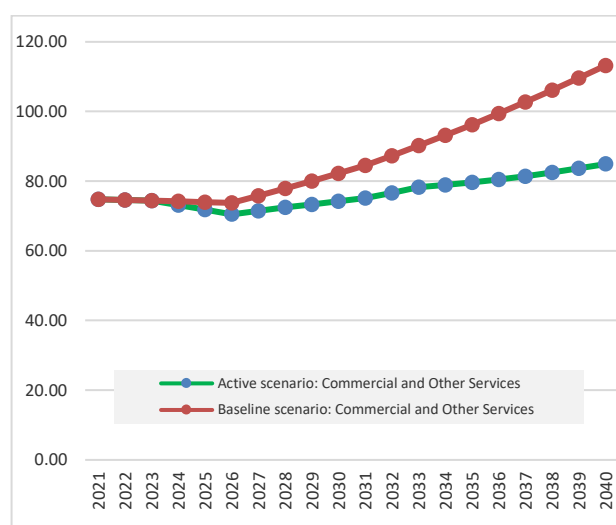


Figure 4-16: BAU & Active energy demand forecast for all private service building stock for the period 2021-2040 (GWh/year)

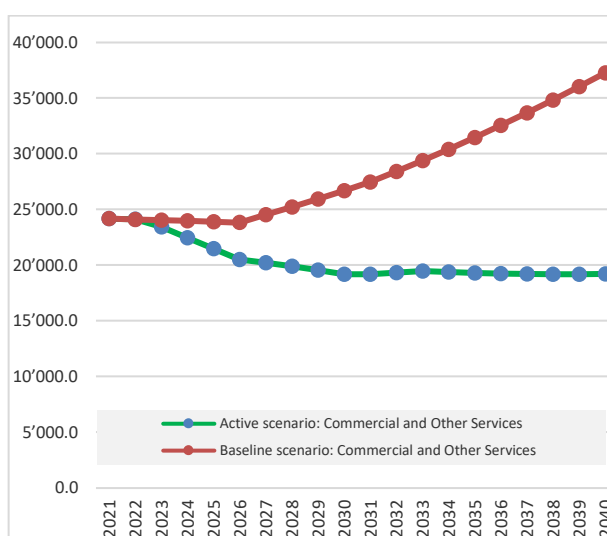


Figure 4-17: BAU & Active GHG emission forecast for all public private service building stock for the period 2021-2040 (tons of CO₂eq/year)

Quantitative analysis is carried out the potential for energy savings and the most common technologies presented at the chapter of Municipality Public Buildings serve also for the Private Service Building Stock.

Table 4-14 presents the main analysis of EE/RES active scenario for the private service buildings stock in the private service building stock (by rehabilitating approximately 36-38 buildings every year (2% of the actual total stock) required to reach the MECAP targets up to 2040) within the territory of Berat Municipality.

Table 4-14: Main analysis of EE/RES active scenario for the private service building stock within the borders of Berat Municipality

Parameters	Number	Area (m2)	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO2eqv reduction, tons/year	Cumulative Investment , MEuro	Pay Back Period, Years
TOTAL Private Service Buildings	1,897	971,460	86	33	14,162	27	6.94

4.4.3 Intervention strategy

It is recommended that the MEMU together with the Commercial and Tourism Association of Berat carries out an awareness raising campaign for pushing owners of such buildings for the development and implementation of a complex EE/RES retrofit program for the private service building stock within the territory of the municipality.

4.4.4 Initial Situation Industrial Sector

Industry occupies an important place in the economy of the region and coexists with its other functions. The balance between industry, agriculture and natural values of the region is of vital importance for guaranteeing its self-renewal capabilities. The belt with industrial economic gravity is located in the southern part of the main agricultural system (with a focus on the oil industry). Berat Municipality is in the process of complying set of values and natural and economic resources contributes substantially, directly and indirectly to the overall economic and social values in the economy, trade, agriculture, and in the promotion of the natural, cultural, and spiritual values on an international scale. With its resources, Berat contributes to the national GDP by the food processing, wineries, beverage productions, building materials, textiles and clothing and other small industries. The main types of business that contribute to economic development are mainly oriented towards food and dairy industry, building materials, light industries, in the processing and production of textile materials as well as in trade and business services.

As a characteristic production area of agricultural and livestock products, Berat has the presence of agro-processing businesses directly related to trade. Also, the presence of handicraft businesses, which have an old tradition in the city of Berat, continues today, playing a special role in economic development.

It is noted that the economic base consists of small businesses. The main types of activities operating in Berat are: food industry; wineries, textile and clothing industry; leather and footwear industry; construction and others. The processing industry constitutes one of the greatest potentials for economic development in Berat. The presence of the industrial zone in Berat is another important element in economic development. Large processing businesses are concentrated in the Berat industrial area, which over the years have offered employment and income to the population (figure 4-18).

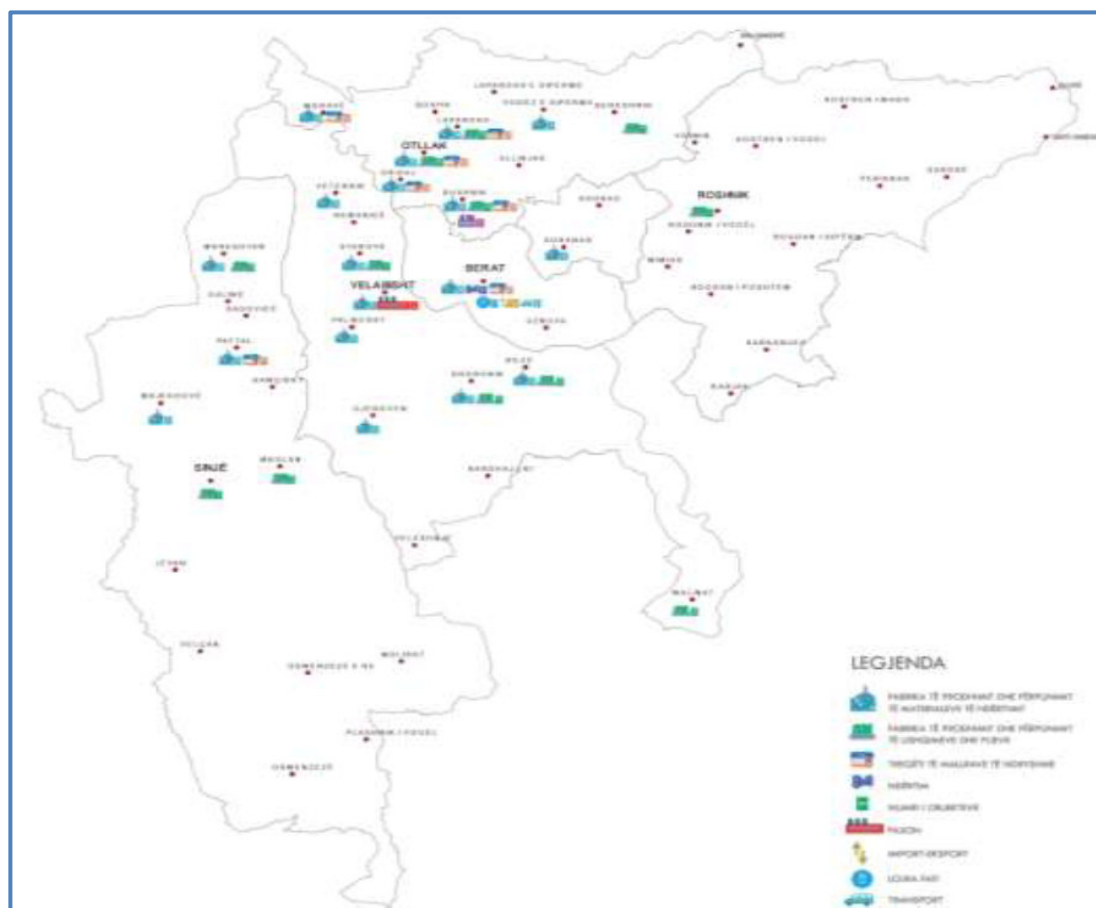


Figure 4-18: Map of distribution of SMEs in the Berat Industrial Area

4.4.5 Energy performance and GHG emissions and forecast

INSTAT and Berat Municipality does not gather data related to energy commodities consumption for all industrial sector. Therefore, the Energy Balance of Albania was broken down for the industrial sectors of Berat Municipality based on the GDP of Berat Contribution versus the national one and type of industries allocated within the borders of the municipality. Figure 4-19 presents total yearly energy consumption based on the National Yearly Balance for the year 2021. Analysis shows clearly that coal is the largest energy commodity with 47.75% of total consumption, followed by electricity with 31.88% of consumption. Figure 4-20 presents total yearly GHG emissions (expressed in CO₂eq) based on energy consumption and their respective emission factors according IPCC 2006 for each energy commodity for the year 2021 (base year). Analysis shows clearly that GHG emissions of electricity are the largest one with 47.56% of total missions, followed by diesel / fuel oil with 28.52% of expenses.

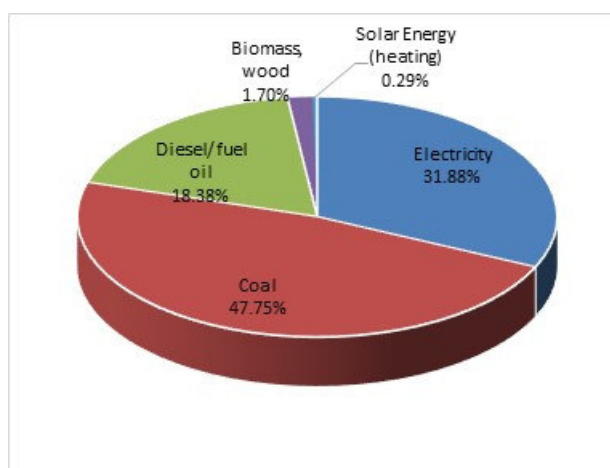


Figure 4-19: Yearly energy consumption for the industrial sector for the year 2021 (base year)

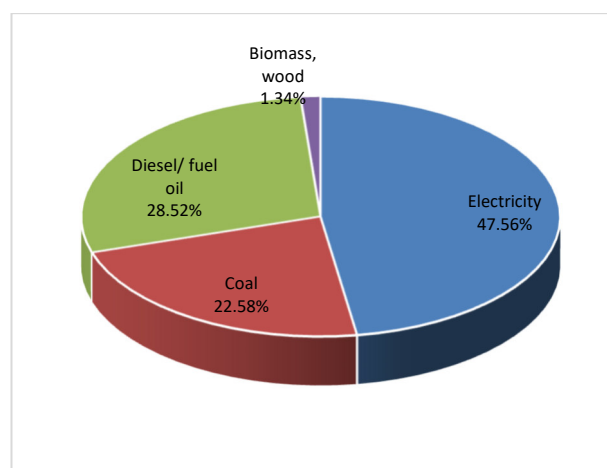


Figure 4-20: Yearly GHG emissions (tons of CO₂eqv) for industrial sector for the year 2021 (base year)

The statistical system of the energy resource consumption in the industrial sector has experienced essential changes during the last 10 years, but the database is not always reliable, therefore many analysis and verifications are needed to approach the reality and the logic of the phenomenon. In this direction MIE and AKBN has completed in 2015 the last energy consumption for the industry sector survey. The survey has served as a base to prepare the national energy balance and calculate the energy intensities and contribution of each energy commodity for the industrial sub sector.

Baseline scenario assumes the development of different industrial sectors, maintaining the actual form of energy supply, generally expressed in energy intensity and energy source contribution. So far, the responsible institutions have not prepared assessments in nature or value for the expected developments of the industrial branches on different municipalities of Albania. Based on previous potentials and the actual possibilities as well as on macroeconomic indicators that have oriented preparation of the National Strategy of Energy, development schemes have been prepared taking it into consideration the World Bank study and the industrial sector financial growth indicators. Baseline scenario (BAU) energy demand forecast for industrial sector is established and at Figure 4-21 is presented the total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 4-22 presents GHG emissions forecast scenario expressed in CO₂eqv for the same period. Active scenario energy demand forecast for industrial sector is established by introducing the respective cost-effective EE/RES measures.

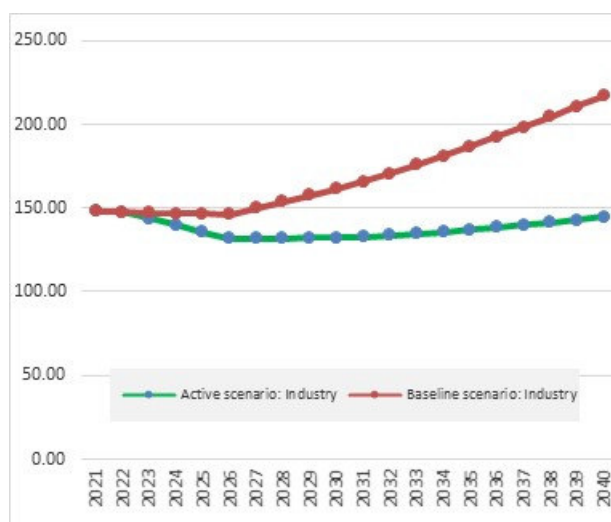


Figure 4-21: BAU & Active energy demand forecast for industrial sector for the period 2021-2040 (GWh/year)

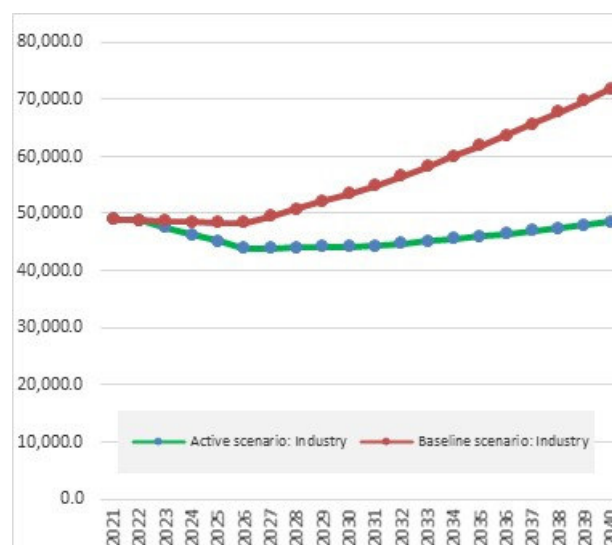


Figure 4-22: BAU & Active GHG emission forecast for industrial sector for the period 2021-2040 (tons of CO2eqv/year)

4.4.6 Intervention Strategy

The structure of the industry sector in Berat Municipality presented shows that three main industrial sectors are consuming the highest share of energy: food, metal and building materials. The growth in GDP-contribution from industrial sectors is the most influential determinant of energy demand in industry. Value-added structure of the GDP drives the energy consumption for the industry and agriculture sectors. In the early development of a society, textile, food, metallic, and agro-processing industries contribute a significant share of Berat Municipality economy. As the society develops, the share of the industrial sector typically will increase considering that Berat Municipality has huge mineral resources and agro-food processing possibilities.

This sector is expected to play a great role in the economic growth, employment, living standard, etc. As a consequence, the Active Scenario establishes the following basic objectives for the industrial development: Increase of industry economic efficiency, considerably affected by weight reduction of energy cost of industrial products, as well as reduction of energy demand. Reduction of environmental pollution from emission of different gases causing global warming or the acid rain, as well as from gases with energetic origins in earth, water and atmosphere, as a factor that depends directly on the reduction level of energy demand. Table 4-15 presents the main analysis of EE/RES active scenario for the industrial enterprises within the borders of Berat Municipality.

Table 4-15: Main analysis of EE/RES active scenario for the industrial enterprises within the borders of Berat Municipality

Parameters	Number	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO2eqv reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL industrial enterprises	339	217.07	72.606	23,370	29.66	3.52

With the objective of reducing the energy consumption, introducing RES technologies and reducing GHG emissions according to the Active Scenario, the following quantitative and qualitative measures shall be promoted by MEMU and Directorate dealing with Industry/Economic Development in relation to:

- Improvement of industry organization and management;
- Maintenance and modernization of techniques and technologies used in the industry sector;
- Increase of raw materials processing level, and increase of the quality and quantity of industrial product value;
- Increase of output, recuperation, level of reuse (or recycling) of technological wastes, quotient of water circulation, reagents, etc.;
- Introduction of concepts such as “cleaner technologies”, “symbiosis of some industries”;
- Better energy management in all industrial sub sectors: For a successful implementation of measures required for a better energy management, training of industrial enterprises staff and awareness campaigns guided by the Energy Efficiency Centre and other institutions, are necessary;
- Increase of efficiency of existing boilers/furnaces in all industrial sub sectors: The elaboration and approval of legal acts to force the industrial enterprises to undertake periodical energy audits is necessary to implement such measure. It will enable the industrial enterprises to know the situation and take measures to reduce the energy consumption, which on the other side would reduce the production cost and energy consumption;
- Improvement of power factor ($\cos\phi$) in industrial enterprises: Necessary technical and efficient measures should be implemented in the power system in order to improve the situation between suppliers and consumers, consisting in installation of battery compensators in MV side of 110/220 kV substations to improve the power factor $\cos\phi$ over 0.9;
- Penetration of efficient lighting in industry; A better lighting provides sufficient light in due place and time, facilitating activities and services. Lighting not only should be available when it is needed but it should be efficient with regards to energy consumption avoiding energy losses due to its inefficient use.

4.4.7 Initial Situation Agriculture Sector

The municipality of Berat boasts a substantial expanse of high-quality agricultural land, totaling area of Municipality is 380 km², of which 170 km² is agricultural land (this includes cultivated and non-cultivated lands) and 180 km² is natural land (forests, pastures). Otllak and Velabisht units have the highest concentration of agricultural land, which is mainly cultivated with fruit and olive trees and nurseries. Sinjë and Roshnik units are characterized by fragmented agricultural land and the largest surface of natural land (hilly and mountainous relief). The municipality of Berat is crossed by the Osum river and is extremely rich in underground water and surface water sources. The total water surface is 9 km². Otllak, Roshnik, Velabisht and Sinjë administrative units have preserved their rural character. The main sector of the economy in these units is agriculture. Cultivation of fruit trees, olives and viticulture is primary in these areas. Also, livestock and processing of meat and dairy products are developed in these units. Berat has developed as a regional center for agribusiness, trade and tourism. This is as a result of its geographical position and access to national roads.

Berat Municipality is well known for agricultural products especially for the production of fresh fruits, wine, and vegetables. The terrain and typical Mediterranean climate of the Berat region make agriculture development in the city possible, with the production of typical products such as olives, figs, and cherries which have been cultivated for thousand of years. The inhabitants have early traditions for the cultivation and the refinement of the olives and Berat is well known for the centuries-old olive groves. The city climate is favorable for the establishment of greenhouses that would produce organic fruits and vegetables, citrus, etc. Also, another investment alternative is the establishment of vineyards of grapes and plantations of other local products. A strong point of Berat county is the beautiful nature

that attracts many tourists during the year. Berat is well known as the most ancient city of Albania and also known as the city of “one above another windows”.

Berat Municipality is abundant in both coastal and inland waters, lending themselves to the development of fishing and aquaculture activities. Fishing plays a significant role in the local economy, particularly in areas surrounding Osumi river agricultural very productive land.

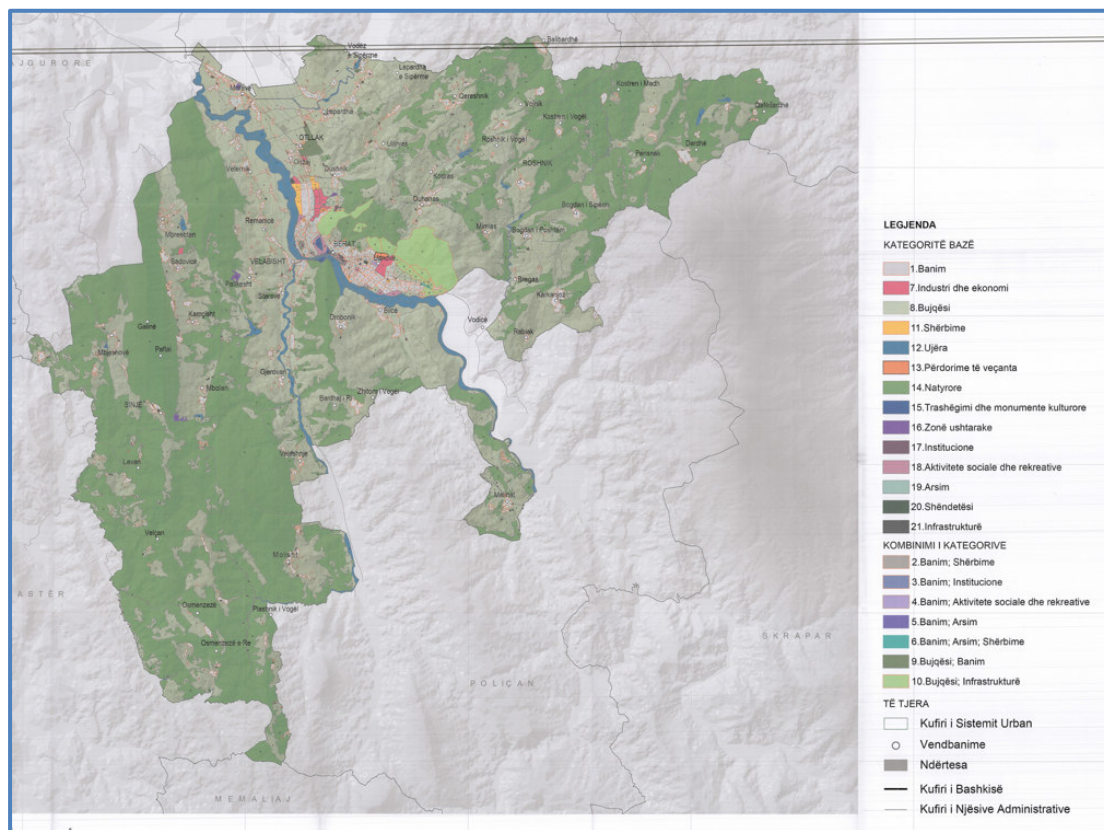


Figure 4-23: Map of Agriculture production for Berat Municipality

4.4.8 Energy performance and GHG emissions and forecast

INSTAT and Berat Municipality does not gather data related to energy commodities consumption for agriculture sector. Therefore, the Energy Balance of Albania was broken down for the agriculture sector of Berat Municipality based on the GDP of Berat Contribution versus national one and based on the number of population of municipality. Figure 4-24 presents total yearly energy consumption based on the National Yearly Balance for the year 2021. Analysis shows clearly that diesel / fuel oil is the largest energy commodity with 81.47% of total consumption, followed by wood biomass with 7.72% of consumption. Figure 4-25 presents total yearly GHG emissions (expressed in CO₂eqv) based on energy consumption and their respective emission factors according IPCC 2006 for each energy commodity according to energy commodity data for the year 2021 (base year). Analysis shows clearly that GHG emissions of diesel is the largest one with 88.07% of total missions, followed by electricity with 11.93% of expenses.

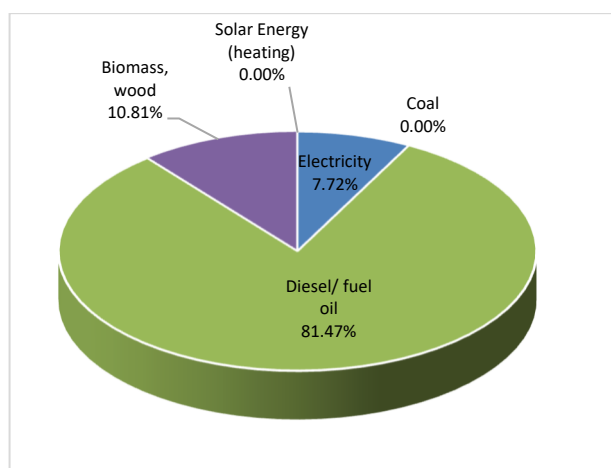


Figure 4-24: Yearly energy consumption for the agriculture sector for the year 2021 (base year)

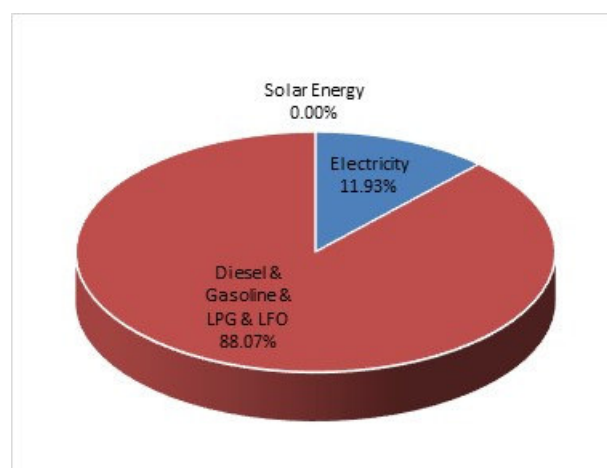


Figure 4-25: Yearly GHG emissions (tons of CO₂eq) for agriculture sector for the year 2021

Baseline assumes the above factors to be mitigated but not in the required level for an intensive agriculture, as foreseen by the Active Scenario. For the scope of energy demand forecast, the sector was divided in 4 sub sectors: Agriculture, Livestock, Forestry and Fishing. The calculation of future energy demands is based on the added value of GDP from the agriculture sector for Berat Municipality. The added value from the agricultural sector and the energy intensities has been used as basic activity to foresee the future energetic demand of the sector.

Baseline scenario assumes the development of different agriculture sub-sectors (agriculture, livestock, forestry and fishing), maintaining the actual form of energy supply, generally expressed in energy intensity and energy source contribution. Based on previous potentials and the actual possibilities as well as on macroeconomic indicators that have oriented preparation of the National Strategy of Energy. Development schemes for agriculture sector are based on the financial growth indicators. Baseline scenario (BAU) energy demand forecast for agriculture sector is established and is presented at Figure 4-26 as total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 4-27 presents GHG emissions forecast scenario expressed in CO₂eq.

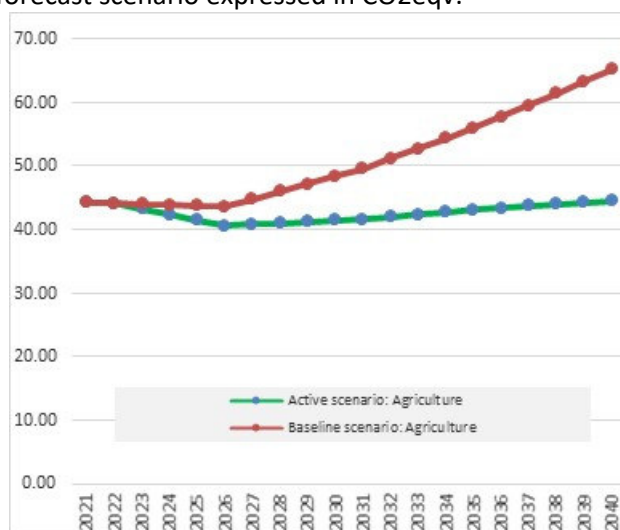


Figure 4-26: BAU & Active energy demand forecast for agriculture sector for the period 2021-2040 (GWh/year)

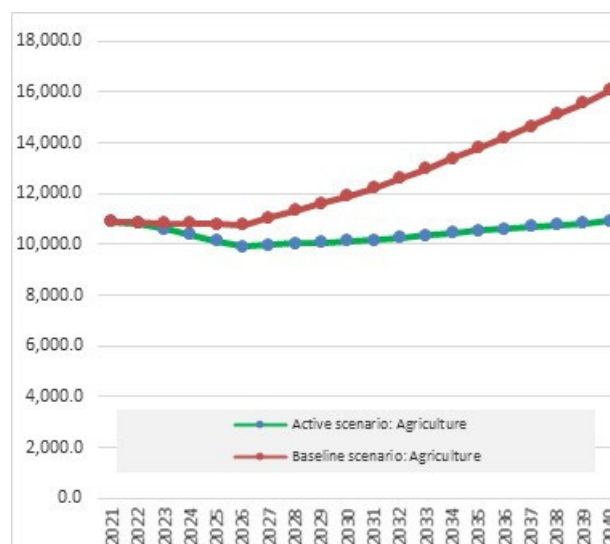


Figure 4-27: BAU & Active GHG emission forecast for agriculture sector for the period 2021-2040 (tons of CO₂eq/year)

4.4.9 Intervention Strategy

There are small businesses and individuals who work for the collection and drying of medical herbs such as sage, mountain tea, or plants producing ethereal oils. Their processing remains a challenge due to the lack of technologies and processing capacities in the territory of the Municipality of Berat. As far as the production of food is concerned, the surrounding agriculture accounts for almost half of the total volume of fruits produced at a municipal level. The value chain starts with the cultivation of the olive trees until it reaches its final product for merchandise. The production of olive oil is mainly for family use. The income increase from the plants production, livestock, agro-industry, fishing and forestry remains the main alternative for the economic and social development of the country. The development of the agriculture sector is conditioned by many factors, where the most important are:

- Farms of minimal sizes and fragmented,
- Problems over arable land property,
- Very high prices of inputs and an unorganised and non-effective production and distribution system of agricultural goods,
- Lack or insufficiency of agriculture crediting,
- Lack or insufficiency of agriculture mechanics, and
- Lack of working force due to internal and external emigration.

Table 4-16 presents the main analysis of EE/RES active scenario for the agriculture farms within the borders of Berat Municipality.

Table 4-16: Main analysis of EE/RES active scenario for the agriculture farms within the borders of Berat Municipality

Parameters	Number	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO ₂ eqv reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL agriculture farms	430 large farms and 18,375 small rural farms	65.24	20.72	5,152	35.43	3.14

With the objective of reducing the energy consumption, introducing RES technologies and reducing GHG emissions according to the Active Scenario, the following quantitative and qualitative measures shall be promoted by MEMU and Agriculture & Rural Development Directorate of Berat Municipality:

- Reduction of energy intensities due to a better management was foreseen. It will be achieved by restructuring the agriculture sector and establishing farmer groups with common interests that will enable the use of mechanized agricultural machineries. Such measures will double the profits, increase agriculture production and reduce, on the other side, the fuel specific consumption.
- Application of biomass schemes and for heating green houses and for production of biogas from plants and agriculture and animal farming wastes is an effective way to meet the growing demands in the agriculture sector. This would increase the contribution of renewable energy sources, and reduce the cost and environmental pollution.

- The high potential of solar energy in Berat Municipality makes it a preferred energy source, especially, if PV pumps for irrigation and solar collectors that produce hot air for drying up of different agricultural goods are used.
- Using efficient tractors and all other mechanical equipment will also be very important.

4.4.10 Recommended measures in service, industry and agriculture sectors

The recommended set of measures for comprise 6 measures, as follow are presented at table 4-17.

Table 4-17: The recommended set of measures for service, industry and agriculture sectors

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
COM-01	Promotion of Demand Side Management	Training & capacity building & information	100
COM-02	Information and support program for Solar Rooftop PV for industrial and commercial buildings	Training & capacity building & information	28
COM-03	National support program: Information on Support Program for EE in industry, SME	Financing mechanism	32,382
COM-04	Support Energy Audits Explore Renewables	Training & capacity building & information	283
COM-05	Strict application of energy performance codes Issuing the construction permits for the commercial buildings	Municipal policy & regulation	284
COM-06	Training for Energy Managers working in Industry	Training & capacity building & information	41

Total costs for 6 EE measures in commercial/ industrial sector would require 33 million EUR. The municipality shall focus on Communication and Cooperation as well as regulatory type of activities to stimulate and support investments by the commercial entities. Financing sources shall be mainly commercial entities, banks and complemented by support programs by the central government. The preliminary economic analysis of energy saving benefits for investment measures are presented at table 4-18.

Table 4-18: The preliminary economic analysis of energy saving benefits for service, industry and agriculture sectors

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
COM-01	COM: DSM	0.5 -1 % electricity	0.6	159	1
COM-03	COM: Nat. EE financing facility	Up to 40% final energy in industry, outreach at 30% of companies	53	8,000	4

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
COM-06	COM: EM training	1% final energy at outreach to 10% of companies	0.4	65	1

If all these EE measures would be implemented, industry in Berat municipality could save annually 57 GWh/year. That represents 30-40% less than the 2021 consumption. The specific annual primary energy savings per each invested EUR could reach 1.7 kWh. The average payback period is at 4 years.

4.5 Other central public buildings within borders of Municipality

4.5.1 Initial Situation

The buildings of Berat can be divided into two types according to the funds used from the budget: those belonging to the Central Government and those belonging to the Municipality. Due to a decentralized structure, only a small part of the buildings can be classified as buildings which are generally owned by the Government. In particular, these include buildings in heritage areas, such as the walls of the castle and the fortress, which operate under the responsibility of the Ministry of Culture. Other public buildings that belong to the agencies and Ministries of the Central Government are hospitals, public security, as well as justice and tax administration buildings.

About 4% of central public buildings are located in Berat municipality, summing up to about 30 buildings with an area of approximately 20,000 m². Those buildings consume about 14.2 GWh annually, which are embedded into the balance of municipal-wide energy. Central municipal buildings are part of the service sector under Albanian Energy Balance. Central public building stock depends on different ministries and central agencies within the borders of Berat and consists of 23 central public buildings with a total floor area of 20,110 m², as presented in the following Table 4-19.

Table 4-19: Central public building stock within the boarders of Berat Municipality

Nr	Category of Central Public Buildings	Number	Area (m ²)
1	Administrative buildings	3	2,860
2	Medical institutions	11	13,200
3	Other buildings	9	4,050
	TOTAL	23	20,110

4.5.2 Energy performance and GHG emissions and forecast

Figure 4-28 presents total yearly energy consumption based on data collection from MEMU for the year 2021 (base year). Analysis shows clearly that electricity is the largest energy commodity with 87% of total consumption, followed by diesel / LFO with 10% of consumption. Figure 4-29 presents total yearly energy expenses based on energy consumption and the respective energy prices for each energy commodity according to data collection from MEMU for the year 2021 (base year). Analysis shows clearly that cost of electricity is the largest one with 87% of total expenses, followed by diesel / LFO with 11% of expenses.

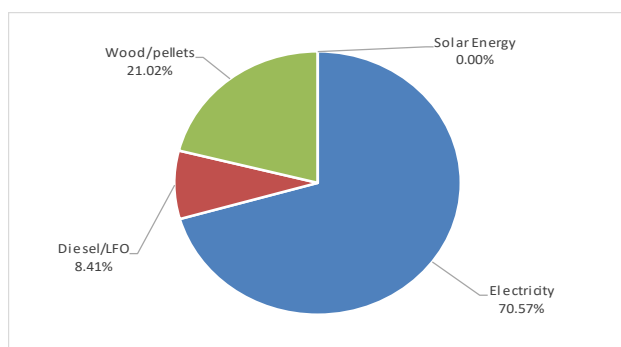


Figure 4-28: Yearly energy consumption for central public buildings for the year 2021

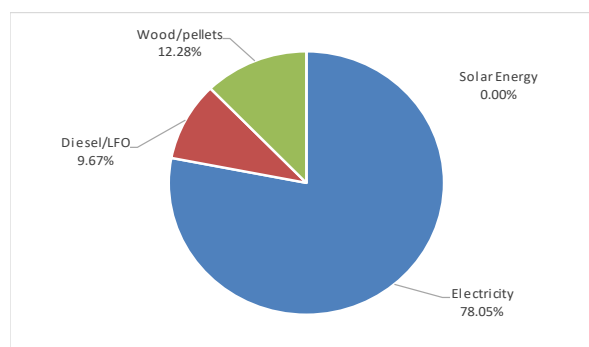


Figure 4-29: Yearly energy expenses for central public buildings for the year 2021 (base year)

Baseline scenario (BAU) energy demand forecast for all central public building stock is established at the same way like municipal public buildings. Figure 4-30 presents total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 4-31 presents GHG emissions forecast scenario expressed in CO₂eqv.

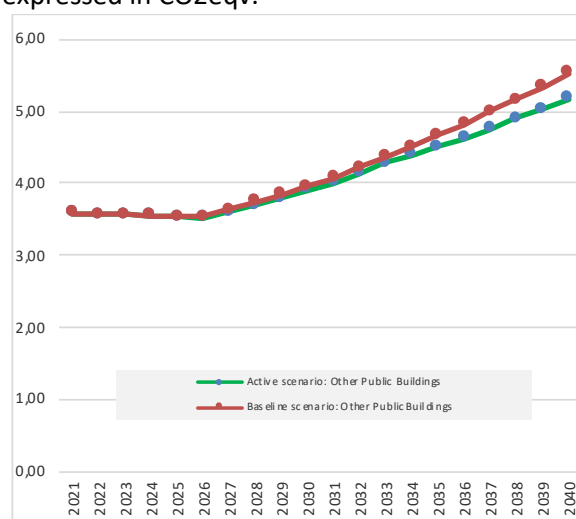


Figure 4-30: BAU & Active energy demand forecast for all central public buildings stock for the period 2021-2040 (GWh/year)

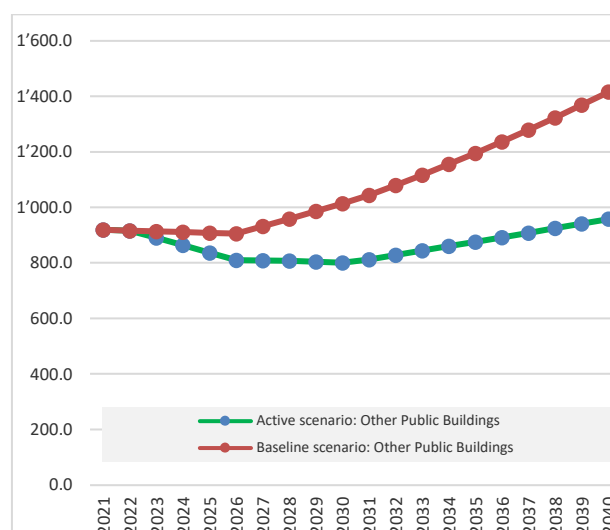


Figure 4-31: BAU & Active GHG emission forecast for all central public buildings stock for the period 2021-2040 (tons of CO₂eqv/year)

Baseline scenario (BAU) energy demand forecast for all central public building stock is established at the same way like municipal public buildings. Figure 6 presents total yearly energy demand for baseline scenario for the period 2021-2040. Meanwhile, Figure 7 presents GHG emissions forecast scenario expressed in CO₂eqv.

4.5.3 Intervention Strategy

The municipality shall focus on Communication and Cooperation as well as regulatory type of activities to stimulate and support investments by the central government agencies. Financing sources shall be mainly central government agencies, complemented by support programs by the central government.

4.5.4 Recommended measures in other public buildings

The recommended set of measures for other public buildings comprise 3 measures are presented at table 4-20.

Table 4-20: The recommended set of measures for other public buildings

Code	Energy Saving Measures	Type of measure	Estimated costs (‘000 EUR)
OPB-01	Obligatory building energy management system (large buildings, > 3,000 m ²)	Investment and preparation	402
OPB-02	Obligatory energy audits and preparation of project pipeline for financing mechanism	Investment preparation	52
OPB-03	Training on Building Energy Management	Capacity building	3

Table 4-21: The preliminary economic analysis of energy saving benefits for other public buildings

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings (‘000 EUR /year)	Simple Payback time (years)
OPB-01	OPB: BEMS	20% of fuel for heating	0.3	27	15
OPB-03	OPB: EM training and audits	1% energy saving	0.1	3	1

If all these EE measures would be implemented, Berat municipality could save annually 0.4 GWh. That represents 10% less than the 2021 consumption. The specific annual primary energy savings per each invested EUR could reach 1.0 kWh, according to experts, is a good ratio for such investments. The payback time is about 9 years (table 4-22).

Table 4-22: Main analysis of EE/RES active scenario for the Central Public Buildings Stock within the borders of Berat Municipality

Parameters	Number	Area (m ²)	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO ₂ eqv reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL Central Public Buildings	23	20,110	5.52	0.4	200	0.5	8

5 UTILITIES SUPPLY & DISPOSAL

5.1 Energy supply

5.1.1 Initial Situation

The Albanian energy sector is characterized by abundant hydroelectric power production and some oil, and natural gas deposits, which forms the foundation of Albania's energy landscape. Over the years, the sector has undergone transformative reforms and modernization initiatives, fostering a dynamic environment that strives for energy security, sustainability, and economic growth. All energy commodities prices are liberalised, excluding electricity for the small SMEs, public municipality services and residential sectors. All other electricity prices for large services and industrial consumers are liberalized, depending to voltage level of their connection to the distribution system.

Gas: Berat Municipality, like all other Albanian municipalities are not yet connected to Natural Gas Transmission network to be developed in Albania. According to the Natural Gas Master Plan approved by the Council of Ministers Decision, Berat Municipality will be connected to natural gas transmission network on long term about 2028-2030.

District Heating: There is no District heating System in Berat and there are no plan for such system up to 2030.

Transmission: The Transmission System in Albania is composed of the 400, 220 and 110 kV level networks and has 120.2 km 400 kV lines, 1102.8 km 220 kV lines, 34.4 km 150 kV lines and 1202.2 km 110 kV lines. The 220 kV network is completely meshed and connects the main plants in the North of Albania (all of them near Berat Municipality) with load centres in areas of Tirana, Berat, Durrës, Elbasan, Korça and Fier. The 110 kV network is used for the supply of the Distribution System. Figures 5-1-5-2 are presenting the Map and Single Line Diagramme of 400/220/110 kV Power Transmission System supplying Berat Municipality. Berat Municipality is supplied from Berat, Kucove and Uznove 220/110/35/20/10/6 kV distribution substations all of them connected at 220 or 110 kV Overhead Power Transmission Lines.

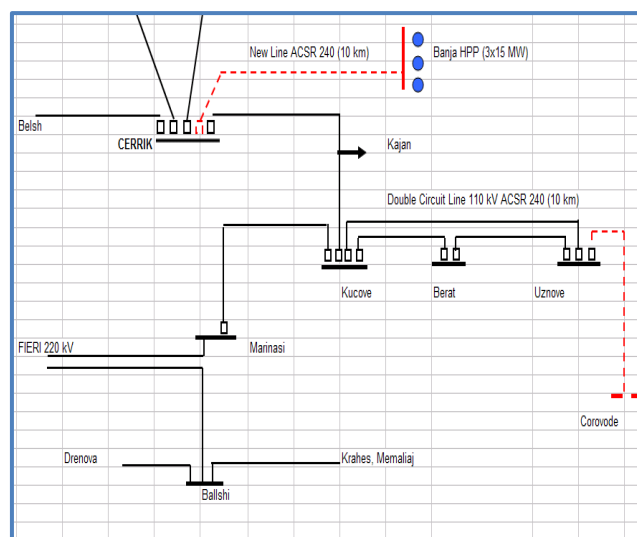
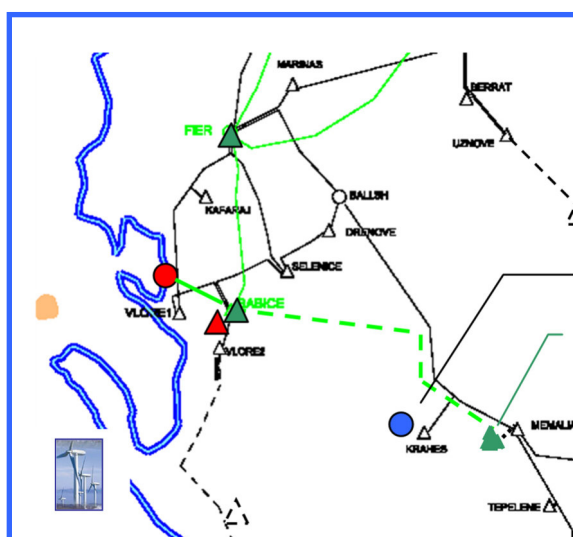


Figure 5-1: Map of 400/220/110 kV Power Transmission System supplying Berat Municipality

Energy Supplier:

The OSHEE sh.a group (OSHEE) is the Distribution System Operator (DSO), the main supplier of electricity and one of the three key actors in Albania's power sector with high importance for the country and its economic development. OSHEE is in a challenging situation, characterized among other things by investment backlogs, high energy losses and dependency on state guarantees. Furthermore, the electricity market is undergoing a period of important transformation, including the unbundling of the grid business, etc. The energy systems in Albania are primarily centralized, with municipalities having limited influence on the development of future energy sectors. Nevertheless, the municipality of Berat exhibits a commendable level of collaboration between itself and OSHEE.

The many measures initiated within OSHEE since 2015 to reduce the technical and commercial losses of network operations have permanently contributed to a reduction. In 2022, the commercial losses amount to 7% (meanwhile in Berat Region have been 12%), so that there is still considerable potential for further improvement. In 2022, the technical losses were reduced to 14%, (meanwhile in Berat Region have been 9%). This results from the modernization of the network infrastructure, which is to be pursued further.

Furthermore, the quality of the energy supply has been continuously improved over the past years, mainly due to modernization of the grid. Nevertheless, average energy supply failures per customer of 30 interruptions (SAIFI) per year and a total duration of 20 hours (SAIDI) (values 2022) are little bit higher from the quality standards that are common in Central Europe. The average energy supply failures per customer in Central Europe are in the lower single-digit range for interruptions per year and below a total duration of 30 minutes per year. Against the background of the conditions described above, OSHEE continued its development also in Berat area, where the progress was made in several fields, e.g.:

1. **Reduction of losses:** A further reduction of technical losses was achieved during the project period by continuing to work on restructuring the distribution network, especially in regions with high energy demand. Additional new 110/20-kV substations were built and the medium voltage networks in these regions were changed over from 10-kV and 6-kV to 20-kV. The implementation of prioritized Loss Reduction Action Plan measures was further advanced and losses have been reduced to 10% and there is plan to be further reduced to 7% at 2030.
2. **Improvement of metering:** A contribution was also made to the further reduction of commercial losses in the DSO area through improvements in the metering process. Work was carried out on quality assurance of the metering systems through cyclical checks. The meter-reading process was completely automated through the use of smart meters in a pilot project for approx. 500 customers, which also will continue to improve the quality of the metering data and saved manpower for meter reading.
3. **Reduction of electrical supply malfunctions/ blackouts or shortages:** The above-average accumulation of electrical faults in 20-kV cable networks was reduced during the period 2019-2022. Through targeted maintenance activities in 20-kV networks, especially by replacing damaged cable terminals, the frequency of faults was reduced almost by two times.
4. **Digital data collection:** The introduction of collection of operational data in Berat 1, Berat 2, Koplik, 110/35/20/10/6 kV distribution substations to be transmitted in digital way will improve the basis for decisions to optimize substation operation, identify possible potentials to reduce technical losses and make investment decisions based on real facts values.

Locally produced Energy: There is a considerable amount of power generation from renewable energies in the region. 2 SHPPs are situated in the Berat region - Bigas 1 and 2 with total installed capacity 900 kW. The municipality is responsible for the issuing of construction permission for all categories of plants: Hydro Power Plants, PV Power Plants, Wind Power Plants. There are also new permits issued for building SHPPs and Solar PviPPs. Different private developers carried out more than 11 feasibility studies for specific projects that have been developed for SHPPs and Solar PVs.

The recommended set of measures for electricity distribution system comprise 3 investment measures and 3 accompanying measures are presented at table 5-1.

Table 5-1: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
EL-01	Rehabilitation of 0,4 - 10 KV network and Transformers upgrade	1,900 km of distribution lines + 0,5 Transformers / km	60,800	22 k €/km
EL-02	Smart metering program, enabling 'RE prosumer' metering and billing	2.000 subscribers, of which 60 % Solar unit applicants	609	300 € per subscriber
EL-03	Non-Technical Loss Reduction Program, enforcement of billing and collection,	100% of subscribers	4,062	100 € per subscriber

In addition the following accompanying measures are recommended and **are presented at table 5-2.**

Table 5-2: Accompanying measures

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
EL-04	Up-date of feasibility studies for RE (solar, wind) and presentation to financiers, investors, donors	investment preparation	150
EL-05	Create a Solar Map to Promote Renewables Generation in the municipality	information/awareness	100
EL-06	Cross sector and city wide power consumption monitoring	Monitoring subscribers	25000 1, 390

Total costs for 6 EE measures on reduction of power distribution network losses would require 55 million EUR, of which the power utility has to cover investments and contribute to accompanying measures, overall 98%. The preliminary economic analysis of energy saving benefits for investment measures are given at the table 5-3.

If all these EE measures would be implemented, Berat municipality could save annually 21 GWh. That represents 14% less than the 2021 consumption. The specific annual primary energy savings per each invested EUR could reach 0.3 kWh.

Table 5-3: EE measures on reduction of power distribution network losses

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
EL-01	EL: Network retrofit	30% reduction of power distribution losses (60% of network)	12.5	2,886.5	19
EL-03	EL: Enforced billing	5% of non-technical power losses	3.44	644.6	5.4

5.2 Potable water supply and wastewater services

5.2.1 Initial Situation

The city of Berat is supplied with water from the Bogova spring at a distance of 37 km south-east of the city. The spring is located on the mountain of Tomorri at a height of about 343 m above sea level and supplies the city using gravity. The maximum flow is 2 to 2.4 m³/s in winter and the minimum flow is 0.35 m³/s. In the period of lack of water, the supply is increased by pumping water from the Uznova aquifer in the southern part of Berat in the Osum and Zagore rivers. The aquifer has 4 wells, the farthest of which is 400 m from the pumping station whereas the closest is 35 m. The wells have a production of 100 lit/sec. The water is pumped to reservoir No. 4 and directly to the main pipeline from the Bogova water source. Because the wells are located below the urban area of Uznova, the water quality is not very good and often sometimes there is considerable pollution, which is why this pumping station has not been turned on since 2016, and the need for water supply has been met by the water source of Bogova. The quality of the water from Bogova is very good. The water is chlorinated in the Gradisht Reservoir. The urban area and the water supply system of Berat have a capacity of about 13,950 m³, including 7 reservoirs.

Potable water supply and sewage services are provided by "Kompania e Ujesjelles-Kanalizime Berat-Kucove" sh.a., which is at the service of all customer groups in the City of Berat, Kucove, as well as the 23 villages in the area of the Municipality. "Kompania e Ujesjelles-Kanalizime Berat-Kucove" sh.a. is a subsidiary 100% owned by the Municipality of Berat. The water supply service is performed well and works by covering its own costs, thus allowing it to pay off the installments of the loan received from KfW.

The municipality, as the owner of "Kompania e Ujesjelles-Kanalizime Berat-Kucove" sh.a., controls the operation, performance and financing of the water supply and sewage sectors. The total number of water supply subscribers is approximately 34,500, of which 91% are residential subscribers. 100% of residential, commercial and public subscribers in the city of Berat and Kucove are connected to the water network. The water supply network of Berat and Kucove has a length of approximately 45 km. Annual costs for water supply and sewage treatment are 1.8 million USD, with energy costs reaching up to 13%, or expressed differently 230,000 USD/year.

Sinjë, Velabisht and Roshnik units are not covered by the water supply service offered by Berat-Kuçovë Joint Stock Company. In these areas water is secured by the residents of the units through wells and natural water sources. The situation in the Otllak unit is different, where the water supply and sewage in a part of the unit is provided by the Berat-Kuçovë company, and partially by Ujesjelles Kanalizime Ura Vajgurore. Sewage system Sewage is provided in the city of Berat and partially in the Otllak unit. The service provided

is at unsatisfactory levels, this is because the sewage system is mostly blocked, damaged and flows into the Osum River.

The situation is even more difficult in non-urban units that are not provided with sewage service. In these units, the removal of water is done through septic tanks, it should be noted, outside the hygienic and sanitary standards, or through open drainage channels that pass very close to residential areas.

The Municipality of Berat and its water services company "Kompania e Ujesjelles-Kanalizime Berat-Kucove" sh.a. are currently implementing an investment program financed by KfW for the rehabilitation and upgrading of sewage facilities.

Collection and removal of rainwater and flood protection in residential areas is provided by the company Ujesjellës Kanalizime Berat sh.a.; Rain water network (KUB) of the city of Berat (for the collection of rainwater) operates separately from the sewage network; The total length of the KUB system for the city is about 23 km; About 21 km consists of closed pipelines and the rest are open channels; The main drainage system covers about 70% of the formal areas of the city, while in the informal areas it has a much lower coverage. Table 5-4 presents a summary of main data of water supply and sewage water systems for Berat Municipality (data collected by MEMU for base year 2021).

Table 5-4: Water supply and sewage water systems for Berat Municipality

Water Supply Service	Value	Unit
Total length of water supply network	506.15	Km
Total water subscribers	29,358	Subscribers
Customers with water meters	22,422	Customers
Share of households with central water supply	26,512	Households
Number of street water taps	0	Streets
Capacity water system, nominal	63,072	m ³ /day
Total amount of water consumed / sold	2,613,890	m ³
Total amount of water produced	8,313,480	m ³
Estimated water losses	5,699,590	of produced water
Estimated water losses	5,699,590	m ³
Average duration of water supply per day	15.00	ø hours per day
Number of fresh water sources (springs, wheels, surface)	3	water processing units
Main pumping stations	11	pumping stations
ø Capacity of pumps	180	kW
Interim/ elevation pumping stations	88	pumping stations
ø Capacity of pumps	70	kW
Electricity consumption at water treatment plants	28,500	kWh/yr
Electricity consumption for water supply	1,362,196	kWh/yr
Waste Water Service	Value	Unit
Total length of sewage network	156	Km
Connected subscribers to sewage network	26,512	Subscribers
Customers with water meters	22,422	Customers
Non revenue water	196,070	m ³
Capacity sewage system, nominal	2,000	m ³ /day
Total amount of collected wastewater	2,613,890	m ³
Interim / elevation pumping stations	11	total number of pumps
ø Capacity of pumps	28	kW
Total amount of treated wastewater	2,613,890	m ³
Number of WW treatment plants	1	water processing units
Electricity consumption of waste water treatment plants	30,000	kWh/yr
Electricity consumption for waste water service	448,294	kWh/yr

With financial support of international donors EU, SECO and KfW the Water Supply and Wastewater Project is under way in the municipality. The completion of that projects will result in reduction of the energy consumption in the water supply and sanitation sector; thus, it will be listed in the MECAP to reflect the results in the future energy balance, compared to the baseline year 2021.

Project components water supply in the city of Berat: Improving the efficiency of the water distribution network; Extension of water supply network; Replacement of outworn pipelines; Leak detection and pressure management system; Improving the efficiency of the water metering system. Project components of waste water system in the city of Berat: Improve Performance of sewer/ canalization networks, new mainline collectors; replacement of the obsolete networks and establishment of pumping stations, Construction main sewage pipeline to waste water treatment plant.

5.2.2 Energy performance and GHG emissions and forecast

Figure 5-3 presents total yearly energy consumption based on data collection from MEMU for the year 2021 (base year). Analysis shows clearly that electricity is the largest energy commodity with 74.46% of total consumption, followed by diesel / fuel oil with 25.54% of consumption.

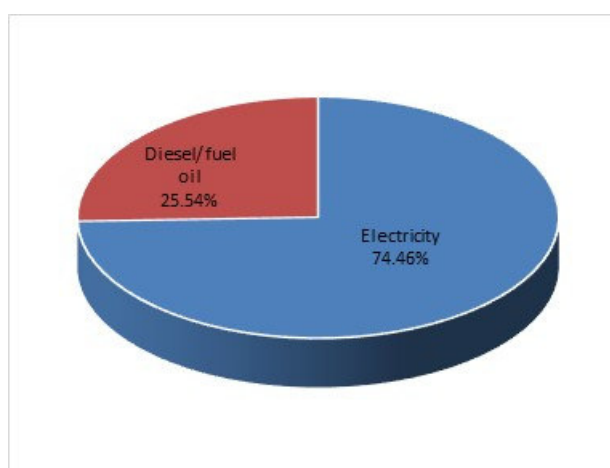


Figure 5-3: Yearly energy consumption for the water supply and waste water system for the year 2021 (base year)

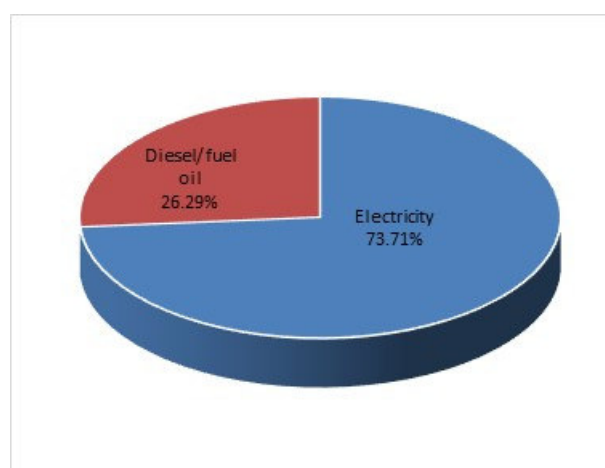


Figure 5-4: Yearly energy expenses for the water supply and waste water system for the year 2021 (base year)

Baseline scenario (BAU) energy demand forecast for the water supply and waste water system is established based on the water production and consumption as well as specific energy consumption. Figure 5-5 presents total yearly the water supply and waste water system for the period 2021-2040. Meanwhile, Figure 5-6 presents GHG emissions forecast scenario expressed in CO₂eq. It is very important to be mentioned that sharp drop in 2026 (under active scenario) is considering the full implementation of KfW, EU and SECO project on water supply and wastewater treatment .

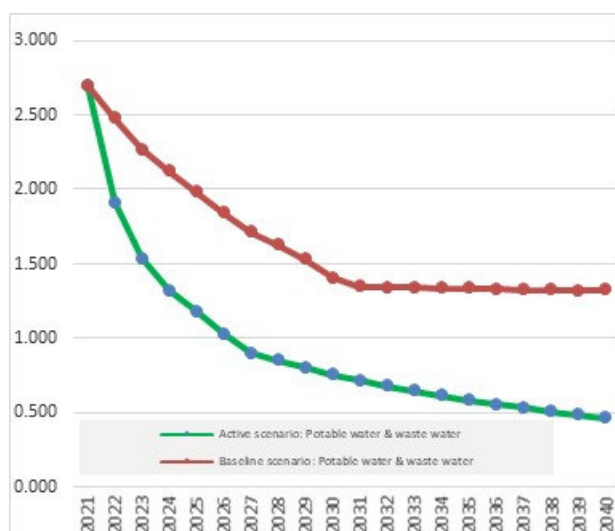


Figure 5-5: BAU & Active energy demand forecast for the water supply and waste water for the period 2021-2040 (GWh/year)

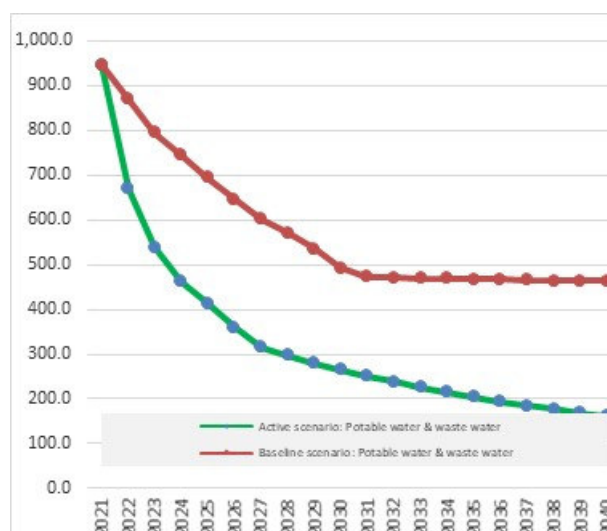


Figure 5-6: BAU & Active GHG emission forecast for the water supply and waste water for the period 2021-2040 (tons of CO₂eqv/year)

Active scenario (BAU) energy demand forecast for the water supply and waste water system is established taking into consideration water supply (including water efficiency) and energy efficiency for the whole elements of the water supply and wastewater system.

5.2.3 Intervention Strategy

At the following are presented the main projects carried out:

Project I: Fund: 898,344,061 ALL - In this investment, the water supply network was built for the area of Uznove and partially for the neighborhood of Donika Kastrioti (Region No. 3). Water supply is done by gravity from Bogova and the system is circular. This area has two supply points in the network: 1) HDPE 110 pipeline which is supplied by Ø700 steel, and 2) Water tank of Bateri. Also in this project, the delivery line for the supply was realized for the city of Kucova from the Bogova aqueduct, about 12 km, DCI 300.

Project II: Fund: 12,134,233 EUR - In this investment, the water supply network has been rehabilitated in the central area, specifically neighborhoods "13 Shtatori", "28 Nentori", "10 Korriku", "Jani Vruho", "Donika Kastrioti", "Mangalem", "22 Tetori", "30 Vjetori". The beneficiaries are about 2100 residents. Also in this investment, the replacement of a section of the main pipeline at the entrance of the city (Uznove) to the vicinity of Turzmi (about 5 km) was carried out, which used to be amortized steel pipeline and was replaced with DCI 600.

Project III-IV: Fund: 10,160,110 EUR - The MIP III-IV program in Berat has rehabilitated the water supply network from the old "Gorica" Bridge to the former "Ushqimore" Roundabout on both sides of Antipatrea Street, and the sewage network in the lower part of Antipatrea Street (the western part). The investment impacts about 25,000 residents). Replacing the water distribution network in metered areas (DMA), which includes approximately:

- 48 km distribution pipe and connector;
- 9.4 km pipe installed in multi-storey buildings;
- 2,670 connections of objects;
- 4,880 water meters.

Berat Sewage Network - Supply, delivery and installation of pipes, wells, filling and rehabilitation of roads which include approximately:

- 12.1 km corrugated HDPE sewer pipe (ribbed);
- 380 sewer pits PP / PE / Concrete;
- 135 pits PP / PE DN 400 for connections of objects;
- 1,020 connections of objects.
- Construction of the water supply system of the village of Lapardha 1, Otlak administrative unit
- Construction of the water supply system of Duhanas village, Velabisht administrative unit
- Construction of the water distribution network in the Otlak and Orizaj areas, Otlak administrative unit
- Construction of the distribution network of the water supply system, Berat informal area
- Construction of the Ushqimore-Otlak transmission line

In this investment, the new water supply network for the informal area of the city, the villages of Orizaj, Otlak, Lapardha 1, which are supplied by gravity from the water supply system of Bogova, and also the water supply network for the village of Duhanas, which is supplied by mechanical lifting, was built from the water tank of Bateria to the new water tank built in the village of Duhanas, from where the village is mostly supplied by gravity, and only the part of the houses located above the water tank can be supplied by mechanical lifting again. This project serves the following villages with a water supply network:

- Lapardha 1 1700 residents
- Duhanas 2300 residents
- Otlak – Orizaj 1778 residents
- Informal area 2114 residents

TOTAL: 7892 residents + 9 institutions + 129 businesses

In this investment, the main network of about 7 km and the distribution network for 4 villages of the Velabisht administrative unit were built. The water supply is made from the main pipe $\varnothing 700$ of Bogova and is sent to the new water tank built in the village of Starova with a capacity of 500 m³. The entire supply is done by gravity. The beneficiaries are 4,800 families, 118 businesses and 7 institutions.

With donor funds: The German Financial Cooperation through KfW provides funding for capacity building and investment projects in urban areas of Albania, covering the water sector infrastructure rehabilitation under the "Water Sector Performance and Investment Program (WPIP)" or "Municipal Infrastructure Program V (MIP-V)" (in continuation of previous Programs MIP-I to MIP-IV). Apart from the German Financial Cooperation, funding is provided from the EU under the IPA 2018 action, directed to wastewater components, as well as by grant funding directed to water supply and wastewater measures being made available by the Swiss State Secretariat for Economic Affairs (SECO). Since 2011 a series of Municipal Infrastructure Programs (MIP) for rehabilitation of the urban water supply and sewage infrastructure in Albanian towns are under implementation, financed by KfW in cooperation with the European Union (IPA funds) and SECO.

Main large investment in Berat Wastewater includes: collector-transmission systems, river crossing, waste water treatment plant, retrofit of water supply network, water meter program, upgrading of pumping stations, active leak detection and pressure management program, prioritizing energy efficient water resources. Table 5-6 presents the main analysis of EE/RES active scenario for the water supply and waste water treatment systems of Berat Municipality.

Table 5-6: The preliminary economic analysis of energy saving benefits for investment measures

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
PW-01	PW: Retrofit water system (KFW/SECO)	Outreach 10% of network, 50% water losses, power	0.35	70,2	31
PW-02	PW: Retrofit water system (remaining)	Outreach remaining network , 50% water losses, power	0.40	624,2	30
PW-03	PW: leak detection system	5% water losses, power	0.15	33,6	2.6
PW-04	PW: PV Solar plants	100% RE power used for pumping	3.6	817,8	4
PW-05	PW: Efficient fixtures	50% outreach, 4% water losses, power	0.17	31,2	8.6
WW-01	WW: Retrofit canalization (ongoing)	25% of waste water, power at WWTP	0.02	33	> 50 years
WW-02	WW: Retrofit canalization remaining	25% of waste water, power at WWTP	0.1	165	> 50 years
WW-03	WW: PV WWTP	100% RE power used for WWTP	1.55	330	3.8
WW-04	WW: Biogas unit	100% RE power used for WWTP	0.7	150	6
WW-05	WW: Extend WWTP	No	0		

If all these EE measures would be implemented, Berat municipality could save annually 1.19 GWh and produce 58.5 GWh from renewable energy sources. By that the sector has the potential to cover its energy demand by own produced RE power. The specific annual primary energy savings per each invested EUR is low at about 0.13 kWh, which is due to low baseline energy intensity and high costs infrastructure renewal and extension. The implementation of this EE investment package in the water and waste water sector in Berat could avoid energy and O&M related costs of up 14.5 million EUR per year, average over the next 20 years. The payback time is about 8.6-31 years (depended from specific measure) (table 5-7).

Table 5-7: Main analysis of EE/RES active scenario for the for the water supply and waste water treatment system of Berat Municipality

Parameters	Covering area of water supply and wastewater services	Baseline energy demand, GWh/year	Energy Savings including RES generation, GWh/year	CO2eqv reduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
TOTAL	100%	1,320,000	6,700,450	3,044	214.5	8.6

It is recommended Berat Municipality together with the Water company should prepare an assessment to introduce PV Autoroducer systems for main pumping stations of water supply for the city and especially for

villages and this will be a top measure to reduce electricity invoices (which actually are the highest cost), increase RES utilization, and meet CO₂ targets.

5.2.4 Recommended measures in potable water supply and wastewater sector

The recommended set of measures for municipal potable water supply and waste water comprise 10 investment measures and 4 accompanying measures addressing Communication, Cooperation, Spatial Planning are presented at table 5-8.

Table 5-8: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
PW-01	Increase performance of water distribution networks; Replacement of outworn pipelines, water pumping stations, metering (SECO/KfW project component)	8.5 km water distribution net, as described above (12%)	2,500	Estimate 300.000 €/km
PW-02	Increase performance water distribution networks; Replacement of outworn pipelines, water pumping stations, metering (remaining network)	Remaining 50 km water distribution net	15,000	300.000 €/km
PW-03	Active Leak Detection and Pressure Management Program	10 water distribution points	30	3.000 €/point
PW-04	Solar PV plant at pumping stations (with preliminary capacity 2.7 MW) to substitute electricity consumption for pumping	Approx 2,700 kWp PV	2,700	1.000 €/kWp
PW-05	Support program (all subscribers) Water Efficient Fixtures and Fittings	80% of subscribers (@3x)	261	2 per unit
WW-01	Improve Performance of sewer/ canalization networks, new mainline collectors; replacement of the obsolete networks and establishment of pumping stations, Construction of main sewage pipeline to waste water treatment plant (SECO/EU/KfW project component)	10 km water canalization (10% of system)	2,500	250.000 €/km
WW-02	Improve Performance of sewer/ canalization networks, new mainline collectors; replacement of the obsolete networks and establishment of pumping stations (remaining network)	40 km water canalization (50% of system)	10,000	250.000 €/km
WW-03	Solar PV plant at WWTP (with preliminary installed capacity 1 MW integrated with distribution network) to substitute part of the electricity consumption for pumping purposes WWTP	1,000 kWp PV	1,000	1.000 €/kWp
WW-04	WW sludge separation and biogas unit (0,5 MW) at WW treatment plant	500 kW CHP	1,000	2.000 €/kW
WW-05	Extension of WW treatment plant	1 WWTP	18,000	Per unit

In addition, the following accompanying measures are presented at table 5-9.

Table 5-9: Accompanying measures for water and waste water systems

Code	Energy Saving Measures	Type of measure	Estimated costs (`000 EUR)
PW-06	Prioritizing Energy Efficient Water Resources (gravitation flow, reservoirs), feasibility study	Investment preparation	60
PW-07	Educational Measures, water saving in municipal facilities	Information / awareness	100
PW-08	Promotion of Water Demand Restrictions (e.g. industry, agriculture)	Municipal policy & regulation	25
WW-06	Auditing of water supply and Treatment Facilities	O&M management & monitoring, 10 WW facilities over 20 years	100

The water utility company Ujesjellës Kanalizime Berat sh.a. has to cover investments and contribute to accompanying measures.

5.3 Municipal solid waste management and street cleaning

5.3.1 Legislative and regulatory framework

The Albanian legal framework for waste management has substantially aligned itself with EU directives. Plans for managing solid waste have been in existence since the early 2000s, although their full implementation was lacking. In May 2020, the government approved a new Strategic Policy Paper on Waste Management, which covers the period from 2020 to 2035. This document outlines the government's policy regarding municipal, non-municipal, and hazardous waste, and it adheres to the guidelines set forth in the Framework Directive 2008/98/EC, much like its predecessor.

The primary vision behind this new plan is to establish a strategic and regulatory framework that reduces waste generation and establishes a waste management system in accordance with the objectives outlined in the EU framework directive. The ultimate goal is to enhance environmental quality while promoting economic and social development in the country. The newly adopted Management Plan introduces two key enhancements: clearer objectives with specified timelines and a delineation of the roles and responsibilities of public institutions, both at the central and local levels, within the entire action plan.

As, it was mentioned above the most important actual legal framework for waste is:

- National Integrated Waste Management Strategy and action plan of 2019
- Berat Municipality (2019): Local Solid Waste Management Plan (2019-2024)
- Annual municipal budget (2023) for Berat municipality

5.3.2 Initial Situation

The control over the solid waste sector lies entirely with the municipality of Berat. The municipality of Berat has developed a comprehensive local solid waste management plan (LSWMP) for the period 2019-2024.²⁷ For the period 2019-2024, the municipality of Berat has subcontracted the company “Ante-Group” (antegroup.al)²⁸ for delivering the services of street cleaning in the urban area and waste collection in the whole municipal territory. The municipality owns the containers, whereas the following vehicles are owned by Ante-Group:

- Compactor trucks No. 1 + 2: carrying capacity is 10-12 tons, operating in Zone 1
- Compactor trucks No. 3 + 4: carrying capacity is 5 tons, operating in Zone 2, 3, and 4
- Street cleaning vehicle (Street sweeper): 1 pc, the volume is 5 ton.
- Street washing truck: 1 pc, the capacity is 10m³
- Self-loading truck for inert waste removal and containers for cleaning: 1pc, 5 ton.

Solid waste collection: The waste collection service is divided into 4 four zones: Zone 1 (Berat city center), Zone 2 (Otlak), Zone 3 (Sinje and Velabisht) and Zone 4 (Rushnik and Duhanas). About **87%** of the population of Berat is covered by this service. Table 5-10 have been provided by Ante Group:

Table 5-10: Berat waste services overview

Zone	No. of Waste Containers	Service Freq.	tons/year collected	km/yr	Diesel (l/yr)	MWh/yr (9.8kWh/l)	t CO ₂ /yr (2.64kg/l)
Zone 1	300	7 x/week	13,115	24,243	59'040	579	156
Zone 2	59	4 x/week	1,486	12,536	16,640	163	44
Zone 3	89	2 x/week	1,109	10,637	8,320	82	22
Zone 4	30	2 x/week	373	7,909	6,240	61	16
Total	478		16,083	55,325	90,240	885	238

Composition of solid waste: As part of the development of the National Waste Strategy and Plan in 2010, the average composition of solid waste for Albania was investigated. Figure 5-5 shows the composition of solid waste that currently goes to landfills in Albania. It shows that up to 85% belong to solid waste fractions that could be separated and recycled or composted. According to INSTAT (2016), the average urban waste generation rate is 1.1 kg/capita/day in Albania. Thus, there is a **great potential to reduce energy consumption and CO₂ emissions if waste separation is already done at the source** and if possibilities for local composting and recycling are created. The goal of the NECP (2021) is to reduce the amount of waste going to landfills to 45% by 2030 and to 24% by 2035.

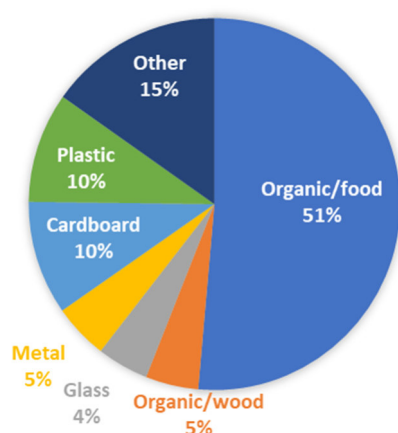


Figure 5-5: Average composition of municipal solid waste in Albania (source: World Bank, Data Catalogue).

²⁷ Berat Municipality (2019): Local Solid Waste Management Plan (2019-2024)

²⁸ until 2018 the company name was “Krenar Merko”

Final solid waste disposal: The above-mentioned km/year include the transport to the landfill in the village of Oriza with an area of 2.5 ha, and a total estimated volume of 100,000 m³. The landfill is currently being rehabilitated with support from the Swiss Government through SECO. In the landfill there are two vehicles. The first one is a transportation vehicle (12 ton) and 1 compactor bulldozer. Both vehicles are owned and operated by the municipality. The figures in the table below have been provided by Ante Group:

Landfill operations	Service area	Service Frequency	hours/yr	Diesel (l/yr)	MWh/yr (9.8kWh/l)	t CO ₂ /yr (2.64kg/l)
Bulldozer + Truck 12 t	Oriza landfill	Daily	730	5,840	57	15

A systematic waste separation or recycling program is not yet in place. According the 2019 LSWMP, the share of organic waste was 47% and paper and cardboard 13%.

The Municipality of Berat is supported by the Swedish Government for International Cooperation and Development (SIDA), and the Ministry of Tourism and Environment (MTE) to implement the project "Separation of urban waste at the source in the city of Berat". The period of implementation of the project is May 2021-November 2023. In 2022, the municipality still reported that no waste separation has taken place.

Street Cleaning: The streets in the urban area of Berat are cleaned every day on a total length of 14 km. The main streets in the city are cleaned by a street sweeper during the night. The same roads are also washed twice a day by a street washing truck with a water capacity of 10m³ (morning and afternoon). This means that some streets in Berat are cleaned three times a day. This is a very high cleaning frequency considering that most European cities clean their streets in average once per week.

The washing truck mentioned above is also used for this purpose. Table 5-11 have been provided by Ante Group:

Table 5-11: Berat street cleaning services

Street services	cleaning	Service area	Service Frequency	hours/yr	Diesel (l/yr)	MWh/yr (9.8kWh/l)	t CO ₂ /yr (2.64kg/l)
Street sweeping		117,321 m ²	Daily	2,555	17,885	175	47
Street washing		117,321 m ²	2 x/day May to Oct.	2,100	16,800	165	44
Pressure washing (Pedestrian areas)		3,050 m ²	18 x/year	126	1,008	10	3
Total				4,781	35,693	350	94

Tariffs/revenues: There are four types of tariffs: For households (1300 ALL/year), Small businesses (2500-1700 ALL/year), Large businesses (7000-80,500 ALL/year) and for institutions 25,000 – 50,000 ALL/year. Such tariffs apply only in the Berat city whereas in other administrative units the values are lower. Overall, 50% of expenditures are allocated for waste collection, 19% for street cleaning and 33% for other activities. The tariff for other administrative units is lower.

According to the municipality, the revenues totalled ALL 78,589,000 in 2020 while the expenditures totalled ALL 70,323,644, the service is fully cost covering.

Waste Collection: As per the waste service contract, the sub-contracted companies are responsible for waste collection and are required to replace and maintain the containers as needed. Currently, only 70% of the service is covered, and the companies are obligated to extend the service to remote areas, as outlined in the environmental program. Table 5-12 presents a summary of main data presenting waste collection for Berat Municipality (data is collected by MEMU for base year 2021).

Table 5-12: Waste collection main data for Berat Municipality

Waste Collection and Street Cleaning	Value	Unit
Amount of solid waste generated within the municipal boundary	21,080	m ³ /yr
Amount of solid waste generated within the municipal boundary	16,088	tones/yr
Total municipal solid waste per year	12,278	t/yr
Percent of solid waste that is captured	95%	%
Percent of solid waste that is recycled	10%	%
Share of waste production/ source, households	82%	of which residential / HH
Amount of solid waste that is captured	12,278	tones/yr
Number of waste collection points	170	pcs. (5 bins per point)
Amount of solid waste that is recycled	160	tones/yr
Amount of solid waste that goes to landfill	12,278	tones/yr
Waste collection trucks	7	ø capacity, m ³ / truck
Truck fuel consumption (diesel) for waste collection	934,752	kWh/yr
Fuel consumption (diesel) for landfill vehicles	267,072	kWh/yr
City / street cleaning vehicles	2	daily operation hours
Truck fuel consumption (diesel) for street cleaning vehicles	96,146	kWh/yr
Total energy consumption	1,297,970	kWh/yr
Total fuel costs (diesel)	181,958	€/yr

Source: Municipality of Berat, 2021

SECO and KfW have been implementing the “Integrated Solid Waste Management Programme in the Berat Region” (Municipalities of Berat, Dimal, Kuçovo, Poliçan and Skrapar) since 2017. Under this program, the Berat Local Solid Waste Management Plan (LSWMP) was developed containing 60 detailed improvement measures in the areas of 1) Legal and Institutional Framework, 2) Waste Collection, Transport and Cleaning, 3) Waste Disposal and Treatment, 4) Waste Separation and Recycling, 5) Financial Aspects, 6) Public Awareness and Education.

SECO summarized the achievements of the first phase 2017-2022 as follows:

*“The relevant ministries consider the SWMP in the Berat Region, phase I, funded by SECO to be a showcase for the development of waste management in Albania. The project successfully strengthened the institutional capacities of five municipalities. As a result, 185’000 people in the Berat Region benefit from improved solid waste management services (a coverage of 89% compared to 78% in 2019). Three rehabilitated dumpsites now comply with EU standards (90% compared to 75% in 2018), considerably improving sanitary treatment of solid waste. Waste management cost coverage through fees have increased to 96% in 2021 (compared to 88% in 2019). The project also helped to create a policy and regulatory framework that included preparing municipal and regional waste management plans, conducting a feasibility study for future regional investment measures, and raising public awareness. The training curricula developed may be transferred to the Albanian School of Public Administration for scale-up.”*²⁹

²⁹www.eda.admin.ch/deza/en/home/countries/albania.html/content/dezaprospects/SECO/en/2017/UR00648/phase2.html?oldPagePath=/content/deza/en/home/laender/albanien.html

In 2022³⁰, an external evaluation was conducted to assess the current status of implementation. The evaluation concluded that Berat Municipality is making good progress in implementing the local waste management plan. A total of 31 projects have been implemented (52% of all 60 PVMM projects), 21 (35%) are still being implemented, and 8 (13%) have not yet started implementation.

The evaluation recommends that more efforts should be made to communicate the achievements of the waste collection service to the population, as citizens do not seem to be aware of the strengths and activities undertaken to improve waste management and cleaning of the city.

The weakest results were achieved in area 4) **waste separation and recycling**, where no measure has yet been completed. Another weak point is in the area of monitoring and reporting, which manifests itself in the fact that Berat has not yet prepared annual reports, which, according to the law, should be submitted to the National Environment Agency by the end of January each year. These reports should include, among others, data on the following topics, which are also relevant for the Energy and Climate reporting:

- Waste data (quantity, type, origin, etc.),
- Vehicle data (age, condition, fuel consumption, etc.),
- Expenses for different types of service recipients (eg households, business, institutions),
- Expenditures for different types of areas (eg, semi-, rural areas).

The municipal administration justified the absence of these reports with the lack of a reporting format specified by the Minister of Tourism and Environment.

5.3.3 Energy performance and GHG emissions and forecast(active scenario)

Figure 5-7 presents total yearly energy consumption based on data collection from MEMU for the year 2021 (base year). Analysis shows clearly that diesel / fuel oil is the largest energy commodity with 94.19% of total consumption, followed by electricity with 5.81% of consumption. Figure 5-8 presents total yearly energy expenses based on energy consumption and the respective energy prices for each energy commodity according to data collection from MEMU for the year 2021 (base year). Analysis shows clearly that diesel / fuel oil is the largest energy commodity with 94.40% of total consumption, followed by electricity with 5.6% of consumption.

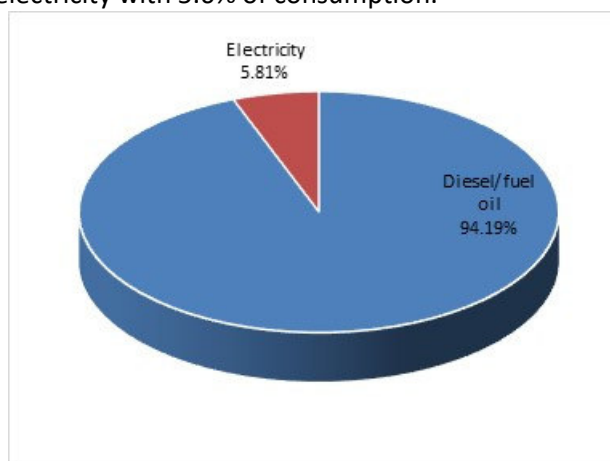


Figure 5-7: Yearly energy consumption for the waste collection system for the year 2021 (base year)

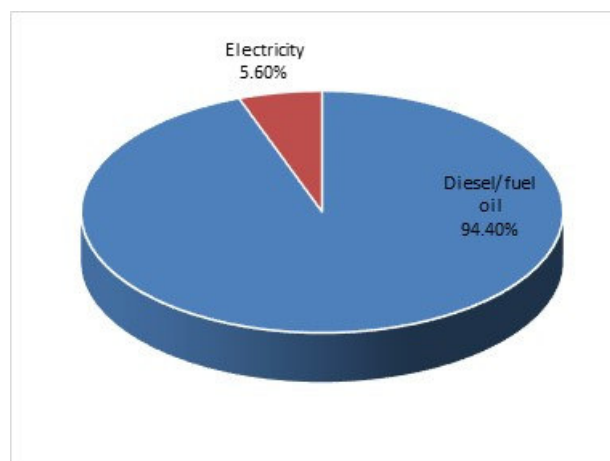


Figure 5-8: Yearly energy expenses for the waste collection system for the year 2021 (base year)

³⁰ FLAG (2022): Evaluation of the Local Waste Management Plan of Berat Municipality. Conducted by Foundation for Local Autonomy and Governance (FLAG), financed by SECO.

Baseline scenario energy demand forecast for the actual waste collection system is established based on the waste generation/collection as well as specific energy consumption. Figure 5-9 presents total yearly waste collection system for the period 2021-2040. Meanwhile, Figure 5-10 presents GHG emissions forecast scenario expressed in CO₂eq.

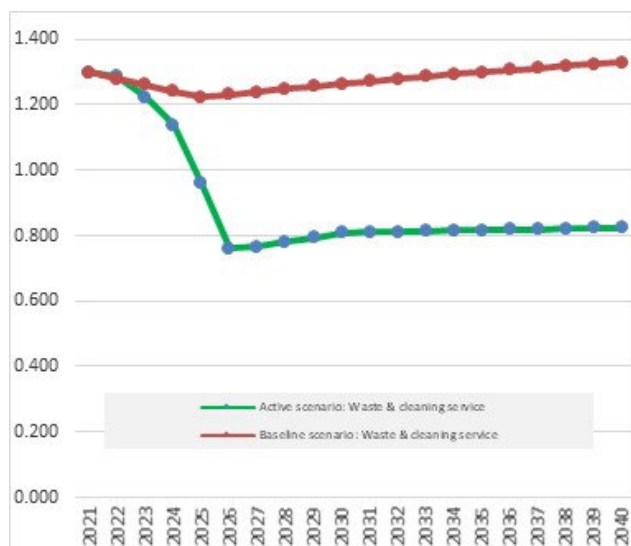


Figure 5-9: BAU & Active energy demand forecast for the waste collection system for the period 2021-2040 (GWh/year)

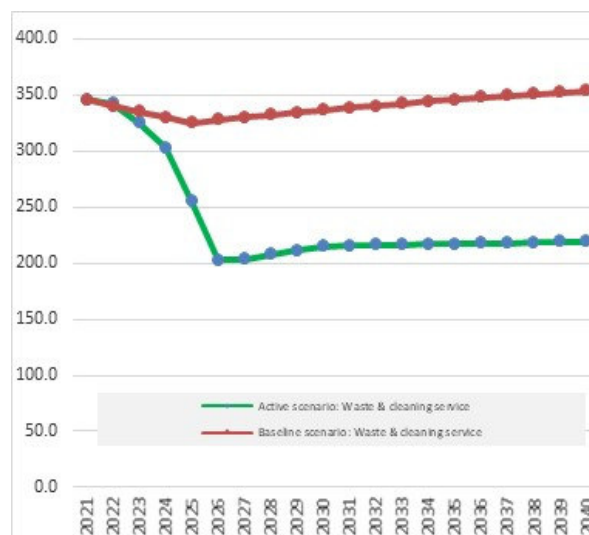


Figure 5-10: BAU & Active GHG emission forecast for the waste collection system for the period 2021-2040 (tons of CO₂eq/year)

Sharp drop for the period 2024-2026 (under active scenario) is considering all activities, which already Berat Municipality is undertaking for fulfilling the Solid Waste Management Plan with the support of the Albanian Government. For the upcoming period from 2025 to 2029, the Solid Waste Management Plan needs to be updated, and additional measures should be taken into consideration.

Waste Collection: To enhance waste collection efficiency and environmental impact, the plan proposes expanding the coverage area by installing more containers, particularly in remote areas.

The increased number of containers allows to reduce the frequency of waste collection thus optimizing the use of fuel accordingly. This extension of coverage is expected to reduce fuel consumption for waste collection by at least 15%. Furthermore, the plan encourages the use of high-energy-performance trucks in future tendering processes, potentially resulting in an additional 20% reduction in fuel consumption.

Quantitative analysis carried out the potential for energy savings and the most common following measures for improvement of EE for the waste collection system. Active scenario energy demand forecast for waste collection system is established based on waste generated (reduced by recycling) and specific fuel consumption (reduced based on efficient fleet).

5.3.4 Intervention Strategy

Thanks to the activities of the Swiss government and KfW, Berat has an LSWMP with 60 different measures to improve the situation. The plan is not yet fully implemented. In the current phase from 2022-2026, modern sorting plants, transfer stations as well as recycling plants will be established. Furthermore, the Swedish government supports waste separation at the source. Funding for the required investments has already been secured and does not need to be pursued as part of this MECAP.

The brief analysis in this chapter has shown that massive fuel savings can be achieved in route planning for waste collection and reducing the frequency of street cleaning. These are organizational improvements that do not require major investments. It is important that the MEMU of Berat establishes a dialogue with those responsible for the "Integrated Solid Waste Management Program". This is to ensure that the energy savings goals of this MECAP are considered in the revision of the LSWMP.

As part of the "Decentralization and Local Development Program" supported by Switzerland, the Municipality has formulated an annual environmental program to address various challenges concerning solid waste management. The main challenges identified are as follows:

- **Recycling rates and waste separation** are below national and international targets, resulting in a large amount of waste per household that must be transported and disposed.
- **Lack of Composting Practices:** In rural areas, composting practices do not exist, so solid waste has a high percentage of organic material that is unnecessarily transported long distances.
- **Insufficient Tariff Revenues:** The low waste collection tariffs do not provide an incentive for citizens to reduce the amount of waste they produce, which contributes to the fact that revenues from waste collection tariffs do not cover costs.
- **Inadequate Monitoring and Reporting:** There is currently no regular monitoring and reporting system in place for solid waste management. It is therefore difficult for the municipality to track progress, identify areas for improvement, and ensure accountability.
- **Low Awareness Levels:** Local communities and businesses have limited awareness regarding recycling and sustainability practices.
- **Lack of GPS Tracking for Waste Trucks:** Monitoring the movement of waste trucks through GPS technology is currently absent which makes it difficult to improve the efficiency of waste collection routes and overall fleet management.

The measures to reduce energy consumption and CO₂ emissions will focus on the following areas:

- a. The Government of Albania has a clear action plan for reducing illegal waste sites to zero and organizing the waste treatment at the regional level, including the Berat municipality. The investment of landfill of Bushati (belonging to Berat Region) will secure a long-term economic waste management solution for the municipality (although the size of the facility may act to constrain the long-term potential for high recycling rates).
- b. The Municipality is procuring contracts to extend household waste collection to the entire area of the city and especially to all administrative units.
- c. The Municipality has its plans until 2025 to launch a separate collection system to separate at source dry recyclable materials and other residual mixed waste. Performance of the new system is currently being monitored in other municipalities of Albania, so, the Municipality plans to extend these facilities first to Berat Municipality by 2025 and then to all county administrative units up to 2030.
- d. Berat Municipality supported by SEMP project has prepared the first concept for the construction of PV plant at the ex-landfill of Berat Municipality. The former waste field of the city of Berat, an area of about 30,000 m², is located in Adm. Unit Rrethina, Berat Municipality. It is proposed to build a photovoltaic park with a power of about 2.7 MW on this area. To contribute to the sustainable economic development of the Municipality of Berat through the use of renewable energy sources, reducing the energy cost of the Municipality, supporting contemporary technologies and benefiting from clean energy and reducing pollution by about 1850 tons/year of CO₂. Main results of this important project will be: Covering the existing waste field by rehabilitating it; Production of clean energy; Reduction of pollution; The environmental quality of the area will improve, measured by the percentage of pollution reduction; Reducing energy costs for the municipality; Reduction of greenhouse gases and acid gases; Installed capacity = 2.7 MW; Clean energy produced = 3.85 GWh/year; Initial Investments = 2.55-3 MEuro; Current Net Value of the Project = 6.44 MEuro; IRR= 18.86%; Pay back Period = 5.84 years; 1850 tons/year of CO₂ reduced directly impacting the realization of the targets of the future Energy and Climate Plan for the Municipality of Berat and the

National Energy and Climate Plan.

- e. The City is currently surveying and formulating an implementation plan to remove the illegal dumpsites, which have been reduced to minimum and actually the plan is to reduce to zero by the end of 2024, including administrative units.
- f. Enhancing the recycling in the municipality, thus reducing the amount of transported waste in the landfill and reducing the fuel consumption.
- g. Establishment of transfer stations for remote areas, thus reducing the fuel consumption for transportation.
- h. Monitoring the performance of sub-contractors in delivering the service as per contract.

5.3.5 Recommended measures in Municipal solid waste management and street cleaning

The recommended set of measures comprise 3 investment measures and 4 accompanying measures are presented at table 5-13.

Table 5-13: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
SW-01	Street cleaning/service vehicle fleet replacement	– 1 street cleaning vehicle	50	50,000 € per Vehicle
SW-02	Modern waste sorting complex and transfer station: including sorting and recycling and composting	– 15 kt of municipal waste to landfill (some 40%)	600	600,000 € per station
SW-03	Solar PV plant at landfill site (2,7 MW) to deliver to water utility	– 2,7 MWp PV	2,700	1,000 €/kWp

In addition the following accompanying measures addressing EEA Area 1 Development & Spatial Planning and EEA Area 6 Communication, Cooperation are presented at table 5-14.

Table 5-14: Accompanying measures addressing EEA Area 1 Development & Spatial Planning and EEA Area 6 Communication, Cooperation

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
SW-04	Promote Zero Waste through sorting recycling and composting	Information/awareness	20
SW-05	Waste Vehicle Fleet Maintenance Audits, annual	O&M management & monitoring	65
SW-06	Waste Collection Route Optimization, GPS tracking and hauling management, central dispatch centre	O&M management & monitoring	36

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
SW-07	Waste collection licenses combined with strict energy performance of vehicles	Municipal policy & regulation	200

Further details if priority measures are described in measures sheets, as presented in annex C. Total costs for 7 EE measures in municipal solid waste would require 3,6 million EUR, of which 95% are allocated for investments. The preliminary economic analysis of energy saving benefits for investment measures are presented at table 5-15.

Table 5-15: The preliminary economic analysis of energy saving benefits

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
SW-01	SW: Replace Street cleaning vehicles	25% fuel for truck	0.1	13.4	2
SW-02	SW: Waste sorting, transfer and recycling station	25% fuel for truck	0.5	127.8	5
SW-03	SW: Solar at landfill	100% power RE	3	885	4

If all these EE measures would be implemented, Berat municipality could save annually 1.95 GWh and produce 3.85 GWh by renewable energy. By that the sector has the potential to become a net producer of RE power. The specific annual primary energy savings per each invested EUR is low at about 1.55 kWh. The implementation of this EE investment package in the waste sector in Berat could avoid energy and O&M related costs of up 0.85 million EUR per year, average over the next 20 years. The payback time is about 3.5-4.5 years.

5.4 Management of green areas

The maintenance service of green areas is carried out by municipality service enterprises and in addition to the provided services, special attention has been paid to the expansion of green areas, and the improvement of existing areas. Based on Berat Municipality data collected the service is carried out for the maintenance of 74,600 m² of green areas, which includes 59 flower gardens, among which 24,200 m² are in Berat city and 50,400 m² are in all villages of Berat Municipality.

These flower gardens, according to their importance and corresponding areas, are specified according to the categories of green areas, type "A", "B", and "C". Green areas Type A (Intensive) with an area of 15,000 m² - including flower gardens and urban parks with an area of more than 4,000 m², conditioned by high social attendance. Green areas Type B (important) with an area of 12,800 m² – include neighborhood green areas, roundabouts, and playgrounds. Green areas Type C (reduced frequency maintenance) with an area of 11,900 m² – include serviced green areas, with reduced frequencies according to the maintenance schedule.

Classifications were carried out by Berat Municipality according to the function of the typologies and attractive elements of these areas in terms of: maintenance of the grass area, decorative trees, green borders, bushes, water areas, maintenance and repair of benches, cleaning of internal streets, etc. Maintenance services were performed on the reconstructed areas during the last year. Berat Municipality shall include the following ideas for adding green areas:

- Continuing rehabilitation of existing parks;
- Revival of the Castle of Berat together with all museums as a cultural heritage site and a touristic attraction.
- Rehabilitation and creation of neighborhood parks, incorporating sport and recreational facilities;
- Creating a new park as part of the Gorica district;
- Creation of “green areas”, based around the already existing land strip between Osumi Rivers

The proposed instruments to enhance biodiversity in Berat are to:

- Create green corridors to connect existing green areas with those that will be created in the near future (i.e. “Biodiversity Bridges”);
- Develop pilot projects, with input from the local community, to create green corridors in residential areas;
- Incorporate green infrastructure across the city;
- Rehabilitate existing parks and blue corridors and improve the quality of water bodies through the Osumi river, etc.;
- Identification of damaged riverbeds and estuaries from solid waste disposal, urban waste, and illegal construction;
- Inspections for protection and exploitation of river gravels;
- Strengthening river ecosystems for Osumi and its bridges etc.;
- Osumi River Rehabilitation Project shall continue for flood protection measures through weirs and walls;
- Separation of sewage and drainage network is the most challenging task. An overflow channel from existing main interceptors to Osumi river is envisaged for peak drainage demand.

The biggest potential for decarbonization lies in transitioning to renewable energies for vehicles and the devices that are used for the management of green areas.

6 MOBILITY & TRANSPORT

6.1 Initial Situation in Albania

The transportation sector in Albania encompasses various modes, including maritime, air, rail, and road transport. Since 1990, it has experienced rapid growth, mirroring the country's economic development. This growth has led to an overall increase in both the transportation of goods and passengers.

It's worth noting that electricity consumption for the transport sector, specifically for electric mobility, is currently minimal and has not been included in the Yearly Energy Balance report.

The transportation sector in Albania has the highest energy consumption of all sectors, which has seen a significant increase over the years. In 2009, it stood at 754.44 ktoe (kilotonnes of oil equivalent), and by 2019, it had risen to 859.77 ktoe. As depicted in Figure 6-1, the transportation sector also makes the most **substantial contribution** to this increase, climbing from 38.86% in 2009 to **40.46% in 2019**.

Additionally, it's estimated that **fuel consumption** for the transport sector in Berat amounted to **124.46 GWh in the year 2021**. Despite recent efforts to introduce bike lanes, the public transport system remains underutilized, accounting for only 0.95% of total transportation and lacking an efficient scheduling system.

Albania is actively working to align its transportation and energy policies with EU regulations. To do so, the country needs to develop a National Transport Strategy and Action Plan and harmonize its traffic management systems and road safety legislation with EU standards. There's also a need to implement the European Intelligent Transport Systems (ITS) Directive.

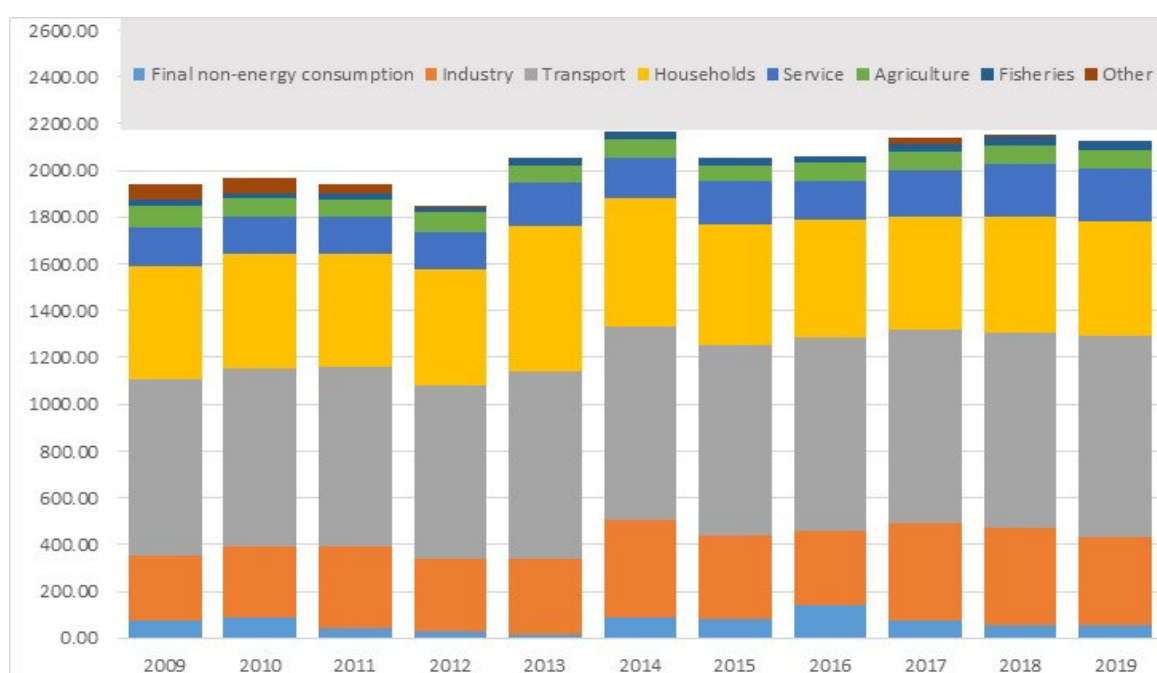


Figure 6-1: Energy consumption according to sectors for Albania from 2009 - 2019 (ktoe)

The UNDP conducted a brief survey to assess the inventory of road vehicles and categorize greenhouse gas (GHG) emissions in the transportation sector. Examination of Figures 6-2 and 6-3 reveals that, in the year 2016, the average age of the road passenger fleet was 19.75 years. In contrast, for the European Union, the average age of passenger road transport during the same year stood at a mere 10 years. Further analysis demonstrates a reduction in the average age of the road passenger fleet stock to 18.25 years by the year 2019.

SECTION B: DETAILED ASSESSMENT OF ENERGY AND CLIMATE SITUATION AND POTENTIALS

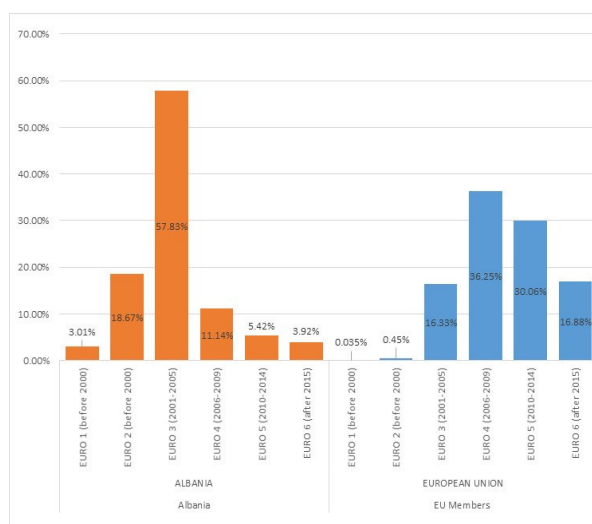


Figure 6-2: Vehicle category for each Euro level (representing the age level)

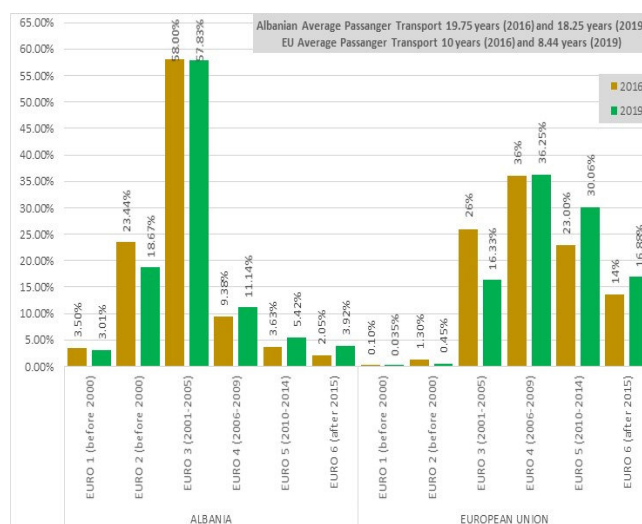


Figure 6-3: Share of vehicle category for each Euro level (representing the age level)

Figure 6-4 presents vehicle stock, in total, according to data processed by Association of Automobiles (ACA) and 87% of registered vehicles are of Euro 1, 2 and 3 standards, with production years until 2005. Of the Euro 5 and 6 standards there are only 14,000 registered vehicles comprising 3.3% of the total (according to the 2021 report of INSTAT).

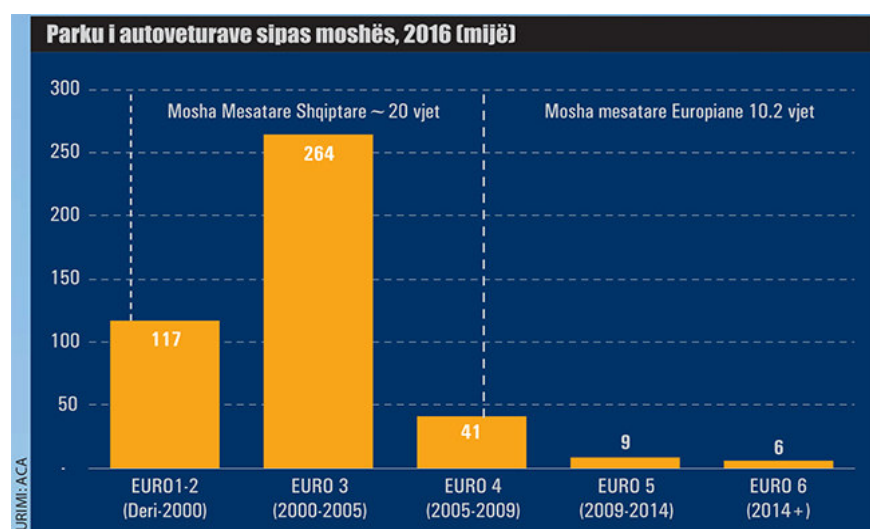


Figure 6-4: Vehicle road stock for Albania according to their age in year 2016 (figures in 000)

The trend of the vehicle road transport stock is presented in Table 5-18.

Passenger stock is presented at figures 6-5 - 6-6 and shows that vehicles for mix transport (passenger and freight) represent the highest shares for Albania for the whole period 2015-2020 based on the Strategy of Energy. The road transport of freight had a very strong increase during the period 2000-2021, where it consumed an average of 15% of the total energy consumed per year. The increase in 2000-2021 was in average only 2.4% per year. There are two basic parameters which are used as a driving factor to calculate the energy demand of the sub sector: passenger-km per year for road passenger transport and ton-km per year for freight road transport. The transport of passengers has also increased, and this increase is dedicated to the use of private cars and the traveling of Albanian citizens (including emigrants).

Table 6-1: Trend of the vehicle road transport stock

Vehicle	2015	2016	2017	2018	2019	2020	2021
Motorbike	33070	36096	31399	33663	37090	34884	35244
Cars	403680	436013	422084	460027	499590	544302	552885
Buses	6423	7050	6761	7146	7535	7634	7789
Vehicles for mix transport (passengers and freights)	41540	43975	40840	42010	44635	46844	47964
Trucks	16927	17670	13406	13013	13518	13819	14223
Transport for particular large transport	5017	5427	5324	5863	6426	6860	71234
Transport for special fragile transport	7516	7892	7018	7493	8041	3755	3933
Campers	54	58	55	58	64	69	75
Trailers	6787	7504	7326	7856	8375	9275	9477
Technical trucks	305	445	530	644	783	893	899
Very special trucks	11	9	5	5	4	8	11

Passenger stock is presented at Figure 6-5 and shows that cars represent the highest shares (85-88%).



Figure 6-5: Road Passenger Transport Stock according to the Association of Automobiles (ACA)



Figure 6-6: Road Freight Transport Stock according to Association of Automobiles (ACA)

6.2 Mobility in administration and municipal fleet

The municipality is actively **promoting responsible and sustainable mobility practices** among its employees. For the past five years, they have encouraged their staff to use bicycles and promote carpooling for commuting to and from work. Additionally, the municipality has implemented several initiatives, such as providing bicycle parking spaces, promoting carpooling through administrative measures, offering facilities for drying cycling equipment, and encouraging non-individual motorized transportation options for our staff.

They also have also undertaken the task of compiling and regularly updating an **inventory of the fleet** of vehicles. The municipality rigorously monitors fuel consumption, comparing it to specific fuel consumption targets measured in liters per kilometer and liters per ton-kilometer. Currently, the municipality maintains a total of **65 vehicles, with 11 allocated for passenger transport**, and the rest serving various freight and specialized machinery purposes.

For five years, a **GPS system** and logbook to effectively manage the usage of each municipal vehicle is in place, overseen by two transportation experts. When the budget permits, the municipality replaces older vehicles as part of the mid-term budget planning. However, it is important to note that they currently lack the budget to acquire new electric, hybrid, or LPG vehicles.

6.2.1 Recommended Measures in municipal administration

In the coming years, there is a pressing need for efficient data processing alongside the implementation of various Energy Efficiency/Renewable Energy Sources (EE/RES) measures. These measures include:

1. **Promotion of Biking:** Continue to encourage the use of bicycles for commuting within the city, particularly for trips within a 5-kilometer radius.
2. **Group Transportation:** Optimize the use of administrative staff transport vehicles by consolidating trips beyond the 5-kilometer radius, promoting carpooling among employees.
3. **GPS Monitoring:** Maintain the utilization of GPS systems for real-time monitoring of the municipality's vehicle fleet, ensuring efficient routing and resource allocation.
4. **Inventory and monitoring:** Implement the EnerCoach software across the entire municipal vehicle fleet to enhance energy management and efficiency.
5. **Transition to Electric Vehicles:** Gradually replace the existing municipal staff transport vehicles with electric cars, e-mini buses, and e-buses, contributing to a cleaner and more sustainable transportation infrastructure.
6. **Upgrade Specialized Vehicles:** Substantiate the replacement of all municipal freight vehicles and specialized machinery with new, highly efficient models, minimizing environmental impact and resource consumption.

These initiatives collectively aim to bolster data-driven efficiency and promote the adoption of environmentally friendly practices within the municipality's transportation operations.

6.3 Public transport

The city of Berat is accessible from the national road network via regional road traversing the Osum Valley, State Road 72 (SH72), which effectively functions as a major transport corridor connecting the region's settlements. The road stretches from the rural settlements in the east and south of Berat, to those of Lushnja. It is also connected to the coastal areas of Albania, including the Durrës-Tirana metropolitan area. The main regional road that connects Berat with the Tirana-Durrës metropolitan area, follows the river bed and is a vital line of communication for the villages that lie south of the city as well as for the Skrapar area.

The private sector company "TRANS BR" shpk makes it possible to transport passengers by means of 30 buses and 24 mini-buses which operate with a 5-year license. Commercial taxis in Berat consist of 28 licensed cars. 15 buses (out of 30 buses) operate within the four municipal bus routes for passenger transport. Regional centers and villages are served by the other 15 buses and 24 mini-buses

The municipality exercises some regulatory controls in the public transport sector through the licensing of some commercial companies that deal with passenger transport. However, budget control and influence on the energy consumption of these vehicles is low. The municipality has no or very little control over the budget, the imposition of energy efficiency rules on the energy supply of sectors that are final consumers, individual private transport as well as residential sectors, commercial buildings and non-municipal public buildings, as long as they are controlled by the central government or are organized individually/commercially. The only possibility for the Municipality to influence these sectors is to involve the interested parties in the Municipal energy planning process and to raise awareness about energy efficiency.

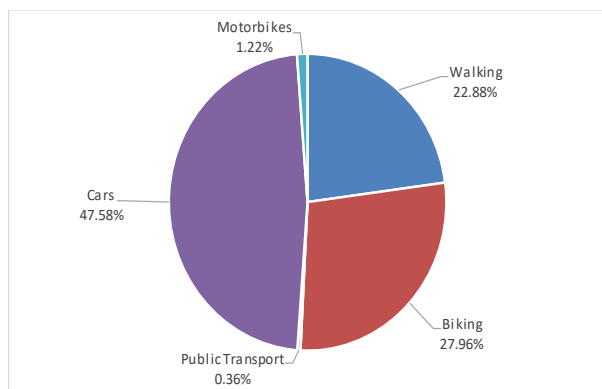


Figure 6-7: Passenger transport modal split for Berat

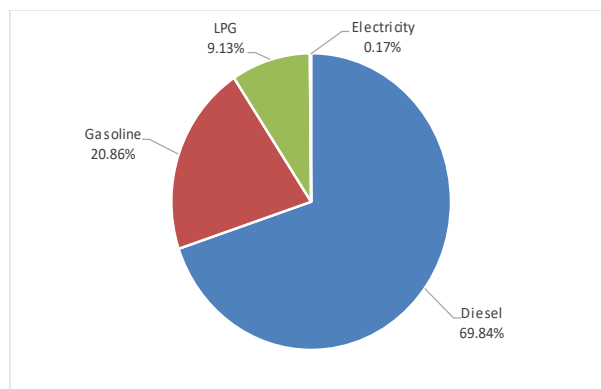


Figure 6-8: Share of fuel for the passenger transport for Berat

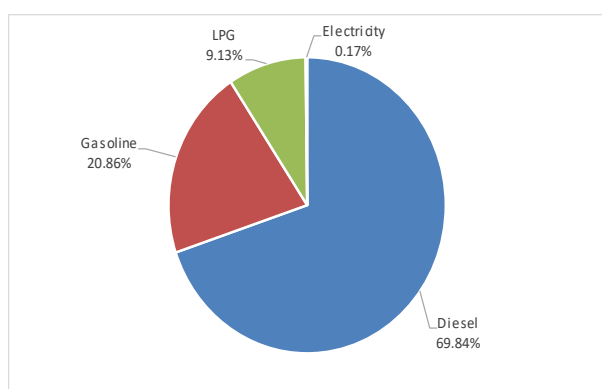


Figure 6-9: Share of GHG emissions for the passenger transport in Berat

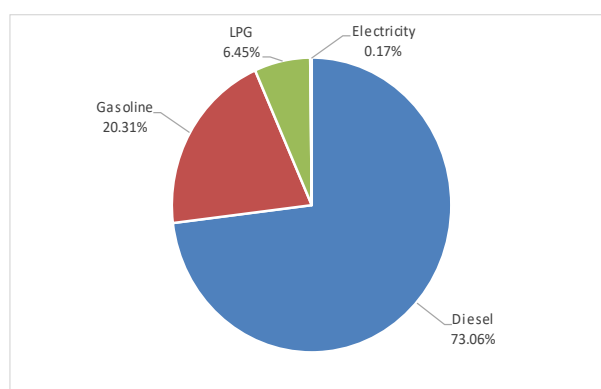


Figure 6-10: Share of fuel expenses for the passenger transport in Berat

Relevant challenges of the public transport sector for the Municipality of Berat are:

- Public transport makes a very small contribution;
- Public transport has not been at the optimal level. Consequently, the use of personal vehicles has not decreased;
- Heavy traffic on various axes, which reduces the speed of urban transport, as well as negatively impacts the observance of frequencies, thus demotivating citizens to use it.
- Congested traffic as a result of vehicular traffic on the main roads and in the city center, which is often presented by reckless drivers exceeding the speed limit;
- The need to supplement with speed limit signage to increase road safety, at certain points;
- It is necessary to continue the construction of ramps, completion and signal maintenance to create conditions for the movement and parking of vehicles for persons with disabilities;
- The need for further infrastructure improvement and increased safety for cycling as well as the promotion of pedaling;
- Improvement of signage in new administrative units where there is a significant lack of horizontal and vertical signage;
- Occupancy of parking spaces by illegal parking of vehicles;
- Damage to existing signage, as well as the need for parking lots, in places where they are missing;
- Informality that impacts the transport of the urban network and regular lines.

6.3.1 Recommended measures in public transport

To support the implementation of Green Transport for Berat Municipality with the main goal to meet EE/RES/GHG targets, the introduction of electric and hybrid buses and the development of green bus corridors and bike lanes will provide environmentally friendly public transport with wide coverage and integration with the existing transport network which will give citizens an opportunity to travel longer distances with a transport line.

One of the central objectives of the local plan is to improve public transport infrastructure across the city, while also accommodating expected growth of the city. The plan recognises that it will be crucial to ensure that transport connects the city with the suburbs, as currently there is poor connection between the two. The local plan shall include numerous actions which focus on improving the transport system in Berat Municipality, such as: upgrade the local public transport network; provide dedicated bus lanes, preferential routes, fare integration systems and transport mobile apps (e.g. City Mapper). There are plans to expand the total length of dedicated bus lanes and develop two other public transportation corridors. The recommended set of measures for the public transport sector comprise investment measures and accompanying measures are presented at table 6-2.

Table 6-2: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
PT-01	Replacement of urban busses by hybrid or electric buses	– 20 mini busses, 50% of existing	1,900	100 k€/ mini bus
PT-02	Extension of bus lines and optimisation of city bus lines	– 2 bus lines	160	80 k€ per line
PT-03	Construction of mobility station, linking urban with regional public transport (busses), car and bike sharing	– 2 mobility station	400	~200 k€ per station
PT-04	Shuttle-busses with clean traction system to touristic sites	– 2 shuttle bus lines, replacing individual and taxi rides	500	250 k€/ line

In addition the following accompanying measures addressing EEA Area 1 Development & Spatial Planning and EEA Area 6 Communication, Cooperation are presented at table 6-3.

Table 6-3: Accompanying measures

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
PT-05	Mobility concept and Promotion of public transport	Training & capacity building & information	100
PT-06	Introduction of conditioned public transport (bus, taxi) licensing , better fuel/ emission performance	Municipal policy & regulation	50

The Mobility Concept which is under preparation is defining the detailed technical and environmental parameters for the selection of bike lines, electric and hybrid buses/mini buses, bus corridors and financial plan. Further details if priority measures are described in measures sheets, as presented in annex C. Total

costs for 6 EE measures in public transport would require 3.8 million EUR, of which 90% are allocated for investments. The preliminary economic analysis of energy saving benefits for investment measures are presented at table 6-4.

Table 6.4: The preliminary economic analysis of energy saving benefits

Code	Measure (short title)	Energy saving (%)	Annual saving (GWh/year)	Annual cost savings ('000 EUR /year)	Simple Payback time (years)
PT-01	PT: urban busses replacement	30% fuel for bus	0.5	146.3	16
PT-02	PT: Extension busses	20% fuel for bus	0.0	5.9	15
PT-03	PT: Mobility station	1% of individual transport	1.6	442.4	n/a
PT-04	PT: Tourist shuttle bus	10% fuel taxis, outreach 25%	0.1	10.9	25

To support the implementation of Green Transport for Berat Municipality with the main goal to meet EE/RES/GHG targets, the introduction of electric and hybrid buses and the development of green bus corridors and bike lanes will provide environmentally friendly public transport with wide coverage and integration with the existing transport network which will give citizens an opportunity to travel longer distances with a transport line. Figures 6-11 - 6-12 present the bike and bus/mini bus passenger transports respectively according to the baseline scenario and active scenario. If all these EE measures would be implemented, Berat municipality could save annually 0.45 GWh. That represents 30% less than the consumption of public transport in 2021. The average payback period is at 4 years. The implementation of this EE investment package in the public transport in Berat could avoid energy and Operation and maintenance related costs of up 0.54 million EUR per year, average over the next 20 years.

Figures present the bus/mini bus passenger transports respectively according to the baseline scenario and active scenario. Analysis shows clearly that it needs to be increased by 10.65 times in order to meet the respective targets.

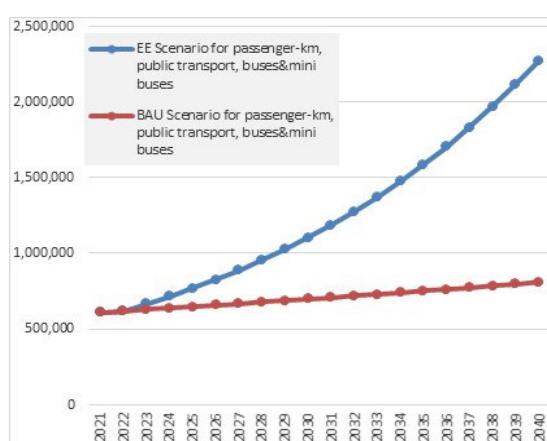


Figure 6-11: Forecasted baseline scenario and active scenario for bus/mini busses transport for Berat Municipality (passengers-km/year)

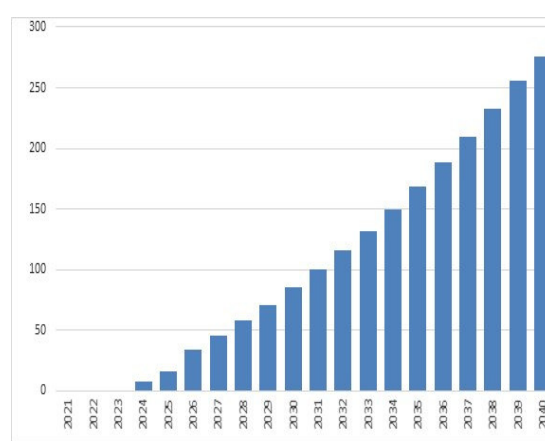


Figure 6-12: GHG reduction from the introduction of efficient e-buses/mini buses transport for Berat Municipality (CO2eq, ton/year)

The project will require financing to undertake soft and hard components of the investment related to the introduction of safety bike lines, electric and hybrid buses in Berat Municipality according to the EU

standards. The introduction of the bike lines and electric and hybrid buses will bring diesel, gasoline, LPG savings, affordable and reliable transport, environmental benefits (reducing GHG, acid rain gases and improving air quality), as well as enhancing the attractiveness of the city to both residents and visitors.

The new e-buses/e-minibuses will serve the objective for the establishment of an urban transport service, which is environmentally and climate friendly, and reliable and affordable for the citizens of Berat. Based on this experience, the Municipality is planning to increase the utilization of the electric and hybrid buses.

6.4 Private transport – passengers, freight, and parking management

The road transport sector in Berat started to develop with a fast growth rate after the year 2000, when in addition to the quantitative increase of road transport means, the infrastructure and transporting capacities of the road were improved, and railway infrastructure was almost stopped. The evident increase of the number of the transport vehicles, especially in the road transport, was accompanied with the increase of transport activity and an evident increase of the fuel consumption, mainly diesel and gasoline. In order to calculate the future energy demand, the sector was divided in two sub sectors: freight and passengers.

According to the General Regulatory Plan of the municipality of Berat in 2023, it turns out that in the city of Berat, with the old administrative division, there were 188 km of linear roads. The analysis of the road infrastructure carried out with the geospatial information systems results that in the Municipality of Berat there are already 812 linear km of roads, or six times more than before the territorial reform of 2014. Of these, 188 km of roads have been added and 624 km are unpaved.

As stated before, **average age of the road passenger fleet stock was 18.74 years** by the year 2019 for Albania. Almost the same trend applies to the vehicle stock of Berat Municipality. Old vehicle fleet of passenger transport is the main reason of having higher specific fuel consumption, higher CO₂, N₂O, CH₄ greenhouse gas emissions (causing global warming) as well as SO₂, NO_x, NMVOX acid rain gasses emissions (causing smog local environmental pollutions). Table 6-5 presents the stock of Berat Municipality for the year 2021 based on the INSTAT data for Berat County and downscaled for the municipal level.

Table 6-5: Stock of Berat Municipality for the year 2021

Vehicle	Berat Municipality
Motorbike	2,079
Cars	14,811
Buses	247
Vehicles for mix transport (passengers and freights)	2,058
Trucks	553
Transport for particular transport	217
Campers	19
Trailers	131
Technical trucks	68
Very special trucks	351
TOTAL	20,535

The road transport of freight had a very strong increase during the period 2000-2021, where it consumed an average of 18% of the total energy consumed per year. The increase in 2000-2021 was in average only

2.55% per year. There are two basic parameters which are used as a driving factor to calculate the energy demand of the sub sector: passenger-km per year for road passenger transport and ton-km per year for freight road transport. The transport of passengers has also increased, and this increase is dedicated to the use of private cars and the traveling of Berat citizens (including emigrants).

The evident increase of the number of the transport vehicles, especially in the road transport, was accompanied with the increase of transport activity and an evident increase of the fuel consumption, mainly diesel and gasoline. In order to calculate the future energy demand, the sector was divided in two sub sectors: freight and passengers. Actual challenges of transport are as follows:

- Signage Deficiency
- Illegal Parking: Parking spaces frequently occupied by illegally parked vehicles.
- Signage Maintenance: Existing signage damage and the need for new parking lots in underserved areas.
- Accessibility for Disabilities: Ongoing construction of ramps, maintenance, and signage for disabled persons' vehicle movement and parking.

Baseline scenario for private passenger transport for Berat Municipality is established based on the same growth rate of increase on the last years and assuming a slow growth rate of e-cars up to 5% for the year 2040. The respective results for baseline scenario are presented at figure 6-13. Meanwhile, the active scenario also is established assuming a stronger penetration of e-cars reaching 25% on total road transport at 2040 in the main goal to reach MECAP respective GHG reduction targets. The respective results for active scenario are presented at figure 6-14.

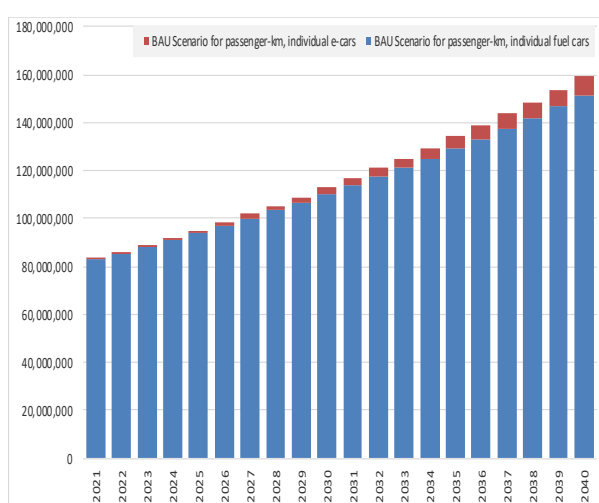


Figure 6-13: Forecast of passengers-km indicator for baseline for fuel cars and e-cars for road passengers transport for the period 2021-2040 (passengers-km/year)

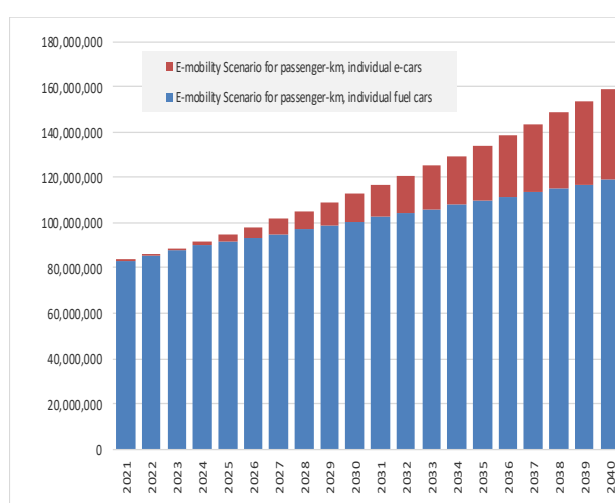


Figure 6-14: Forecast of passengers-km indicator for active for fuel cars and e-cars for road passengers transport for the period 2021-2040 (passengers-km/year)

Quantitative energy analysis is carried out for baseline scenario, for active scenario and for the potential for energy savings and GHG reduction by introducing hybrid/electric cars for covering part of the passenger's transport. Figure 6-15 presents total yearly energy demand for active scenario for the period 2021-2040. Meanwhile, Figure 6-16 presents GHG emissions forecast for active scenario.

SECTION B: DETAILED ASSESSMENT OF ENERGY AND CLIMATE SITUATION AND POTENTIALS

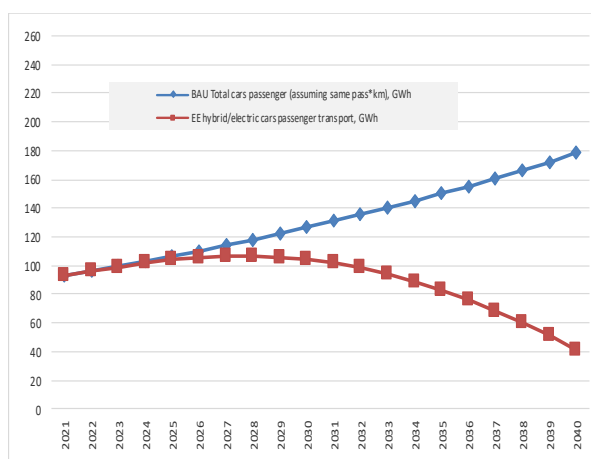


Figure 6-15: Energy demand forecast for baseline and active scenarios for private cars road passengers transport for the period 2021-2040 (GWh/year)

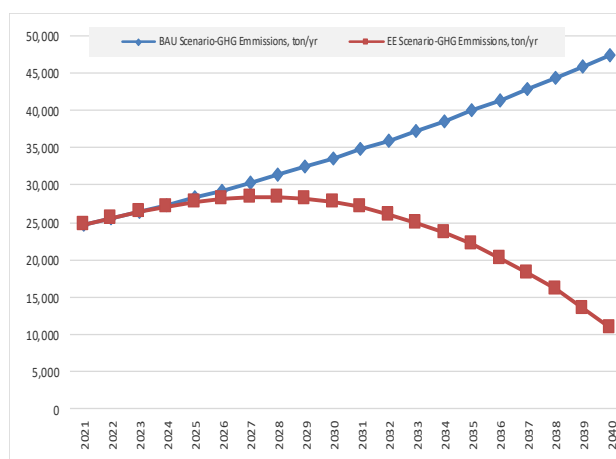


Figure 6-16: GHG emission forecast for baseline and for the active scenario for private cars road passengers transport for the period 2021-2040 (tons of CO2eqv/year)

Table 6-5: Main analysis of e-cars for the active scenario for Berat Municipality

	Total Number	Number of e-cars	Baseline energy demand, GWh/year	Energy Savings, GWh/year	CO2eqreduction, tons/year	Cumulative Investment, MEuro	Pay Back Period, Years
Number of cars	20,535	5450	188.31	41.54	49,089	178.27	7.65

6.4.1 Recommended measures in private transport sector

The most decisive factor in the widespread adoption of (e-vehicles) EVs is cost competitiveness against conventional vehicles due to a lower energy cost. The approximately quantified advantage of e-cars versus the diesel/gasoline/LPG cars is presented at the table 6-6. Analysis shows clearly that energy costs for EVs are about 40-80% lower compared with average diesel & gasoline costs, and this is the main driver for pushing the private transportation towards e-cars.

Table 6-6: Energy costs for different car categories

Vehicle type for the year	Energy Cost (ALL / 100 km)	Charging time (hours)	Relative cost difference versus average Diesel & Gasoline Costs
Gasoline car	1414	0	
Diesel car	1150	0	
LPG car	919	0	
E-car (charging at home)	255	8-10	80%
E-car (charging at charging station shopping malls (at - Alternative Current (AC))	360	8	69%
E-car (charging at private charging stations (at AC))	396	8	69%
E-car (Faster charging stations (at AC))	650	6	49%
E-car (super faster charging station (at Direct Current - DC))	790	0.5-2	38%

Main data used for above calculations:

- 1) Gasoline price 202 ALL/litre and gasoline specific consumption=7 litres/100km;
- 2) Diesel price 192 ALL/litre and gasoline specific consumption=6 litres/100km;
- 3) LPG price 91 ALL/litre and gasoline specific consumption=10.15 litres/100km;
- 4) Average electricity specific consumption=18 kWh/100km.
- 5) Electricity Tariff for the residential charger is 11.4 ALL/kWh and for other chargers is 22 ALL/kWh

With the objective of reducing the energy consumption and electrifying the transport fleet through shifting towards e-cars according to the Active Scenario, the MEMU team together with Transport Directorate shall promote these technologies for their municipality fleet and Berat Municipality citizens. Data suggest that congestion persists during the peak hours. Anecdotally, the reduction in speed can also be attributed in part to road side parking taking up road capacity (legal and illegal). Increased enforcement with public information campaigns can help address this problem while also raising awareness among the public of the importance of not obstructing traffic. This is of secondary urgency following the physical infrastructure improvements. Also, improving the car parking system is very important with the aim to reduce illegal parking and to create a parking development. An electronic car park payment system shall be introduced and spaces will be specifically allocated to residents in the area. Introduction of information systems for traffic monitoring through establishment and operation of a traffic monitoring station and electronic billboards installed in different city areas, providing online information on traffic, is also very important (table 6-7).

Table 6-7: Investment measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
OT-01	Deployment of Electric Vehicle Charging Infrastructure	– 20 e-charging stations at 10 places	600	30 k€ per station

In addition, the following **accompanying measures** addressing EEA Area 1 Development & Spatial Planning and EEA Area 6 Communication, Cooperation are presented at table 6-8.

Table 6-8: Accompanying measures addressing EEA Area 1 Development & Spatial Planning and EEA Area 6 Communication, Cooperation

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
OT-03	Development of P+R facilities in combination with traffic restriction measures in city centre	Municipal policy & regulation + investment	400

Further details if priority measures are described in measures sheets, as presented in annex C. Investments and operation of charging stations can be realised by commercial contractors or in PPP model. The preliminary economic analysis of energy saving benefits for investment measures are presented at table 6-9.

Table 6-9: The preliminary economic analysis of energy saving benefits

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
OT-01	OT: E-charging stations	2% fuels switch cars + taxi 5%	3.3	144.6	5

If all these EE measures would be implemented, Berat municipality could save annually 6.21 GWh as car fuel in individual and commercial vehicles. In that amount the car fuel savings are included which result from public transport measure PT 03,04,05 and 06, as they address the replacement of individual be public

The Municipality of Berat has built in the center of the city an underground parking space below Teodor Muzaka Square. This parking is available for 200 vehicles.

A public parking space for 50 vehicles has also been built in the Gorica neighborhood.

Other public parking spaces are near some axes of the city, determined according to certain areas.

There is a need for a parking plan and especially for a mobility plan near the touristic areas of the city.

With the objective of reducing the energy consumption and electrifying the transport fleet through shifting towards e-cars according to the Active Scenario, MEMU team together with Transport Directorate shall promote these technologies for their municipality fleet and Berat Municipality citizens.

The growth in fleet size over the last few years points to an increasing car mode share in Berat Municipality. More people now have access to a car, albeit the fleet is older and less energy efficient than the EU average, as it was compared in the prevision sessions of this chapter. Some measurement carried out by Berat Municipality have indicated moderately high average annual concentration of PM2.5 and PM10, although these indicators have been shown to improve over time. Transport is the main contributor of pollution in city area. Number of kilometres of road dedicated exclusively to public transit is very low. This is an urgent and salient issue for the Municipality and its inhabitants. In addition, the number of kilometres of dedicated bicycle lanes per 100,000 population is low compared with EU cities.

The extension and improvement of public and non-motorized transport is planned and supported through investments in place, which is an urgent and salient issue to be addressed. Public and non-motorized transport is promoted through information and awareness campaigns. This has been identified as an important issue and urgent to be treated in continuously with the development of the infrastructure and access to it.

There is a significant increase in the use of cars for commuting in recent years, since public buses coverage is reasonably still low. Data suggest that congestion persists during the peak hours. Anecdotaly, the reduction in speed can also be attributed in part to road side parking taking up road capacity (legal and illegal). Increased enforcement with public information campaigns can help address this problem while also raising awareness among the public of the importance of not obstructing traffic. This is of secondary urgency following the physical infrastructure improvements.

One of the central objectives of the local plan is to improve public transport infrastructure across the city, while also accommodating expected growth of the city. The plan recognises that it will be crucial to ensure that transport connects the city with the suburbs, as currently the connection is poor. The local plan shall include numerous actions which focus on improving the transport system in Berat Municipality, such as: upgrade the local public transport network; provide dedicated bus lanes, preferential routes, fare

integration systems and transport mobile apps (e.g. City Mapper). There are plans to expand the total length of dedicated bus lanes and develop two other public transportation corridors.

6.5 Non-motorized mobility (bike and foot)

Berat has increased bicycle usage, which is aimed to leverage in order to enhance the city's image and reputation. In order to reach faster penetration of bikes, it is planned to enhance the cycling infrastructure throughout Berat, including designated cycling lanes on main roads and the installation of bicycle rental and parking stations. Within the city itself, the approach will be rooted in the concept of "shared space," aligning with Berat's unique cultural tradition. However, as extending the cycling network beyond the urban center, where vehicle speeds are higher, dedicated cycling lanes for safety reasons will be implemented. To expand the cycling network, several new routes have been identified:

- Berat Municipality has built in 2022 four trails for mountain bikes in the outskirts of the city, in areas with touristic and eco-touristic potential. There are also three mountain bike trails in the area of the Roshnik touristic village.
- During 2018 the domestic net production of electricity reached the value of 8,552 GWh, up from 4,525 GWh of energy produced in 2017, marking an increase in production of 89%.

These routes will contribute to the city's efforts to promote cycling and provide safer options for cyclists both within and outside of Berat. These designated routes will incorporate recreational spaces and amenities, providing areas for activities like picnics and other leisure pursuits. Infrastructure development efforts will prioritize inclusivity, beginning with the adaptation of public spaces and institutions to ensure accessibility for all residents. Berat's mobility vision for 2030 is ambitious, aiming for a balanced distribution of transportation modes, including 30% for bicycles, 25% for public transport, 25% for pedestrians, and 20% for individual cars. To achieve this, it is planned to expand the network of pedestrian-friendly streets and extend the reach of public transportation to cover not only the city but also administrative regions.

In urban areas, Berat will continue to extend bicycle lanes, adhering to the principle of shared space to preserve Berat's cycling culture. However, in areas with higher vehicle speeds, separate bicycle lanes will be established. Additionally, the availability of public parking spaces will be increased and three large "park & ride" facilities will be prepared, offering public transport and bicycle rental services.

Currently, many sidewalks are narrow and inadequately maintained. Enhancing pedestrian infrastructure will not only boost pedestrian safety but also enhance the overall urban environment and quality of life. Implementing green public procurement for city buses and introducing restricted or traffic-free zones will play a pivotal role in reducing traffic congestion in the city center and mitigating air pollution.

Figure 6-17 - 6-19 present the bike transports respectively according to the baseline scenario and active scenario. Analysis shows clearly that an increase by 1.3 is needed in order to meet the respective targets.

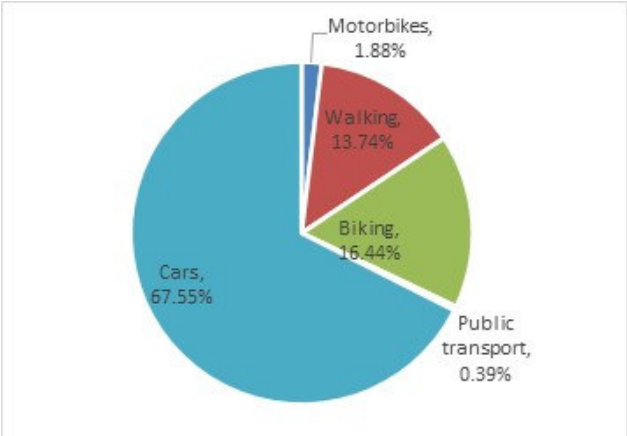


Figure 6-17: Passenger transport modal split for Berat

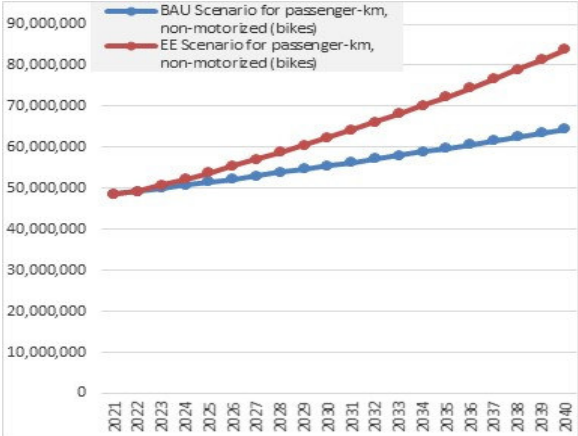


Figure 6-18: Forecasted baseline scenario and active scenario for bike transport for Berat Municipality (passengers-km/year)

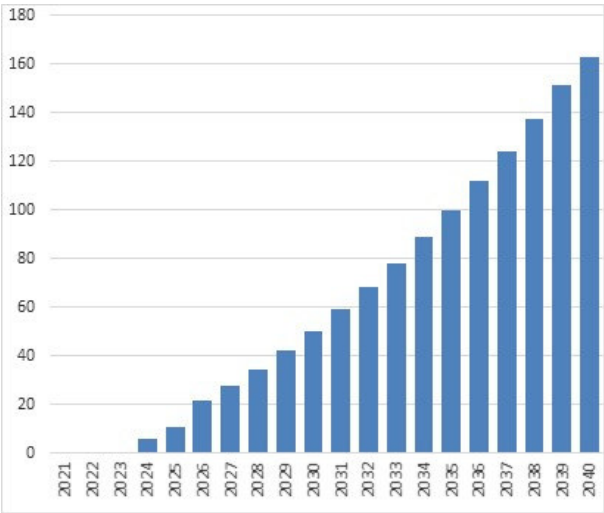


Figure 6-19: GHG reduction from the introduction of stronger penetration of the bike transport for Berat Municipality (CO2eqv, ton/year)

6.5.1 Recommended Measures in non-motorized transport

The modifications to the carriageway involve the creation of additional bus and bike lanes, which in turn reduce the available space for parking and other vehicles. These changes should be implemented through various measures such as lane delineation through painting, establishing dedicated rights of way for cyclists and pedestrians at crossings, installing curbs to demarcate cycle lanes, elevating certain sections of the carriageway to align with the pavement at critical intersections, and making alterations to traffic signals and signage, including provisions for bike parking.

Furthermore, to address the parking needs displaced due to the allocation of space for bus and bike lanes, there is the possibility of constructing underground car parks to provide an alternative parking capacity. This approach allows for the efficient use of on-street spaces, which can then be repurposed for the exclusive use of bus and bike lanes are presented at table 6-10 –6-12.

Table 6-10: Investment Measures

Code	Energy Saving Measures	Details of applications	Estimated investment costs	
			('000 EUR)	Specific costs
OT-02	Development of Bike lanes and promotion of non-motorized transport (bike, scooter sharing)	– 10 km bike lanes + Sharing stations	500	50 k€/km

Table 6-11: Accompanying measures

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
OT-04	Promotion of Non-Motorized Transport Modes	information/awareness	100

Table 6-12: Bikeline measure

Code	Measure (short title)	Energy saving (%)	Annual energy saving (million kWh/year)	Annual energy cost savings ('000 EUR /year)	Simple Payback time (years)
OT-02	OT: bike lanes	0,5% fuels of cars + taxi	0.8	221.3	4

7 INTERNAL ORGANIZATION

7.1 Establishment of Energy management structure

MEMU: To fully address the complex and multi-disciplinary aspects of energy management, the municipality has established the Municipal Energy Management Unit (MEMU). The MEMU is an interdepartmental body within the municipality, consisting of four to eight professionals who lead the process of addressing energy and climate challenges, presenting plans and guiding the implementation of concrete actions. The MEMU coordinates the various actors and ensures cooperation with external bodies such as the AEE. In other words, **MEMU is the municipal hub for energy and climate issues at the municipal level.**

The primary mission of the MEMU is to seamlessly incorporate energy management and climate protection across various sectors (“mainstreaming”), including urban planning, construction, public lighting, transportation, water, and waste management. The MEMU ensures that the commitment to energy and climate management doesn't stop with the adoption of MECAP but remains an ongoing and annually monitored and reported endeavor.

For effective operation, the MEMU requires the authority to collaborate with municipal departments, enterprises, and subcontractors. This collaboration includes the ability to access necessary support, data, documents, and information without the need for a formal letter from the Mayor each time to make a request. This empowerment enables the MEMU to swiftly carry out its responsibilities and contribute to the municipality's energy and climate management objectives (figure 7-1).

Anchoring: All energy and climate related issues within the municipality are handled by the following offices and directorates of the Municipality that are also represented in the MEMU.

- Mayor, Deputy Mayors and Cabinet;
- EU Integration and Strategic Planning Directorate
- Financial Management Directorate;
- Tourism Directorate;
- Transport and Service Directorate;
- Strategic Urban Planning and improvement of Business Directorate;
- Analysis and Budget Planning Directorate;
- Human Resource Directorate.

The institutional anchoring of the MEMU within the municipal organization is not yet clear at this point. To ensure the long-term sustainability of energy and climate management in the municipality, it is crucial to establish the MEMU as an integral part of the municipality's institutional framework. It is therefore strongly recommended that the MEMU should be integrated as an official unit in the organizational structure of the municipality. Furthermore, it is recommended to establish the MEMU as a high-priority executive department, directly reporting to either the Mayor or the Deputy Mayor. This ensures its prominence and influence in decision-making processes.

Capacity building is a crucial component in driving the effective implementation of energy policies. Members of the MEMU are already actively engaged in training activities. The mayor encourages staff to participate in training. The municipality has a limited budget allocated for further education, covering the costs and time commitment, specifically for energy-related topics such as energy efficiency and renewable energy, which is available to municipal employees and teachers. The objective is to develop an annual training program that comprehensively addresses all aspects of energy and climate issues, thereby encompassing all areas and sectors of the EMS system. Knowledge transfer has already taken place on Energy Audits, data collection, DEDs for energy efficiency, LED lighting and effective management of public buildings using Enercoach.

- Deployment of well-established software that is used by several staff members, such as Enercoach
- Documentation of processes (e.g. in EMT)
- Storage system for key documents (e.g. in EMT)

- Training manuals
- Knowledge sharing Platform (e.g. EMT)
- Close collaboration with EMS Consultant

7.3 Procurement

The major legislation related to public buildings budgeting and financing includes:

This Law regulates the planning, preparation, adoption and execution of the budget of Albania, the budgets of central ministries, state agencies and municipalities (hereinafter referred to as budget) and financial plans for out-of-budget funds, budget principles, borrowing, guarantees and debt management, rules of fiscal responsibility, accounting, reporting, monitoring and auditing of budget and other budget users. This law is very important for public buildings sector because it determines the amount of operation and maintenance of the building including the energy expenses and investment needed to implement EE measures. Ministry of Finance and Economy is implementing the Public Investment Program of Albania for the purpose of management and coordination of development funds in Albania.

The budgeting process starts early in June with providing instructions, three-year framework budget with caps for individual budgetary user, and forms to all budgetary users. Budgetary users, including Ministries and their agencies as well as all municipalities when submitting yearly expenses (including O&M and especially energy expenses) and capital investment (including the implementation of EE measures and constructing new public buildings by implementing all EE measures according the Energy Building Code) in the budget requests, include total investment and multi-year estimation of expenses and management plan. All draft Ministries/agencies and municipalities budgets are submitted to MoF&E as preliminary one according to guidelines early September. The government body in charge of central and municipal for finance is Albanian Ministry of Finance and Economy prepares draft budget based on budgetary user requests and other inputs. The draft budget together with three-year framework budget, is prepared by October 31st, and adopted by the respective legislative body by last plenary session of the parliament until December 31st of the fiscal year.

The Municipality procurement procedures are in compliance with national regulations and guarantee that procurement considers EE as technical criteria, which are directly related to climate and energy savings aspects. The Municipality considers the following aspects in their procurement: Availability of energy efficient devices; Purchase of recycled paper; usually purchasing of environmentally friendly cleaning products.

The municipality implements guidelines for procurement that take into account energy saving aspects (and indirectly also GHG reduction) for four above mentioned cases.

7.4 Budgeting Process of Energy Policy

The major legislation related to public buildings budgeting and financing includes:

- Law on Budget in Albania
- Regulations on Accounting of Budget in Albania
- Law on Accounting and Audit in Albania

Public sector budgets for each municipality are typically submitted and approved based on three years' timeframe as per the Administrative Instruction No. 4/1, date 29 02 2016 – "for preparation of the Medium Term Budget Program for the period 2017-2019 for Local Authorities (municipalities)". Also, every year they are adjusted based on income of the local taxes and grants received from the central Government. This

process allow for the multiyear (three years) planning and the multiyear contracting. The time span of an annual budget helps to introduce Energy Saving Programmed Contracts, but it is important to consider that such contracts require multiple years (might go in some EE measures up to 6-9 years) of energy savings to permit the ESPs to recover their investments.

Note: Due to the nature of the government structure in Albania related to public buildings (some of public buildings “nominated central public buildings” are depended directly on the central ministries & central state agencies and some others are dependent on municipal levels and they are nominated “municipal public buildings”) and there is clear designation of who is responsible for the payment of energy bills.

All municipalities in Albania in conformity with the Law on Local Government, ensure financing from the following sources:

- Local taxes and levies on movable and immovable property, as well as on the transactions conducted on them;
- Local taxes and levies on the economic activity of small businesses and on hotel residency, restaurants, bars and other services;
- Local taxes and levies on the personal income derived from donations, inheritances, testaments, and from local lotteries; and
- Other taxes and levies provided by law.

By law, all municipalities in Albania have the authority to independently obtain revenue to finance the exclusive functions under their jurisdiction. The budget allocation and spending is according to decision of the respective city council. The central government provides funds to all municipalities in Albania to meet the requirements for the provision of shared and delegated functions.

The law on the Local Government Tax System defines the tax base as well as the minimum and/or maximum rates. For local taxes, local government can modify the tax base by +/- 30% of the tax rate by a decision of the local council. Municipalities have the right to decide whether or not to apply a local tax.

If a municipality decides to apply the tax, it defines the tax rate, as well as the type of collection and administration within the limits and criteria set forth in the respective law. Local government also derives revenues from local fees for:

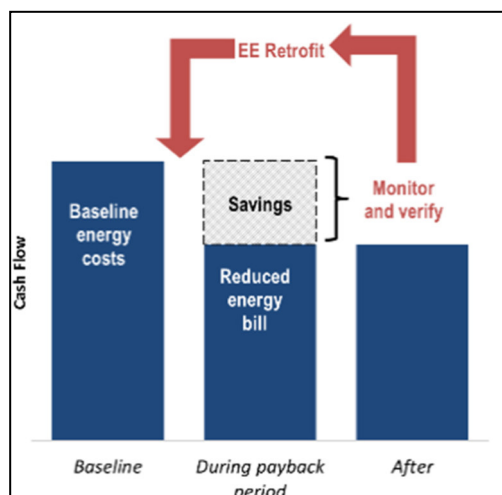
- Public services provided by the local government;
- The right to use municipal public property; and
- The issuance of licenses, permits, authorizations and issuance of other documentation, at the discretion of local government.

Local Municipalities are responsible for regular investment in the maintenance of their public buildings (schools, kindergartens, administration buildings, health centers, sport centers, social care institutions, etc.). The municipalities receive a budget for investment in their assets from the central government that can be used for renovation of buildings and payment of energy use out of their own budgets. Therefore, savings in energy costs directly result into savings to the municipal budgets. This is especially important in a view of their dire financial situation. Hence, a focus on energy-efficiency, but also renewable energy application in public buildings, represents a good entry point for the transformation of the entire municipal sector in Albania.

Commercial banks can offer loans to public sector. However, municipalities must procure loans through tendering procedure according to Public Procurement Law, and very often terms and conditions of credit lines offered by banks for EE projects do not meet the price expectations of public agencies. Lending directly to municipalities is not problematic to commercial banks, if their debt and annual service of loan are within legal limits. So far, commercial banks have not had any major problems with loan repayments from the public sector. If the banks are lending to an entity established by the government at any level, then they usually require a guarantee to be issued by the government. The collateral for public institutions is requested in the form of central government institutions and municipal’s revenues that allows bank to tap

in directly into financial cash stream of coming from the government grant and its local taxes (central institutions and municipalities) budget.

The basic concept of the energy savings revolving mechanism is that energy costs savings resulting from EE investments can be used to support additional EE investments without requiring another capital injection or increasing public funds. As part of the energy savings revolving mechanism, the generated energy cost



savings in each retrofitted facility would be monitored, verified, and captured in an escrow account to support EE investments in additional public sector buildings. EERMs have proven to be a viable option for scaling up EE financing in the public sector all over the Western Balkan countries. An Energy Efficiency Revolving Mechanism is typically established as a governmental (or municipal) EE fund with a separate institutional setup and fund management.

This mechanism anticipates that financing will be provided by the different donors, Banks, Ministry of Finance and Municipality using a combination of government budget allocations (for example, for planned retrofit of hospitals, schools, social facilities). The funding would cover the initial investment costs of the EE projects in the public buildings as well as transaction costs, such as project preparation, fund administration, and monitoring and verification. The resulting energy cost savings are then accumulated in an EE escrow account and then used to finance additional projects, thereby allowing the capital to revolve and create a sustainable financing mechanism.

For the last 6 years, the Municipality of Tirana has been implementing a programme to retrofit the building envelopes of approximately 200 MABs based on the following financial structure: 50% grant from municipality and 50% from the apartment owners. The retrofit of another 20 MABs are in the planning and construction process for 2024. It will be good that Berat Municipality to establish the same Community Fund like Tirana Municipality for the Implementation of EE/RES measures for meeting regulatory minimum energy performance requirements as well as NZEB standards for the MAB Stock is recommended.

7.5 Recommended Measures for internal organisation

Table 7-1 Organisational Measures

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
CC-08	Target setting (mid- and long-term) for EE, CO2 and RES	O&M management & monitoring	inkind
CC-09	Finalise MECAP Development	O&M management & monitoring	inkind
CC-10	Institutionalise data collection for MECAP (update)	O&M management & monitoring	inkind
CC-11	Institutionalise the MEMU	O&M management & monitoring	inkind
CC-12	Prepare and apply Eco-behaviour Guidelines for municipal staff	O&M management & monitoring	inkind

8 COMMUNICATION & COOPERATION

8.1 Initial Situation

In the municipality of Berat communication is under the responsibility of the communication department.

The staff in the department has the capacity to cover: social medial management, website management, media relations and event management.

The key target group are the citizens and the main communication channels are the website of the municipality and the social media: Facebook page of the municipality with more than 20,000 followers and the page of the mayor with more than 10,000 followers. The communication is done on regular basis, both with citizens as well as with journalists. Sustainable energy (energy efficiency and renewable energy), as well climate change topics are covered in regular communication towards citizens.

Within the MEMU there is a responsible person for communication, establishing the link with the communication department.

In terms of cooperation, the municipality cooperates with other municipalities on joint projects.

Although there are annual plans of events and activities, the work on communication is predominantly demand driven and strategic planning is missing. Considering the impact of climate change and energy crisis on everyday life, the communication on these topics is imperative to increase awareness, incite involvement of the citizens' and private sector and achieve ownership for policies. In this context, communication and cooperation is key for the successful implementation of the MECAP. The approach is briefly described in the following subchapter, while priority activities in this area are included in the measure sheets.

8.2 Communication

8.2.1 Intervention strategy

The implementation of MECAP and achievement of its targets requires the engagement of all stakeholders. Thus, communication and cooperation is one of the pillars of MECAP and a strategic communication approach is key. The overarching goal is to regularly increase awareness raising, enhance ownership and foster participation about local action geared towards improving energy efficiency, deployment of renewable energy and combatting climate change.

To increase visibility on the subject, it is strongly recommended to act not solely as a Municipality on its own but use existing and new networks as multipliers. Particularly important is to strongly support each other by joint social media activities, reposting interesting and useful information of each other under a certain hashtag etc. Although, already initiated, there is still very limited implementation seen. Taking into consideration that such an approach does require little input, neither financially nor human-resource wise. Thus such an approach should be activated on a regular basis as soon as possible.

Specific objectives for outreach from the municipal point of view are:

- Initiate and support a systemized stakeholder communication on municipal climate action, its objectives and vision
- Fostering participation and enhance ownership from all stakeholders for the implementation of MECAP
- Increasing knowledge and awareness raising on energy management system and its benefits

Key messages are vital not only to get attention but also the buy-in from all citizens. The uniting nature of all MECAP activities should therefore always be stressed: Not only the municipal administration is important but also the support and if possible even engagement from the citizens. On the one hand the municipalities prepare and implement the MECAP and on the other hand they should ideally enable and encourage the citizens to do something in their own small surrounding. This is important when formulating messages to not separate the municipal administration from the citizens. It must become clear that activities linked to climate change are not a matter of ‘they’ or ‘the others’. Without the involvement of everybody, change will not take place. Some ideas of key messages can be found below. Ideally, they should be linked to the vision of the MECAP.

Key messages:

- *We (Municipality of Berat) are investing in low-carbon development for the benefit of every single citizen. With small changes we reach a big impact and contribute to global climate change combat.*
- *The MECAP is the cornerstone of our (Berat’s) vision - Setting the municipality on a path towards a low-carbon city. Help create a greener future for Berat, because together we can make a difference.*
- *Our municipality (Municipality of Berat) is a pioneer in green energy transition and climate action. We contribute to national climate objectives and herewith are heading towards EU integration.*
- *Berat is going low-carbon. Be part of the change.*
- *Berat goes green! Be part in a great movement and be proud of your home-town.*

The approach provides clear guidance for MEMU and other participants in the implementation of MECAP on messaging and objectives for each target group to create a common understanding what should be communicated to whom and why.

The target groups and the objectives are provided in the following table.

Target group	Objective	Key Message
General public – including vulnerable groups information recipients	Raising awareness on EE and its positive impact on daily life Raising awareness on municipal efforts for the green transition Inform vulnerable groups about energy efficiency and their rights as vulnerable consumers Educating consumers on practical ways how to get engaged in MECAP implementation and contribute to green transition	⇒ <i>Using energy in an efficient way saves money, reduces costs and protects your environment.</i> ⇒ <i>Energy efficiency action from every citizen is necessary for meeting the upcoming challenges in relation to energy supply and climate change</i> ⇒ <i>Every citizen can contribute to climate action</i> ⇒ <i>Smart investment in housing rehabilitation and construction, in line with energy efficiency standards in buildings, reduces your costs mid- and long-term.</i>
General public – information multipliers (NGOs and CSOs)	Raising awareness on municipal efforts for the green transition	⇒ <i>Implementing energy efficiency in your house and community will improve the</i>

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working in the field of energy, young people, climate activists)	<p>Involving CSOs/NGOs, community leaders etc. in communication regarding municipal climate action</p> <p>Enable young people to get engaged in climate action</p> <p>Create awareness about the green job creation potential</p>	<p><i>quality of life and boost economy</i></p> <p>⇒ <i>Green transition will lead to opening new career opportunities for men & women.</i></p> <p>⇒ <i>Civil society holds municipalities accountable and transparent during the implementation of MECAP.</i></p>
Municipal council, administration and relevant municipal companies	<p>Ensure awareness about MECAP, its objectives, expected results and measures</p> <p>Ensure the involvement of all administration and relevant companies</p> <p>Obtain support for the implementation from the municipal council/assembly</p> <p>Raising awareness on the needs of vulnerable groups of citizens</p>	<p>⇒ <i>Introducing EE measures and sound energy management systems will positively impact the municipal budget and improve public services.</i></p> <p>⇒ <i>Pioneering low carbon local development will provide benefits to the local economy</i></p> <p>⇒ <i>Being an innovative and future-oriented municipality helps you keep young and well-educated people in town.</i></p> <p>⇒ <i>Special measures will be tailored to mitigate social risks of the green transition</i></p>
International donors and international and national finance institutions	<p>Inform about the MECAP measures and needed financial support</p> <p>Position the municipality as a trustworthy partner for cooperation</p>	<p>⇒ <i>We need donors stand together and support Albanian efforts in combatting climate change</i></p> <p>⇒ <i>EMS based on EEA offers an internationally recognized quality management tool for achieving local energy and climate targets. We are ready for your support!</i></p> <p>⇒ <i>International support is necessary to support the financing needs for our green transition</i></p> <p>⇒ <i>We trust in donors and national institutions standing together and support local climate action and creating a better future for the benefit of every citizen</i></p>
National policy-makers, central government development agencies including AEE	<p>Inform about the experience and efforts of the municipality</p> <p>Obtain support and guidance from the national policy makers</p>	<p>⇒ <i>EMS based on EEA offers an internationally recognized quality management tool for achieving local energy and climate targets.</i></p>

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	Communicate lessons learned and incite a multi-level dialogue on climate action	<p>⇒ <i>We do the best we can on local level, but we need your support and guidance. Only together we can make a difference.</i></p> <p>⇒ <i>Best practise examples should be communicated throughout the country. We count on your support!</i></p>
Local business and private sector representatives / Energy Services – Design & audit companies, technology providers & vendors	<p>Informing about EMS and MECAP and benefits and business opportunities</p> <p>Incite active involvement and contribution from the private sector</p> <p>Developing a trend of responsible energy utilization in the commercial sector</p>	<p>⇒ <i>Become a role-model in your business-community and be the first to take the new path!</i></p> <p>⇒ <i>MECAP anticipates significant investments which provide business opportunities for local economy</i></p> <p>⇒ <i>Introducing innovative EE measures and sound energy management systems will positively impact your budget.</i></p>
Media (Journalists, bloggers, influencers)	<p>Involving media actively in the communication process on MECAP implementation</p> <p>Promote successful and positive stories on energy in a world of bad news</p>	<p>⇒ <i>Find a good story. Promote best practise examples. Become the voice of the community you live in.</i></p> <p>⇒ <i>Climate change is happening now, promote action for combatting climate change</i></p> <p>⇒ <i>Energy efficiency is not only about saving money or taking responsibility on the environment. Highlight different benefits – be a knowledgeable and well-know source of information for your municipality.</i></p> <p>⇒ <i>Promote successful and positive stories on energy in a world of negative news. Make the difference.</i></p>

A wide range of communication tools are available and most relevant ones are listed below:

1. Mass media – media relations

- Journalists: Regular interactions with journalists via press releases, press conferences, events, publications
- Interactive sessions: Meetings, seminars, journalist-breakfast, trainings, media tours
- Television: participation in morning and talk-shows, becoming part of news
- Radio: participation in special programmes, podcasts, talk shows

- Press (printed and online editions): articles/interviews in newspapers, specialised web-magazines or websites of bloggers, influencers, opinion leaders, multipliers etc.

2. Internet and digital media

- Webpage of the municipality
- Social Media (e.g. facebook, LinkedIn, Instagram, YouTube)
- Publications and promotional items

3. Promotional products: to be used for promotional purposes, seminars, events etc.

4. Events

- Organisation of awareness raising events (targeting school children, citizens, exhibitions for promotion of relevant technologies, etc.)
- Participation in fairs and exhibitions, special days (Energy days/EU energy week): organised by third parties

8.2.2 Recommended measures

Based on the above outlined communication strategy (key messages, target groups etc.), several tools and measures have been defined in the communication action plan as provided in Annex G.

The communication plan addresses:

- Media relations (preparation of articles, radio / television reports)
- Social Media (regular posts about activities, projects, achievements)
- Publication and promotion material (posters, leaflets etc.)
- Events (per target group) (see also cooperation chapter 8.3)

All activities proposed are described in detail in the communication action plan. Measures with the highest priority are listed are presented at table 8-1.

Table 8-1: Accompanying measures

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
CC-01	Implementation of Communication Action Plan with focus on energy and climate	Information/awareness	inkind
CC-02	Prepare and implement Internal Communication Concept	Information/awareness	inkind
CC-07	Develop Concept for Citizen and Council Involvement	Information/awareness	inkind

Additional accompanying measures are listed under the corresponding sectors (Chapters 4,5,6,7)

8.3 Cooperation

8.3.1 Intervention Strategy

Same as communication, the cooperation should be established both with stakeholders outside of the municipality, as well as within the municipal territory. The cooperation with external stakeholders should encompass other municipalities and national authorities. At the same time, taking into account that the GHG emissions in a municipality are to the greater extent beyond the municipal authority, the municipality needs to engage in cooperation with the households, industry, commerce, and farmers.

Different approaches based on international best practices are recommended as activities :

- Financial Supporting Schemes like:
 - Subsidies for the installation of PV – up to 50% grant
 - Support program for boiler change and EE retrofit for residential multi apartment buildings - Municipal support complementing gov. program – target EE rehabilitation of 5 MABs per year
 - Introducing property tax rebates for efficient new construction – target 200 apartments/houses every year for the efficient new construction focused in new MABs and new single houses
- Promotion Activities and Events like:
 - Promotion and support of advanced heating systems - Support the Installation of 100 efficient heating systems in residential houses per year
 - Organize business related events – Events related to climate change, renewable energy sources or energy efficiency, with the aim to promote new technologies, different measures and products (solar panels, heat pumps, etc.). It is meant to provide information on investment opportunities and business development in this area etc.

8.3.2 Cooperation with other municipalities and national authorities

The municipalities should regularly exchange on their efforts on the introduction of the energy management system and the implementation of MECAP. Joint cooperation on donor project provides an excellent platform for such exchange, such as Smart Energy Municipalities Project. Also, the use of the European Energy Award system and advisory services of the EMS consultants enable for an objective comparison between municipalities. The exchange between municipalities should not be only on technical aspects of energy management, but also between the communication officers, exchanging on good practice and ensuring its broader dissemination.

The local experience from policy implementation needs to be communicated to the national level. Thus, the municipality needs to ensure regular exchange with the EE Agency and the Ministry and engage in both policy dialogue and joint cooperation projects supporting the implementation of both NECP and MECAP.

8.3.3 Cooperation and Support for Residential Sector

The residential sector is a major energy consumer and source of GHG emissions. Thus, the awareness raising and other communication activities need to be complemented with cooperation measures. Based on international good practice, several cooperation measures are proposed.

Promotion program for building retrofits and EE investments

A subsidy mechanism should be developed in which entire building renovations or individual measures such as heating system replacement, boiler replacement, building insulation, window replacement, solar thermal

and PV roof systems, can be financially supported. Existing national programs, credit lines and potential funding from international donors should be taken into account. Same options include:

- Subsidies for the installation of PV – up to 50% grant
- Support program for boiler change and EE retrofit for residential multi apartment buildings - Municipal support complementing gov. program – target EE rehabilitation of 5 MABs per year
- Promotion and support of advanced heating systems - Support the Installation of 100 efficient heating systems in residential houses per year

The promotion of such programs should be included in the communication action plan. The municipality can print brochures and distribute them to the population. The supporting programs should be explained on the municipality's website and include links to further information. The municipality's communication officers should regularly disseminate the information via social media.

Energy Consulting

Homeowners are often overwhelmed to decide which options are suitable in their concrete case. “Which heating system is right for my house? Should I insulate only the roof or also the walls? What is the best approach to planning? Where can I get financial support?”

The municipality of Berat should therefore provide advice to its citizens. The advisors can be professionals from the private sector or municipal employees. For this purpose, an open day once a month can be introduced or fixed telephone hours in which an expert can be reached by phone.

Legal measures

The municipality should try to combine building regulation and incentive mechanisms for promotion of construction of more efficient buildings. For example, new buildings and general renovations, the use of conventional electric boilers and electric resistance heating systems should be prohibited. At the same time, the use of renewables should be promoted, for example by requesting the installation of solar water heaters or PV. At the same time, the municipality should change its taxation policy by providing rebates for buildings with higher efficiency standard.

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
CC-03	Establish Exchange of Experience with other municipalities	Information/awareness	inkind
CC-04	Set-up inter-municipal Communication Task Force	Information/awareness	inkind

8.3.4 Cooperation and Support for Commercial Sector, Industry, Agriculture

The business sector is a key partner for the implementation of MECAP. On one side, there are companies which are technology providers, construction and service providers, supporting the implementation of MECAP measures. On the other side, the companies are emitters of GHG and need to contribute to the achievement of MECAP target. The first group should become aware of the business opportunities stemming from MECAP, as well as to cooperate with the municipalities on awareness raising events (e.g. technology promotion events) or on subsidy programs. The second group needs to be incentivized for contributing to efforts for reducing GHG emission. Here, the good practice should be promoted by the

municipal communication department. Also, subsidies for EE and RES targeting the commercial sector, industry and agriculture should be designed, in cooperation with national authorities and donor activities.

8.3.5 Recommended measures

Accompanying measures

All proposed activities proposed are described in detail in the communication action plan as provided in Annex G. Measures with the highest priority are presented at table 8-2.

Table 8-2: All activities proposed in the communication action plan

Code	Energy Saving Measures	Type of measure	Estimated costs ('000 EUR)
CC-05	EE & RES technology promotion events for business/industry: Organization of events together with the technology suppliers for promotion of EE & RE technology	Awareness raising	1
CC-06	Awareness raising on topic of energy: Organization of an energy day in the municipality or similar activity for promoting EE	Awareness raising	3

Additional accompanying measures are listed under the corresponding sectors (Chapters 4,5,6,7)

9 REFERENCES

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Annex A: Relevant Legal framework

This Annex presents a short summary of Legal framework on the Energy, Power Sector, Climate Change, Energy Efficiency, Renewable Energy, National Strategy of Energy and National Energy and Climate Action Plans in Albania.

Law on Energy Efficiency: In November 2015, Albania adopted the Law on Energy Efficiency (Law No. 124/2015), in order to transpose the provisions of the EU Directive 2012/27/EU into the Albanian legislative framework. The EE law was amended in March 2021 (Law No. 28/2021). The current EE Law defines the obligations of Government authorities including the Central Government and all 61 Local Governments (Municipalities), public and private sectors, residential sector, services, industry, transport, agriculture and of all the other sectors of the economy for the promotion of the efficient use of energy and energy saving and for the development of a market for energy services in the energy efficiency sector. The aim of this law is to: to set up and enforce national policy and rules for the promotion and improvement of the efficient use of energy with the goal to save energy and increase the security of energy supply as well as to remove the barriers in the energy market; to establish indicative national energy efficiency targets; and to promote economic competitiveness.

The Energy Efficiency Directive 2012/27/EU (EED) was adopted by the Ministerial Council of the Energy Community in October 2015 and had a deadline for transposition of 15 October 2017. This Directive repeals the Energy Services Directive 2006/32/EC (ESD). The Law on Energy Efficiency for Albania was adopted in November 2015 and transposes most of the EED. Additional technical assistance is underway to assist the Ministry of Infrastructure and Energy (MoIE) by identifying all elements of the EED that remain missing from the current Law and revising the EE Law, which is in the process of approval by the Albanian Parliament. Under the revised EE Law there are very important aspects related to the energy management at municipality level.

Law on Energy Performance of Buildings: Albania has prepared a stand-alone law transposing the EU Directive on Energy Performance of buildings - EPBD (Law no.116/2016). The Law on Energy Performance of Buildings was prepared as a stand-alone law transposing the EU Energy Performance in Buildings Directive (EPBD). The legislation has been in the force since January 2021. The legislation includes the requirements under the recast Directive in this respect, that: New buildings occupied and owned by public authorities must meet the Nearly Zero Energy Buildings (NZEB) definition since 31 December 2018. For buildings with total useful floor area exceeds 250 m² and that are occupied and owned by a public authority and are frequently visited by the public, there is a requirement that an energy performance certificate must be displayed in a prominent place clearly visible to the public. The Law also lays out the basis for development of Minimum Performance Requirements of Buildings (approved by the Albanian Council of Ministers Decision Nr. 537 dated 8/7/2020) that are designated for different categories of buildings, such as renovation, new building, technical systems to be installed for heating and cooling, etc. The main sectors of applications are as follows:

- all new buildings and new building units during all phases of construction, including design;
- existing buildings and units of existing buildings when undergoing significant renovation or when adding/expanding, including design;
- individual building elements that are part of the building envelope and that have a significant impact on the energy performance of the building when they are replaced or added to the building;
- air infiltrations in the building;
- technical systems of new buildings and existing buildings (in case a new system is installed or replaced) regarding their energy performance, including proper installation, installation of their control systems and automation in order to increase efficiency.

- This includes the requirements for new buildings occupied and owned by public authorities to meet the Nearly Zero Energy Buildings (NZEB) definition.

Law on Labelling of energy-related products: In 2012 Albania adopted the Law on Indication of Consumption of Energy and Other Sources by Energy-related Products (Law no.68/2012, date 21.06.2012) which fully transposes the EU Directive 2010/30/EU. This law establishes obligation for informing the consumers with the energy consumption of energy-related products.

Law on Renewable Energy Sources: The Albanian Parliament approved a new Law on RES (Law no.7/2017 and amended on April 2023), which replaced the former Law on RES. The new RES Law partially transposes the Directive 2009/28/EU. The objective of the RES Law is to facilitate the harnessing of Albania's significant RE resources, in particular in the area of SHPPs, Solar Hot Water Systems, PV Power Plants, efficient traditional and industrial biomass heating systems as well as other RE sources. The Renewable Energy Sources Law has the following main objectives: Promote the increase of use of energy from renewable sources; Reduce the import of fossil fuels, greenhouse gas emissions and protect the environment; Promote development of the renewable electricity market and its regional integration; Increase diversification of energy resources and the security of energy supply in the Republic of Albania; Promote the development of rural and isolated areas by improving their supply with energy.

Law on the production, transporting and trading of biofuels and other renewable fuels used in transport: This Law (no. 9876, date 14.02.2008) promotes the production and use of renewable biofuels so as to replace oil by-products in the transport sector. The Law aims at fulfilling the obligations established by the the Kyoto Protocol and ensuring the supply of renewable energy resources by promoting the cultivation of energetic plants to protect the environment.

Law on the establishment of facilities for construction of new power generation capacities (Law no. 8987, date 24.12.2002).

Law 107/2014 "On Urban Planning and Development" is also an important basic law that regulates the activity and procedures for territorial planning and the process of the land development.

Construction Law 2013 (amended on October 2021) is the base of Construction Inspectorate based on the construction law, part of the municipality, do the regular inspections on site, including meeting structural standards, health, environment and safety standards, energy performance standards etc. before issuing the final utilisation permit for the buildings/facilities.

The new Power Sector Law transposing the Third Energy Package in the electricity sector was adopted in April 2015 and entered into force on 13 June 2015.

National Energy Sector Strategy contains the following Vision for 2030: Development of domestic energy sources, leading to a regional integrated and diversified energy system based on market principles, able to meet demand for energy and for sustainable development of the economy, ensuring security and quality of supply, safety, environmental protection and climate action, and increased welfare.

Debt generation in Albania are regulated through three following laws: **Law on Budget System Management / No. 9936, date 26.06.2008; Law on Local Government Borrowing / No. 9869, date 4.02.200 and Law on Local Taxes and Fees / No. 8982, dated 12.12.2002.** Law on Budget regulates the planning, preparation, adoption and execution of the budget of Albania, the budgets of central ministries, state agencies and municipalities (hereinafter referred to as budget) and financial plans for out-of-budget funds, budget principles, borrowing, guarantees and debt management, rules of fiscal responsibility, accounting, reporting, monitoring and auditing of budget and other budget users. This law is very important for public buildings sector because it determines the amount of operation and maintenance of the building including the energy expenses and investment needed to implement EE measures.

Ministry of Finance and Economy is implementing the Public Investment Program of Albania for the purpose of management and coordination of development funds in Albania. Albania's Public Investment Program is a three-year document that includes: Ongoing projects and programs for whose realization are secured sources of funding; Priority projects and programs for which, at the moment of Albania Public Investment Program development, it is certain that funds will be secured for their funding; and Priority projects and programs for which the sources of funding are not secured at the moment of Albania Public Investment Program. Central institutions and municipalities and municipalities can borrow for: financing of budget deficit; financing capital investments or special projects as approved by assembly; for re-financing of the debt; financing of the cash flow deficit; for financing of guarantees issued, in case of debtor default.

Albania Ministry of Finance and Economy (MoF&E) has overall role of managing, supervising and planning new debt in Albania. Albania MoF&E is in charge for debt generation and managing for Albania Government, while financial department of municipalities perform those tasks at decentralized levels. In general, municipalities have significant capacity to borrow. However, the situation varies from municipality to municipality, and there are some of them that have high levels of generated debt, bordering on the maximum legal limit. Second, many municipalities have arrears to suppliers, unpaid salaries and other work-related obligations, that municipalities will need to pay based on court orders. The debt ceilings and the maximum annual debt service in relation to collected own source revenue and general grant appear conservative, which is positive from a banking perspective. The credit enhancements are liquid and easily enforceable in case of default and the procedures that need to be taken by a municipality in case of default are rigid. The requirement of two years of unqualified audit is deemed appropriate as a lender is therefore able to rely on the validity of the presented financial information.

Entities responsible for municipal buildings/facilities are obliged (by the laws summarized above) to conduct retrofit works and new investments according to the Law on Public Procurement. Municipality in the role of Contracting Authority based on the secondary procurement legislations (issued by the Council of Ministers and the National Procurement Agency) shall carry out the preparation of tender documentations, evaluation of bids for works, and awarding contracts. The contracting authority (i.e. Berat Municipality) awards contracts to the qualifying, most economically advantageous tender, which is typically based on the lowest price. According to the Law on Public Procurement's article on award criteria, procurement decisions are made on the basis of price or cost while also considering life-cycle cost in the assessment of the best price-to-quality ratio. The calculation method for life-cycle costs is stipulated in the law. However, in practice, this life-cycle cost approach is not used.

Apart from the above legal framework, Albania has also adopted the following secondary legislation on EE and RE:

- Decision of the Council of Ministers (no.852, date 7.12.2016) on establishment and manner of organization and functioning of the Agency for Energy Efficiency.
- Decision of the Council of Ministers auditors (no.407, date 19.06.2019) on approval of procedures, categories, conditions and requirements of qualifications and professional experience for energy which defines the procedures, categories and requirements for issuance of the energy auditing certificates.
- Decision of the Council of Ministers (no.342, date 22.05.2019) on approval of procedures, categories, conditions and requirements of qualifications for energy auditors.
- Decision of the Council of Ministers (no.256, date 27.03.2020) on calculation methodology of optimum cost levels for the minimum energy performance of buildings, and building units and elements.
- "National Methodology for Calculating Energy Performance in Buildings" approved by DCM no. 1094, dated 24/12/2020.
- Decision no. 537, dated 8/7/2020 on "Minimum Energy Performance Requirements of Buildings" - which imposes minimum energy performance requirements for all new buildings / newly renovated buildings and sets out standards for Nearly-zero Energy Buildings

- Decision no. 256, dated 27/3/2020 "On the Approval of the Methodology for Calculating the Optimal Cost Levels for the Minimum Energy Performance Requirements of Buildings, Units and Elements of Buildings".
- Decision no. 958, dated 2/12/2020 on "Approval of procedures and conditions for certification of energy performance of buildings and the model and content of conditions for registration of Energy Performance Certificate of buildings".
- Decision no. 934, dated 25/11/2020 on "Approval of Criteria and Procedures for the Manner of Selection and Quantity of Certificates to be Verified, as well as the Process of Supervision of Energy Performance Certificates in Buildings".
- Order no. 5 dated 12/01/2021 on "Regulation of the Energy Audit Format and Energy Auditor Payment". Secondary Legislation related to Energy Auditors was approved by the Albanian Council of Minister with Decision Nr. 404 dt. 19/06/2019. The EU technical assistance supported the Agency for Energy Efficiency (AEE) to prepare questions and procedures for carrying out the final test for issuing Energy Auditors and Energy Managers certificates for three areas: Energy Auditors for Buildings; Energy Auditors for Industry; and Energy Auditors for Transport companies.
- Decision of the Council of Ministers (no.537, date 8.07.2020) on minimum requirements of energy performance of buildings and elements of buildings.
- Decision of the Council of Ministers (no.934, date 25.11.2020) establishing the criteria and procedures for the selection manner of energy performance certificates of buildings which shall be subject of evaluation and their monitoring process.
- Decision of the Council of Ministers (no.1094, date 24.12.2020) approving the national methodology of calculation of energy performance of buildings.
- Decision of the Council of Ministers (no. 580, date 28.08.2019) on approval of consolidated National Renewable Energy Action Plan 2019-2020, which establishes the national overall RES target and specific targets for different RES technologies including the supporting measures required to be taken for reaching the objectives.
- Decision of the Council of Ministers (no.839, date 5.12.2007) on setting conditions and procedures of reimbursement of excise tax and establishing the facilities for construction of power generation capacities with installed capacity not less than 5 MW, as amended.
- Decision of the Council of Ministers (no.687, date 22.11.2017) on approval of methodology for setting the annual purchasing price of electricity from existing Priority Producers. The Priority Producers include the small HPPs commissioned before the date of entering in force of Law no.7/2017 on RES with installed capacity less than 15 MW.
- Decision of the Council of Ministers (no.369, date 26.04.2017) on approval of methodology for setting the purchasing price of electricity produced by small solar and wind power generators.
- Decision of the Council of Ministers (no.27, date 17.01.2018) on approval of methodology for setting the purchasing price of electricity produced by small RES power generators using the biodegradable part of solid industrial, urban and rural wastes.
- Decision of the Council of Ministers (no. 349, date 12.06.2018) on approval of supporting measures for promotion of electricity use from solar and wind energies and the procedures of selection of their projects, as amended.
- Decision of the Council of Ministers (no. 822, date 7.10.2015) on approval of rules and procedures for construction of new power generation capacities that are not subject of concessions, as amended.
- Decision of the Council of Ministers (no. 519, date 13.07.2016) on approval of electricity market model.
- Decision of ERE's Board of Commissioners (no.214, date 28.12.2017) on approval of Electricity Market Rules and Agreement for Participation on the Albanian Power Exchange.
- Decision of ERE's Board of Commissioners (no.229, date 20.12.2019) on approval of Regulation for issuance, transferring and cancelling of Guarantees of Origin for electricity produced by RES.

Annex B List of Measures

List of all selected measures (download from EMT) that are required to achieve 2040 targets

Long List of Activities

2023-11-26, eea Management Tool

Area	EMT order of measures	Code	Specification	measure/activity
1 Development and Spatial Planning Strategy	1.1.1 Targetat per Energjine dhe Klimen	CC-08	O&M management & monitoring	Target setting (in line with national targets) for EE, CO2 and RES
	1.1.2 Programet e Energjise dhe Klimes ne Eficencen e Energjise	CC-09	O&M management & monitoring	Develop MECAP
	1.1.3 Skenari bazë dhe inventari i monitorimit te emetimeve	CC-10	O&M management & monitoring	Institutionalise Data collection
		EL-06	O&M management & monitoring	Power consumption monitoring
	1.1.4 Strategjia per mbetjet	SW-02	Investment	Feasibility Study: Modern waste sorting complex
		SW-05	O&M management & monitoring	Waste Vehicle Fleet Maintenance Audits
		SW-06	O&M management & monitoring	Waste Collection Route optimization
	1.2.1 Ngrohja dhe ftohja e hapësires dhe planifikimi i energjisë	MPB-17	Municipal policy & regulation	Development of a Spatial heating/cooling plan
	1.2.2 Lëvizshmëria e qëndrueshme dhe planifikimi i trafikut	OT-02	Investment	Development of Bike lanes
		OT-01	Investment	Electric Vehicle Charging Infrastructure
		OT-03	Municipal policy & regulation	Development of P+R facilities
	1.3.1 Mjete të detyrueshme për pronarët e tokave në lidhje me rinovimin e ndërtesave	RB-07, COM-05	Municipal policy & regulation	Strict application of energy performance codes
2 Public Buildings & Facilities	2.1.2 Auditimi fillestar i energjisë, monitorimi i konsumit të energjisë dhe ujit dhe raportimi...	MPB-09	O&M management & monitoring	Up-date of municipal public buildings inventory
		OPB-01	Investment Preparation	Obligatory building energy management system
		MPB-11	Investment Preparation	Pipeline of EE/RES municipal public buildings

3 Supply & Disposal	2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	MPB-01	Investment	EE rehabilitation of the schools
		MPB-02	Investment	EE rehabilitation of the kindergartens
		MPB-04	Investment	EE rehabilitation of social buildings
		MPB-14	Municipal policy & regulation	Establishment of municipal public buildings Database
		OPB-02	Investment Preparation	Obligatory energy audits
		MPB-03	Investment	EE rehabilitation of the administrative buildings
	2.2.1 Pjesa e burimeve të rinovueshme të energjisë - për ngrohje	MPB-05	Investment	Solar Hot Water Program for social and kindergarten facilities
		MPB-07	Investment	Public building wood boiler
	2.2.2 Pjesa e burimeve të rinovueshme të energjisë - për energji elektrike	MPB-08	Investment	Public buildings rooftop solar PV program
		EL-04	Investment Preparation	Up-date of feasibility studies for RE
		SW-03	Investment	Solar PV plant at landfill site
	2.2.4 Eficienca e energjisë - në energji elektrike	EL-03	Investment	Non-Technical Loss Reduction Program
		EL-01	Investment	Rehabilitation of 0,4 - 10 KV network
	2.3.1 Ndriçimi publik	SL-01	Investment	Street + Public Space LED Lighting Program
		SL-05	O&M management & monitoring	Up-date of lighting inventory
		SL-03	Investment	Solar PV for new Autoproducer units Street lighting
	3.1.1 Ngrahje dhe Ftohje nga Burime të Rinovueshme të Energjisë brenda territorit të Bashkisë	RB-01	Investment	Efficient lighting in public spaces of MAB
		MPB-12	Investment Preparation	Production and distribution of wood pellets
		WW-04	Investment	WW sludge separation and biogas unit
		EL-05	Information/Awareness	Create a Solar Map
	3.2.1 Eficienca Energjie në sistemin e Furnizimit me Ujë, përfshirë sistemet PV	PW-04	Investment	Solar PV plant at pumping stations
		WW-01, WW-02	Investment	Improve Performance of sewer
		WW-03	Investment	Solar PV plant at WWTP
		WW-05	Investment	Extension of WW treatment plant
		PW-01, PW-02	Investment	Increase performance water distribution networks
		PW-03	Investment	Active Leak Detection and Pressure Management Program
		WW-06	O&M management & monitoring	Auditing of water supply of Treatment Facilities

4 Mobility	3.2.2 Efiçencë në përdorimin e ujit.	PW-06	Investment Preparation	Prioritizing Energy Efficient Water Resources
		PW-07	Information/Awareness	Educational Measures for water saving in schools
	4.1.2 Automjetet e Bashkisë	SL-03	Investment	Replacement of SL service maintenance vehicles
		SW-01	Investment	Street cleaning/service vehicle fleet replacement
	4.2.1 Cilësia e transportit publik dhe prioriteti i transportit publik	PT-01	Investment	Replacement of urban busses by hybrid or electric buses
		PT-02	Investment	Extension of bus lines
		PT-03	Investment	Construction of mobility station
		PT-04	Investment	Shuttle-busses/minibuses
		PT-06	Municipal policy & regulation	Introduction of conditioned public transport
5 Internal Organisation	5.1.1 Skuadra e Energjië e Bashkisë (MEMU) Menaxheri i Energjië dhe burimet njerëzore	CC-11	O&M management & monitoring	MEMU institutionalisation
	5.2.2 Ngritja e kapaciteteve të brendshme (vetiake)	COM-06	Training & capacity building & information	Training of energy managers for data collection
		MPB-10	Capacity Building	Training for EE retrofit in Buildings
		MPB-13, OPB-03	Capacity Building	MEMU training for municipal public buildings management
		SL-04	Capacity Building	Training for EE lighting retrofit
		SL-06	Investment Preparation	Training on Energy audits, detail engineering design and tender documents
		MPB-16	Capacity Building	Janitors' Training on Building Energy Management
		CC-12	O&M management & monitoring	Prepare and apply Eco-behaviour Guidelines for municipal staff
	5.2.3 Prokurimet	SW-07	Municipal policy & regulation	Waste collection licenses
		SL-07	Municipal policy & regulation	Procurement Guide for New Street Light Installations
6 Communication and Cooperation	6.1.1 Koncepti i komunikimit dhe bashkëpunimit (I brendshëm lidhur me qeverinë qendrore ...	CC-02	Information/Awareness	Prepare and implement Internal Communication Concept
		CC-01	Information/Awareness	Prepare Communication Action Plan
	6.2.1 Bashkitë dhe rajonet e tjera, bashkëpunimi kombëtar dhe ndërkombëtar	CC-04	Information/Awareness	Set-up Inter-municipal Communication Task Force
		CC-03	Information/Awareness	Establish Exchange of Experience with other SEMP municipalities
	6.3.1 Industritë, bizneset, tregtia dhe ofruesit e shërbimeve	PW-08	Municipal policy & regulation	Promotion of Water Demand Restrictions

		SW-04	Information/Awareness	Promote Zero Waste through sorting recycling and composting
		COM-01	Training & capacity building & information	Promotion of Demand Side Management
		COM-02	Training & capacity building & information	Information and support program for Solar Rooftops
		COM-03	Financing mechanism	Information on Support Program for EE in industry, SME
		CC-05	Information/Awareness	Organise Business related Events
	6.4.2 Popullsia lokale	MPB-15	Information/Awareness	EE awareness program in schools
	6.5.1 Mbështetje financiare për projektet e shoqërisë civile	PT-05, OT-04	Training & capacity building & information	Promotion of Non-Motorized Transport Modes
		CC-06	Information/Awareness	Organise Information activities/events (e.g. Municipal Energy Day)
		PW-05	Investment	Support program (all subscribers) Water Efficient Fixtures
		COM-04	Training & capacity building & information	Support Energy Audits Explore Renewables
		RB-02	Financing mechanism	Program for boiler change and EE retrofit of residential multi-apartment buildings
		RB-06	Municipal policy & regulation	Promotion and support of advanced efficient heating systems
		EL-02	Investment	Smart metering program
		MPB-06	Investment	Program on energy-efficient electric appliances
		RB-05	Financing mechanism	Incentivize Rooftop PV
		RB-03	Financing mechanism	Property Tax rebates for efficient new construction
		RB-04	Investment Preparation	Energy audit support program
		CC-07	Information/Awareness	Develop Concept for Citizen and Council Involvement

Annex C Measure Sheets

Measure sheets , only for short listed measures (Download from EMT and formatted)

Short List - Measure Sheets

Alle Aktivitäten

2023-11-26, eea Management Tool

EMT order of measures	titel	start	Priority	Description	Specific Information	Department
1.1.1 Targetat per Energjiene dhe Klimen	Target setting (in line with national targets) for EE, CO2 and RES	06.01.2023	1	Municipality has to put the target in convergence with National Energy and Climate Action Plan for: 1) CO2 eqv reduction versus baseline scenario for the year 2030; 2) Energy Savings versus baseline scenario for the year 2030; 3) RES contribution versus baseline scenario for the year 2030; MECAP should follow these steps: 1) Diagnosis phase of the action atituation; 2) Establishing baseline scenario for energy and GHG emissions; 3) Establishing energy and GHG emissions (including EE saving targets, RES targets and CO2 targets); 4) Preparing all other aspects including investment and no-investment measures; 5) presenting MECAP to EEA and all other stakeholders; 6) Revising MECAP according to the any potential review of EEA and other important stakeholders; 7) Presenting MECAP to Municipality Council and getting final approval; 8) Preparing the first three year action plan for implementation and introducing it to middle-term budget.	MEMU supported by the SEMP consortium has collected all data and has prepared the preliminary ESMAP scenarios calculation for reaching the EE, RES and CO2 targets according to NECAP. MEMU supported by the SEMP consortium has collected all detail data related to municipality public building stock and is actively collaborating with AEE and SEMP team for preparing PPF for "Refurbishment of Municipality Public Buildings". MEMU supported by the SEMP consortium has collected all detail data related to municipality school stock and is actively collaborating with AEE for introducing part of them for KFW "School Rehabilitation Programme"	Mayor and Council of Municipality
1.1.2 Programet e Energjië dhe Klimes ne Eficencen e Energjië	Develop MECAP	06.01.2023	1	With the support of the SEMP team, prepare a workplan, concept and responsibilities for the preparation of MECAP	MEMU supported by SEMP consortium is working for: 1. Data collection (finalized) 2. Data calibration (finalized) 3. Carry out calculation (finalized) 4. Discussion of main targets for EE/RES/CO2 based on NECAP 5. Develop MECAP discussing it with MEMU 6. Presenting it to Council of Municipality 7. Review based on Agency and MIE comment 8. Carry out final presentation to council of Municipality and its final approval 9. Approve MECAP	Mayor and Council of Municipality
1.1.3 Skenari bazë dhe inventari i monitorimit të emetimeve	Institutionalise Data collection	06.01.2023	1	MEMU should collaborate with many directorates of municipality to collect all energy consumption data related to indirect sectors: residential, commercial services, industry, private transport and agriculture.	MEMU did collected all data for 2021 and these data are calibrated with the support of SEMP consortium. MEMU should continue to collaborate with many directorates of municipality to collect all energy consumption data related to direct municipality and indirect sectors: residential, commercial services, industry, private transport and agriculture. MEMU supported by the SEMP consortium has collected data for 2022 and will introduce them at the ENERCOACH as soon as possible the tool will be ready.	Mayor and Council of Municipality
2.1.2 Auditimi fillestar i energjisë, monitorimi i konsumit të energjisë dhe tit dhe raportimi	Up-date of municipal public buildings inventory	01.01.2023	1	Up-date of municipal public buildings inventory, energy consumption monitoring, reporting and evaluation.	Including all public building inventory with all their characteristics and yearly energy commodities consumption monthly/yearly at selected data base (Enercoach). Preliminary inventory of all public buildings has been prepared for all public buildings of Berat Municipality.	MEMU supported by Environmental Directorate

2.1.2 Auditimi fillestar i energjisë, monitorimi i konsumit të energjisë dhe ujit dhe raportimi...	Obligatory building energy management system	01.01.2023	1	Obligatory building energy management system (large buildings, > 3.000 m ²)	EE obligatory building energy management system (large buildings, > 3.000 m ²) is in process and in order to reach the targets it is important to implement every year 4 central buildings discussing line ministries starting with those which have the highest specific energy consumption kWh/m ² year. Prepare a training and carrying it out for MEMU and all energy managers presenting energy management and good housekeeping for public buildings.	Regional Education Directorate & Health Directorate
2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	EE rehabilitation of the schools	01.01.2023	1	EE rehabilitation of the schools including: a) Retrofit of building envelop, b) modernization of heating system.	EE rehabilitation of schools is in process and in order to reach the targets it is important to implement every year 6-7 schools starting with those which have the highest specific energy consumption measured in kWh/m ² year. Following steps need to be considered: School Inventory, Heating Concept, Energy Audits, Ranking of Schools, DED, Procurement, Securing Finance for EE rehabilitation of the schools.	Education Directorate & Service Directorate with Environmental Directorate and Financial Directorate
2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	EE rehabilitation of the kindergartens	01.01.2023	1	EE rehabilitation of the kindergartens including: a) Retrofit of building envelop, b) modernization of heating.	EE rehabilitation of kindergartens is in process and in order to reach the targets it is important to implement every year 2 daily care and kindergartens starting with those which have the highest specific energy consumption (kWh/m ² year). Following steps need to be considered: Kindergarten inventory, Heating Concept, Energy Audits, Ranking of Schools, DED, Procurement, Securing Finance for EE rehabilitation of the kindergartens.	Education Directorate & Service Directorate with Environmental Directorate and Financial Directorate
2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	EE rehabilitation of social buildings	01.01.2023	1	EE rehabilitation of social buildings Retrofit Program (dormitories, elder houses, etc.).	EE rehabilitation of social buildings is in process and in order to reach the targets it is important to implement every year 2 social buildings (part of them belonging to Ministry of Social affairs and part of them belonging to municipality) starting with those which have the highest specific energy consumption kWh/m ² year. Social buildings Inventory, Heating Concept need, Energy Audits, Ranking of Schools, DED, Procurement, Securing Finance for EE rehabilitation of the social buildings.	Service Directorate, Ministry of Social Affairs, Environmental Directorate, Financial Directorate
2.3.1 Ndrëçimi publik	Street + Public Space LED Lighting Program	01.01.2023	1	Street + Public Space LED Lighting Program, including Replacement and adaptation of power supply network for advanced LED street lighting: retrofit, voltage stabilization, wiring, timing, dimming	EE rehabilitation/expanding of the street lighting is in process and in order to reach the targets it is important to implement every year 300 Street and Public Space LED Lighting Programs, including Replacement and adaptation of power supply network for advanced LED street lighting: retrofit, voltage stabilization, wiring, timing and dimming starting with those which have the highest specific energy consumption kWh/km year. Public streets and public spaces (parks) Inventory, EE LED Concept, Energy Audits, Ranking of Streets & parks, DED, Procurement, Securing Finance for EE rehabilitation of the Streets & Parks.	Service & Decoration Directorate with Environmental Directorate and Financial Directorate
2.3.1 Ndrëçimi publik	Up-date of lighting inventory	01.01.2024	1	Up-date of lighting inventory, energy consumption monitoring, reporting and evaluation	MEMU will carry out training of operation and maintenance team for updating of lighting inventory, energy consumption monitoring, reporting and evaluation for all Street Lighting System and simple ways of data recording by using their smart phone and delivering such data to a responsible expert of MEMU. Preliminary inventory of all public streets and parks has been prepared for Berat Municipality.	Service & Decoration Directorate with Environmental Directorate
5.1.1 Skuadra e Energjisë e Bashkisë (MEMU) Menaxheri i Energjisë dhe burimet njerëzore	MEMU institutionalisation	01.02.2023	1	Municipality has nominated 8 experts covering the areas of spatial planning, the areas of energy, climate and mobility issues, or the municipality and has not hired external experts. SEMP consortium is providing the relevant external consultancy. MEMU with 8 experts led by the Deputy Mayor is very good number of starting is a good number and they/MEMU could collaborate much more with all directorates. Prepare job description for all MEMU members, fix responsibilities, install MEMU on a high level within the organization of the municipality	The Municipal Energy Team is institutionalised with the respective decision-order issued by the Mayor and they are meeting every week and at the same time they are dedicating 3 working days every week. Experts and SEMP Consortium are working actively and effectively and are properly managed by the municipal authorities. MEMU consists of competent 8 experts with a great will within the administration who know their inputs and are able to describe their work carried out under the guidance of SEMP consortium. Head of MEMU has presented to the Human Resource Directorate the tasks of MEMU and the need according to EE Law to establish an Energy Office in the Municipality and to have an Energy Manager.	MEMU
5.2.2 Ngritja e kapaciteteve të brendshme (vetiAKE)	Training of energy managers for data collection	01.09.2023	1	Training of building caretakers/ energy managers	MEMU will carry out Training of building caretakers/ energy managers for proper operation of all energy systems and simple ways of data recording by using their smart phone and delivering such data to a responsible expert of MEMU. Active participating in on job training by carrying also simple case studies directly visiting 2-3 public buildings of the municipality.	Education Directorate & Service Directorate







6.1.1 Koncepti i komunikimit dhe bashkëpunimit (I brendshem lidhur me qeverine gendrore	Prepare and implement Internal Communication Concept	01.03.2023	1	Defining communication channels within the municipality	Establish mechanisms for regular exchange of information between MEMU, Communication Department and decision makers with the aim that both the decision makers as well as other local administration employees are aware of local efforts in the area of energy efficiency and climate action	Communication Department
6.2.1 Bashkitë dhe rajonet e tjera, bashkëpunimi kombëtar dhe ndërkombëtar	Set-up Inter-municipal Communication Task Force	01.03.2023	1	Coordination and regular exchange of information amongst the municipalities on the priority topics supports sustainability and the best possible utilization of human and financial resources	The communication departments of the SEMP municipalities should be in regular communication exchange and be interlinked on social media channels. Information should be multiplied and used in different channels. Best practice examples should be shared and distributed in all municipalities	Communication Department
1.1.4 Strategjia per mbetjet	Feasibility Study: Modern waste sorting complex	01.06.2024	2	Modern waste sorting complex and transfer station: including sorting and recycling and composting	Carrying out a detailed feasibility study analysis of modern waste sorting complex and transfer station: Including sorting and recycling as well as composting for urban areas and rural areas. After finalising the study, carry out the investment for the most suitable respective schemes for urban areas and for rural areas	Waste management Company and/or Service Directorate
1.1.4 Strategjia per mbetjet	Waste collection licenses	01.01.2024	2	Waste collection licenses combined with strict energy performance of vehicles	Waste collection licenses combined with strict energy performance of vehicles carried out the investment for the most suitable respective schemes for urban areas and for rural areas	Waste management Company and/or Service Directorate
1.1.4 Strategjia per mbetjet	Promote Zero Waste through sorting recycling and composting	01.01.2024	2	Promote Zero Waste through sorting recycling and composting	MEMU will carry out information/awareness meetings for Promoting Zero Waste through sorting recycling and composting in 1) Especially starting with high schools; 2) Chamber of industry; 3) Commercial activities; and 4) Farmer associations	Waste management Company and/or Service Directorate
1.2.1 Ngrohja dhe ftohja e hapësires dhe planifikimi i energjisë	Production and distribution of wood pellets	01.01.2024	2	Support local production and distribution of wood pellets	Three feasibility studies and business plans will be carried out for supporting the local production and distribution of pellets/briquets based on sustainable biomass: 1) Olive oil pomace; 2) Agriculture and fruits processing industrial enterprises; and 3) Pruning of fruit trees and cleaning of forests	MEMU
1.2.1 Ngrohja dhe ftohja e hapësires dhe planifikimi i energjisë	Development of a Spatial heating/cooling plan	06.01.2023	2	Spatial heating/cooling plan shall be part of the Urban/Territorial Development Plan, which is approved firstly from Municipality/Council of Municipality and secondly by the National Council of the Territory of Republic, leaded by the Prime Minister and approved by the Council of Ministers Decision (secondary legislation)	Mayor has is concerned for preparation of Spatial heating/cooling plan for urban and especially rural areas in order to reduce forest protection. Spatial heating/cooling plan for urban and especially rural areas in order to reduce wood consumption and increase forest protection.	Mayor and Council of Municipality
1.2.2 Lëvizshmëria e qëndrueshme dhe planifikimi i trafikut	Development of Bike lanes	01.01.2023	2	Development of Bike lanes and promotion of non-motorized transport (bike, scooter sharing)	Development of Bike lanes and promotion of non-motorized transport (bike, scooter sharing) by construction of 2 lines every year based on the e-mobility plan	Urbanistic Directorate & Transport Directorate
1.3.1 Mjete të detyrueshme për pronarët e tokave në lidhje me rinovimin e ndërtesave	Strict application of energy performance codes	01.01.2024	2	Strict application of energy performance codes related to Minimum Thermal Requirements for new residential buildings	Strict application of energy performance codes related to Minimum Thermal Requirements for new residential buildings by monitoring every year 200 single houses and 10 MABs.	Urbanistic Directorate & Communication Office/Directorate
2.1.1 Standartet e Eficiencës së Energjisë për ndërtesat bashkiake	Training for EE retrofit in Buildings	01.09.2023	2	Capacity building program of EE retrofit, concept of Minimum Thermal Requirements, NZEB (including RES)	Capacity building program of EE retrofit, concept of Minimum Thermal Requirements, NZEB (including RES) has not started yet and it will be carried out by SEMP. Active participating in the training by carrying also simple case studies	Education Directorate & Service Directorate including urbanistic directorate
2.1.1 Standartet e Eficiencës së Energjisë për ndërtesat bashkiake	MEMU training for municipal public buildings management	01.01.2023	2	Municipal Energy Management Unit dealing with municipal public buildings	Trainings on job for MEMU will continue especially for dealing with municipal public buildings energy management, database establishment and establishing short list of buildings to be rehabilitated year by year. Active participating in on job training by carrying also simple case studies directly visiting 2-3 public buildings of the municipality	Service Directorate, MEMU and 2-3 buildings of the municipality
2.1.2 Auditimi fillestar i energjisë, monitorimi i konsumit të energjisë dhe ujit dhe raportimi	Pipeline of EE/RES municipal public buildings	01.09.2023	2	Pipeline of EE/RES municipal public buildings retrofit audits and application at national financing mechanism	Preparing the Pipeline of EE/RES municipal public buildings retrofit audits and application at national financing mechanism based on the concept of Minimum Thermal Requirements, NZEB (including RES). This activity has not started yet and it will be carried out after the training will be finalised	Education Directorate & Service Directorate
2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	Establishment of municipal public buildings Database	01.01.2023	2	Establishment of municipal public buildings Database and Benchmarking Program	MEMU will continue monitoring monthly energy consumption and a establishing short list of buildings to be rehabilitated year by year	Education Directorate & Service Directorate

2.1.3 Koncepti i rinovimit të ndërtesave bashkiake	Obligatory energy audits	01.01.2024	2	Preparing the Pipeline of EE/RES for 4 central public buildings energy audits (every year) discussing with line ministries and application at national financing mechanism based on the concept of Minimum Thermal Requirements, NZEB (including RES). This activity has not started yet and it will be carried out after the training will be finalised.	Regional Education Directorate & Health Directorate. Prepare a training needed for MEMUs and technical staff related to tender documents to understand energy audits, to use them for budget preparation, for DED and securing the finance.	Regional Education Directorate & Health Directorate
2.2.1 Pjesa e burimeve të rinovueshme të energjisë - për ngrohje	Solar Hot Water Program for social and kindergarten facilities	01.01.2023	2	Solar Hot Water Program for social and kindergarten facilities, including storage tank (based on the respective hot water energy demand), control and piping systems.	Installing Solar Hot Water in daily care and kindergarten & elementary schools & dormitories is in process and in order to reach the targets it is important to implement every year 3 buildings starting with those which have the highest specific energy consumption for securing hot water based on kWh/m2 year. Analysis securing Hot Water Concept, Energy Audits, DED-for standard SHWSs, Procurement, Securing Finance for SHWSs for the daily care, kindergarten & schools.	Education Directorate & Service Directorate Environmental Directorate and Financial Directorate
2.2.1 Pjesa e burimeve të rinovueshme të energjisë - për ngrohje	Public building wood boiler	01.01.2023	2	Public building wood boiler (or electrical heaters) replacement by pellet program.	Installing Pellet/Briquette EE Boilers in daily care and kindergartens & elementary schools & dormitories is in process and in order to reach the targets it is important to implement every year 4 buildings starting with those which have the highest specific energy consumption for securing space heating based on kWh/m2 year. Analysis of securing Space heating though central efficient biomass system by preparing the standard Concept, Energy Audits, DED-for standard SHWSs, Procurement, Securing Finance for SHWSs for the daily care, kindergarten & schools.	Service Directorate with Environmental Directorate and Financial Directorate
2.2.2 Pjesa e burimeve të rinovueshme të energjisë - për energji elektrike	Public buildings rooftop solar PV program	01.01.2023	2	Public buildings rooftop solar PV program, PV autoproducer with installed capacity based on the 70-100% of covering the demand and integrated with the distribution network.	Installing PV Autoproducer systems in public buildings is in process and in order to reach the targets it is important to implement every year 8 buildings starting with those which have the highest specific electricity consumption for securing electricity demand based on kWh/m2 year. Analysis possibilities of introducing PV Autoproducer system, DED-for standard PV Systems, Procurement, Securing Finance for EE rehabilitation of the public buildings.	Service Directorate with Environmental Directorate and Financial Directorate
2.2.2 Pjesa e burimeve të rinovueshme të energjisë - për energji elektrike	Up-date of feasibility studies for RE	01.01.2024	2	Up-date of feasibility studies for RE (hydro, solar, wind) and presentation to financiers, investors, donors	Carrying out an Update 5 feasibility studies for RES (hydro, solar, wind) and presentation to financiers, investors, donors within the boundary of the municipality.	Private Investors
2.2.4 Eficenca e energjisë - në energji elektrike	Non-Technical Loss Reduction Program	01.01.2024	2	Non-Technical Loss Reduction Program, enforcement of billing and collection,	Investing in Non-Technical Loss Reduction Program, enforcement of billing and collection is in process and in order to reach the targets it is important to implement every year 500 customers per year starting with those which have the highest electricity non-technical losses within the boundary of the municipality.	OSHEE
2.3.1 Ndrëçimi publik	Replacement of SL service maintenance vehicles	01.01.2024	2	Replacement of SL service maintenance vehicles (2)	Replacement of SL service maintenance vehicles shall be done for 1 vehicle in 2024 and for another 1 on 2025 starting with the one which has the highest specific energy consumption liters/hours of work.	Service & Decoration Directorate
2.3.1 Ndrëçimi publik	Training for EE lighting retrofit	01.01.2024	2	Capacity building program of EE lighting retrofit, advanced technologies and maintenance	MEMU will carry out training of operation and maintenance team for proper operation of EE lighting retrofit, advanced technologies and maintenance of all Street Lighting System and simple ways of data recording by using their smart phone and delivering such data to a responsible expert of MEMU.	Service & Decoration Directorate
2.3.1 Ndrëçimi publik	Training on Energy audits, detail engineering design and tender documents	01.01.2023	2	Energy audits, detail engineering design and tender documents	MEMU will carry out training of engineering team for Energy audits, detailed engineering design and tender documents for evaluation for all Street Lighting System. Active participating in on job training by carrying also simple case studies directly visiting 2 streets and 1 public park of the municipality.	Service & Decoration Directorate
3.1.1 Ngrrohje dhe Ftohje nga Burime të Rinovueshme të Energjisë brenda territorit të Bashkisë	WW sludge separation and biogas unit	01.01.2026	2	WW sludge separation and biogas unit (0,5 MW) at WW treatment plant	WW sludge separation and biogas unit including gas-engine and electricity generator system (0,5 MW) at WW treatment plant to substitute part of the electricity consumption for pumping purposes WWTW for central urban areas.	Regional Water Company
3.2.1 Efiçencë Energjie në sistemin e Furnizimit me Ujë, përfshirë sistemet PV	Solar PV plant at pumping stations	01.01.2024	2	Solar PV plant at pumping stations (with preliminary installed capacity 2.7 MW integrated with distribution network) to substitute part of the electricity consumption for pumping purposes	Solar PV plant at pumping stations (with preliminary installed capacity 2.7 MW (as total) integrated with distribution network) to substitute part of the electricity consumption for pumping purposes for central urban areas and especially for individual water supply systems for villages including the optimisation of water volume of reservoirs.	Regional Water Company

3.2.1 Efiçencë Energjie në sistemin e Furnizimit me Ujë, përfshirë sistemet PV	Improve Performance of sewer	01.01.2025	2	Improve Performance of sewer/ canalization networks, new mainline collectors; replacement of the obsolete networks and establishment of pumping stations, Construction main sewage pipeline to waste water treatment plant (SECO/KfW project component)	Improve Performance of sewer/canalization networks, new mainline collectors; replacement of the obsolete networks and establishment of pumping stations. Construction main sewage pipeline to waste water treatment plant (SECO/KfW project component) is in process and in order to reach the targets it is important to implement every year 10 km of water distribution system starting with those which have the highest waste water losses and the highest specific energy consumption kWh/m3 year.	Regional Water Company
3.2.1 Efiçencë Energjie në sistemin e Furnizimit me Ujë, përfshirë sistemet PV	Solar PV plant at WWTP	01.01.2025	2	Solar PV plant at WWTP (with preliminary installed capacity 1 MW integrated with distribution network) to substitute part of the electricity consumption for pumping purposes WWTW	Solar PV plant at WWTP (with preliminary installed capacity 1 MW integrated with distribution network) to substitute part of the electricity consumption for pumping purposes WWTW for central urban areas.	Regional Water Company
3.2.1 Efiçencë Energjie në sistemin e Furnizimit me Ujë, përfshirë sistemet PV	Extension of WW treatment plant	01.01.2026	2	Extension of WW treatment plant	Extension of WW treatment plant including the waste water distribution system starting with those surrounding villages close to the main/urban WW plant.	Regional Water Company
3.2.2 Efiçencë në përdorimin e ujit.	Support program (all subscribers) Water Efficient Fixtures	01.01.2023	2	Support program (all subscribers) Water Efficient Fixtures and Fittings	Support program (all subscribers): Water Efficient Fixtures and Fittings is in process and in order to reach the targets it is important to implement every year 500-600 subscribers of water distribution system starting with those which have the highest water losses and the highest specific energy consumption kWh/m3 year.	Regional Water Company
3.2.2 Efiçencë në përdorimin e ujit.	Prioritizing Energy Efficient Water Resources	01.01.2024	2	Prioritizing Energy Efficient Water Resources (gravitation flow, reservoirs), feasibility study	Prioritizing Energy Efficient Water Resources (gravitation flow, reservoirs) integrated with the Solar PV plant at pumping stations for central urban areas and especially for individual water supply systems for villages including the optimisation of water volume of reservoirs.	Regional Water Company
3.2.2 Efiçencë në përdorimin e ujit.	Educational Measures for water saving in schools	01.01.2024	2	Educational Measures, water saving	EE rehabilitation of the schools is in process and in order to reach the targets it is important to implement every year 6-7 schools starting with those which have the highest specific energy consumption kWh/m2 year.	Regional Water Company
4.2.1 Cilësia e transportit publik dhe prioriteti i transportit publik	Replacement of urban busses by hybrid or electric buses	01.01.2023	2	Replacement of urban busses by hybrid or electric buses	Replacement of urban buses by hybrid or electric buses and in order to reach the targets it is important to implement every year 4 buses/minibuses starting with those which have the highest specific energy consumption measured in liters/100 km year.	Private Transport Company related to Public Transport and/or Transport Directorate
4.2.1 Cilësia e transportit publik dhe prioriteti i transportit publik	Extension of bus lines	01.01.2023	2	Extension of bus lines and optimisation of city bus lines	Extension of bus lines and optimisation of city bus lines and in order to reach the targets it is important to carry out an e-mobility plan for 3 new lines.	Private Transport Company related to Public Transport and/or Transport Directorate
4.2.1 Cilësia e transportit publik dhe prioriteti i transportit publik	Shuttle-busses/minibuses	01.01.2024	2	Shuttle-busses with clean traction system to touristic sites	Replacement of old minibuses by shuttle-busses/minibuses with clean traction system to remote villages and the touristic sites and in order to reach the targets it is important to implement every year 3 buses/minibuses starting with those which have the highest specific energy consumption liters/100 km year.	Private Transport Company related to Public Transport and/or Transport Directorate
4.2.1 Cilësia e transportit publik dhe prioriteti i transportit publik	Introduction of conditioned public transport	01.01.2024	2	Introduction of conditioned public transport (bus, taxi) licensing , better fuel/ emission performance	MEMU will introduce new regulatory aspects more strict related to conditioned public transport (for selection of 30 buses/mini buses, taxi) licensing , better fuel/emission performance.	Private Transport Company related to Public Transport and/or Transport Directorate
5.2.2 Ngritja e kapaciteteve të brendshme (vetiAKE)	Janitors' Training on Building Energy Management	01.01.2024	2	Building Energy Management Training	MEMU will carry out training for 30 caretakers/ energy managers of buildings for proper operation of all energy systems for central public buildings (every year) owned by line ministries (within their territory) and simple ways of data recording by using their smart phone and delivering such data to a responsible expert of MEMU.	Regional Education Directorate & Health Directorate
6.1.1 Koncepti i komunikimit dhe bashkëpunimit (I brendshëm lidhur me qeverinë qendrore ...)	Prepare Communication Action Plan	01.01.2024	2	Basic Communication Concept, which outlines the approach towards the predefined target groups, including definition of communication channels and tools, budget, KPIs, timelines etc.	The municipal communication concepts should guide the communication departments in the implementation of different communication measures related to the priority areas and in particular with respect to energy efficiency. Content should be closely defined and outlined with MEMU representatives of the respective municipality.	Communication and PR Department

6.2.1 Bashkitë dhe rajonet e tjera, bashkëpunimi kombëtar dhe ndërkombëtar	Establish Exchange of Experience with other SEMP municipalities	01.02.2023	2	stablish Exchange of Experience with other SEMP municipalities is ongoing on the frame of four SEMP municipalities	Every six months four SEMP municipalities are meeting with each other and discussing important areas. These meetings are and will be very important for defining comparative benchmarks for all municipality services and for following good examples to be implemented under their own municipality. Second meeting was in Berat on 15-16 March 2023 dealing with: Energy Management System at the Municipality; Second Performance Approach; MECAP preparation; Selection of all priority measures for MECAP; Selection of measures for PPF; and carrying out supervision and monitoring of EE LED street lighting projects.	
6.3.1 Industritë, bizneset, tregtia dhe ofruesit e shërbimeve	Promotion of Water Demand Restrictions	01.01.2023	2	Promotion of Water Demand Restrictions (e.g. industry, agriculture)	MEMU will carry out water saving awareness program 1) Starting with high schools in order to explain to them simple ways of saving water at school, at home and other environments; 2) chamber of industry; and 3) Farmer irrigation associations;	Regional Water Company
6.3.1 Industritë, bizneset, tregtia dhe ofruesit e shërbimeve	Promotion of Non-Motorized Transport Modes	01.01.2024	2	Promotion of Non-Motorized Transport Modes	MEMU will carry out information/awareness 2 meetings for Promotion of Non-Motorized Transport Modes for 1) High schools; 2) Chamber of industry; 3) Commercial activities.	Urbanistic Directorate & Transport Directorate
6.3.1 Industritë, bizneset, tregtia dhe ofruesit e shërbimeve	Information and support program for Solar Rooftops	01.01.2024	2	Information and support program for Solar Rooftops for industrial and commercial buildings	MEMU will carry out information/awareness raising in 2 meetings for Information and support program for Solar Rooftops for industrial and commercial buildings for 1) Chamber of industry; and 2) Commercial activities.	Communication Office/Directorate
6.3.1 Industritë, bizneset, tregtia dhe ofruesit e shërbimeve	Support Energy Audits Explore Renewables	01.01.2024	2	Support Energy Audits Explore Renewables	Preparing the Pipeline of EE/RES for 150 entities by supporting them for carrying out the Energy Audits for Exploring the RES with focus especially on Pv Autoproducers	Communication Office/Directorate
6.4.2 Popullsia lokale	EE awareness program in schools	01.01.2024	2	EE awareness program in schools	MEMU will carry out EE awareness program in schools especially starting with high schools in order to explain to them simple ways of saving energy at school, at home and at other environments.	Education Directorate & Service Directorate.
6.4.2 Popullsia lokale	Organise Information activities/events (e.g. Municipal Energy Day)	01.03.2023	2	Different type of awareness activities to inform the public on various topics helping to save energy	Information days, hearings, social media stories and much more are meant to raise awareness amongst the population about the possibilities to save energy and the activities of the municipalities to improve the living standards of its citizens. Events could be of different scale and of different intensity	Communication Department
6.5.1 Mbështetje financiare për projektet e shoqërisë civile	Program for boiler change and EE retrofit of residential multi-apartment buildings	01.01.2024	2	Municipal support facility complementing gov. program for boiler change and EE retrofit of residential multi-apartment buildings (promotion; linking contractors, municipality, gov. agency, banks; complementary municipal grant support)	EE rehabilitation of 5 MABs per year by including municipal support facility complementing government program for boiler change and EE retrofit of residential multi-apartment buildings (promotion, linking contractors, municipality, government agency, banks, complementary municipal grant support) starting with those which have the highest specific energy consumption kWh/m ² year.	Urbanistic Directorate & Communication Office/Directorate
6.5.1 Mbështetje financiare për projektet e shoqërisë civile	Promotion and support of advanced efficient heating systems	01.01.2024	2	Promotion and support of advanced efficient heating systems by parallel permission procedure (chimneysweep service) ; combined with information and support (HP, pellet boilers integrated with solar hot water systems), ban inefficient wood	Installation of 100 residential houses per year by promotion and support of advanced efficient heating systems by parallel permission procedure (chimney sweep service); combined with information and support (HP, pellet/briquette boilers integrated with solar hot water systems), ban inefficient wood starting with those which have the highest specific energy consumption kWh/m ² year.	Urbanistic Directorate & Communication Office/Directorate
6.5.1 Mbështetje financiare për projektet e shoqërisë civile	Smart metering program	01.01.2023	2	Smart metering program, enabling 'RE pro-sumer' metering and billing	Investing in Smart metering program, enabling 'RE pro-sumer' metering and billing is in process and in order to reach the targets it is important to implement every year 500 customers per year starting with those which have the highest electricity technical and non-technical losses within the boundary of the municipality.	OSHEE
	Street cleaning/service vehicle fleet replacement	01.01.2025	2	Street cleaning/service vehicle fleet replacement	Street cleaning/service and vehicle fleet replacement are important to implement. Firstly will be substituted those which have the highest specific energy consumption liters/working hours per year	Waste management Company and/or Service Directorate
	Construction of mobility station	01.01.2025	2	Construction of mobility station, linking urban with regional public transport (busses), car and bike sharing	Construction of 2 mobility stations, linking urban with regional public transport (buses), car and bike sharing. Extension of bus lines and optimisation of city bus lines and in order to reach the targets it is important to carry out an e-mobility plan.	Private Transport Company related to Public Transport and/or Transport Directorate
	Promotion of Demand Side Management	01.01.2026	2	Promotion of Demand Side Management	MEMU will carry out information/awareness raising in 2 meetings for Promotion of Demand Side Management for 1) Chamber of industry; and 2) Commercial activities.	Communication Office/Directorate

Annex D Municipal contribution to National Policies and Measures

NECP measures to be included in MECAPs				Already addressed in MECAP (case Berat, 3/23)	
Code	Measure	Type		Measure	Type
G-I2	Establishment of a mechanism for implementation of MMR	Regulatory		Target setting (in line with national targets) for EE, CO2 and RES	Municipal policy & regulation
				Institutionalize Data collection	Training & capacity building & information
G-W1	Emission reduction from waste	Regulatory; Financial		Waste Collection Route Optimization	INVESTMENT
				Waste Vehicle Fleet Maintenance Audits	O&M management & monitoring
				Feasibility Study: Modern waste sorting complex	Investment preparation
				Waste collection licenses	Municipal policy & regulation
				Promote Zero Waste through sorting recycling and composting	Municipal policy & regulation
G-W3	Increase of Wastewater Treatment Plants and their related coverage	Regulatory; Financial		Extension of WW treatment plant	INVESTMENT
				Improve Performance of sewer	INVESTMENT
				Solar PV plant at WWTP	INVESTMENT
				WW sludge separation and biogas unit	INVESTMENT
R-E3	Mechanism of net metering for installations up to 500 kW	Regulatory		Smart metering program	INVESTMENT
				Power consumption monitoring	Training & capacity building & information
R-E6	Demand side management and electricity storage systems for power grid flexibility	Regulatory		Promotion of Demand Side Management	Investment preparation

NECP measures to be included in MECAPs			Already addressed in MECAP (case Berat, 3/23)	
Code	Measure	Type	Measure	Type
R-T1	Electrification of the transport sector	Regulatory	Electric Vehicle Charging Infrastructure	INVESTMENT
			Replacement of urban busses by hybrid or electric buses	INVESTMENT
R-I1	Supporting the deployment of small-scale renewable energy applications in the non-food industrial sector	Investment, Financial; Information; Educational	Public buildings rooftop solar PV program	INVESTMENT
			Up-date of feasibility studies for RE	Investment preparation
			Solar PV plant at landfill site	INVESTMENT
			Create a Solar Map	Investment preparation
			Solar PV for new Autoproducer units Street lighting	INVESTMENT
EE-L1	Implementation of the Minimum Energy Performance Requirements in buildings	Regulatory	Strict application of energy performance codes	Municipal policy & regulation
			Issuing the construction permits for the commercial buildings	Municipal policy & regulation
EE-L2	Long-term renovation strategy (for public and private buildings)	Regulatory; Financial; Information	Obligatory building energy management system	Municipal policy & regulation
			Establishment of municipal public buildings renovation concept	Municipal policy & regulation
			Up-date of municipal public buildings inventory	Training & capacity building & information
			Pipeline of EE/RES municipal public buildings	Investment preparation
EE-L4	Retrofitting of the public building stock (all public buildings except central government buildings)	Investment; Regulatory	Strict application of energy performance codes	Municipal policy & regulation
			Issuing the construction permits for the commercial buildings	Municipal policy & regulation
			Obligatory building energy management system	Municipal policy & regulation

NECP measures to be included in MECAPs				Already addressed in MECAP (case Berat, 3/23)	
Code	Measure	Type		Measure	Type
				EE rehabilitation of the schools	INVESTMENT
				EE rehabilitation of the kindergartens	INVESTMENT
				EE rehabilitation of social buildings	INVESTMENT
EE-L5	Financial support schemes for improving energy efficiency in buildings (private sector)	Financial; Fiscal	↔	Obligatory energy audits	Municipal policy & regulation
EE-S1	Uptake of ESCO models	Regulatory; Financial	↔	EE rehabilitation of the administrative buildings	INVESTMENT
				Solar Hot Water Program for social and kindergarten facilities	INVESTMENT
EE-P1	Energy efficiency measures related to purchasing by public authorities	Regulatory	↔	Procurement Guide for New Street Light Installations	Municipal policy & regulation
EE-P2	Municipalities Energy Efficiency Action Plans, implementation, and reporting	Regulatory, Educational	↔	Develop MECAP	Municipal policy & regulation
				Development of a Spatial heating/cooling plan	Municipal policy & regulation
				Institutionalize Data collection	Training & capacity building & information
EE-E2	Energy management systems for SMEs	Regulatory; Organizational	↔	Issuing the construction permits for the commercial buildings	Municipal policy & regulation
				Information on Support Program for EE in industry, SME	Training & capacity building & information
				Organise Business related Events	Training & capacity building & information
				Information and support program for Solar Rooftops	Training & capacity building & information
				Support Energy Audits Explore Renewables	Training & capacity building & information

NECP measures to be included in MECAPs			Already addressed in MECAP (case Berat, 3/23)	
Code	Measure	Type	Measure	Type
EE-T3	Support mechanisms for EE and clean vehicles	Regulatory; Financial; Fiscal	Construction of mobility station	INVESTMENT
EE-T4	Increasing the share of public transport for passengers and freight (roads, railways and waterways)	Regulatory	Promotion of public transport	Training & capacity building & information
			Promotion of Non-Motorized Transport Modes	Training & capacity building & information
RIC-E1	Improvement of the regional and international collaboration in the scientific research related to the energy sector	Regulatory; Informational; Educational; Financial	Prepare and implement Internal Communication Concept	Training & capacity building & information
			Prepare Communication Action Plan	Training & capacity building & information
			Set-up Inter-municipal Communication Task Force	Municipal policy & regulation
			Establish Exchange of Experience with other SEMP municipalities	Training & capacity building & information



Annex E ESMAP Methodologies

Objectives of municipal Energy Efficiency Transformation are to assist in **building local capacity for developing and implementing transformational energy efficiency investments** in municipal services, infrastructure, and buildings, by:

- (i) assisting to efficiently plan and implement energy efficiency investment programs in municipal sectors;
- (ii) helping identify and **develop bankable municipal energy efficiency projects and facilitating their financing;**
- (iii) facilitating **development of financial mechanisms** for replicating and scaling up piloted municipal energy efficiency investment transactions; and
- (iv) development of planning and implementation capacities.**

The overarching objectives of the MECAP are to reduce energy consumption, increase RES penetration and reduce CO₂, diminish related expenditures from the municipal budget, and improve municipal service delivery for the residents of the municipality. The applied methodology comprises four steps, namely assessment of the energy performance, prioritization of sectors with highest energy potential savings under municipal control, and drafting and implementation of the EE plan (see Figure E-1 below).

Figure E-9-1. Steps for preparing the MECAP



The team conducted interviews with the Municipal Administration, municipal service providers and other relevant stakeholders, in addition to organizing a couple of technical workshops aimed at identifying sector challenges and discussing about the EE investment program and potential delivery mechanisms for the implementation of the plan.

The plan was prepared by using the advanced Tool for Rapid Assessment of City Energy (TRACE), a tool developed by the World Bank through ESMAP, which aims to assess the EE potential of cities, identify sectors with the most improvement potential, and recommend a set of EE measures (including timeline, costs and savings). Features of the adjusted qualitative assessment tool are:

- Throughout inventory of energy consumption of all sectors, aggregated into an energy balance, a GHG emission and the energy cost balance for the baseline year.
- Useful deliverables to generate understanding are:
 - a) an energy flow diagram (Sankey diagram) visualizing the flows of energy types by sector as well as losses for the high-level decision makers;
 - b) a set of aggregated key-performance indicators (KPI) of energy consumption by sector, enabling benchmarking with peer cities (in Albania and the region) and estimation of energy saving potential.

Intervention strategy and types of measures

The EE strategy is based on two types of interventions (i) investments and (i) non-investment measures, both along the intervention strategy of European Energy Award (EEA) areas:



INVESTMENT MEASURES: They comprise a pipeline of direct EE investment projects that can generate physical energy savings with co-benefits in the form of increase of services and comfort at end-users, in addition to reducing O&M costs³¹. The investments should be prioritized based on:

- 5) **Reduction of energy demand and consumption** for end-users,;
- 6) **Reduction of energy losses** for power distribution;
- 7) **Reduction of GHG emissions**, and
- 8) **Use of renewable energy (RES)** sources, whenever these are technically and economically feasible to substitute fossil fuels for end-users and as direct electricity and heat production.

The MECAP comprise a time frame until the year 2040 – target year. The recommended measures are recommended to implement to achieve the EE & RE targets in that time frame from 2024 to 2040, depending on the set priorities and available financial and implementation capacities. Priority 1 measures are recommended to be implemented first to achieve the interim targets of the year 2030.

The key to success will be the *inclusiveness* of the municipal stakeholders in the process to develop and regularly update the MECAP. This will be led by the EEA initiative-based energy management *process*. This provides the basis for (i) sector prioritization of energy efficiency investment interventions and (ii) assessment of impacts of any type of EE measures, compared to the baseline year. Figure 1 presents screenshots of the assessment model, several stages.

Energy efficiency measures were analyzed and recommended, both in qualitative and quantitative terms with the main goal to reach EE/RES/CO₂ targets in line with National Energy and Climate Action Plan. The qualitative evaluation considers implementing environment, such as regulatory, institutional, stakeholder frameworks and capacities. The quantitative evaluation of investment projects was carried out both in terms of energy and cost efficiency of the projects but also in terms of their potential impact to reduce the municipality's energy balance. Baseline year for all collected data is 2021.

Sector analysis uses average cost per energy type in all direct and indirect sectors. Both average consumption rates per unit for each energy type used in a sector and average cost per energy type are subsequently used for economic evaluations of the respective projects in a sector.

Energy cost savings, RES contribution and CO₂eqv reduction as result of reduced energy consumption and penetration of RES technologies are calculated at the average cost of energy over the implementation period 2024 to 2030 or 2040 respectively. The profitability of each recommended measure is expressed as simple Payback Time (PBT) by using the factors of initial costs and annual saved costs. A cash flow analysis can only be prepared after a deeper assessment for selected pilot projects (figure E-3).

³¹ Investments for the extension of urban infrastructure and performance increase of utilities are not listed in the EE plan, since those measures will not have a direct saving effect compare to the baseline energy consumption of the year 2021, they are not an inherent part of the MECAP.

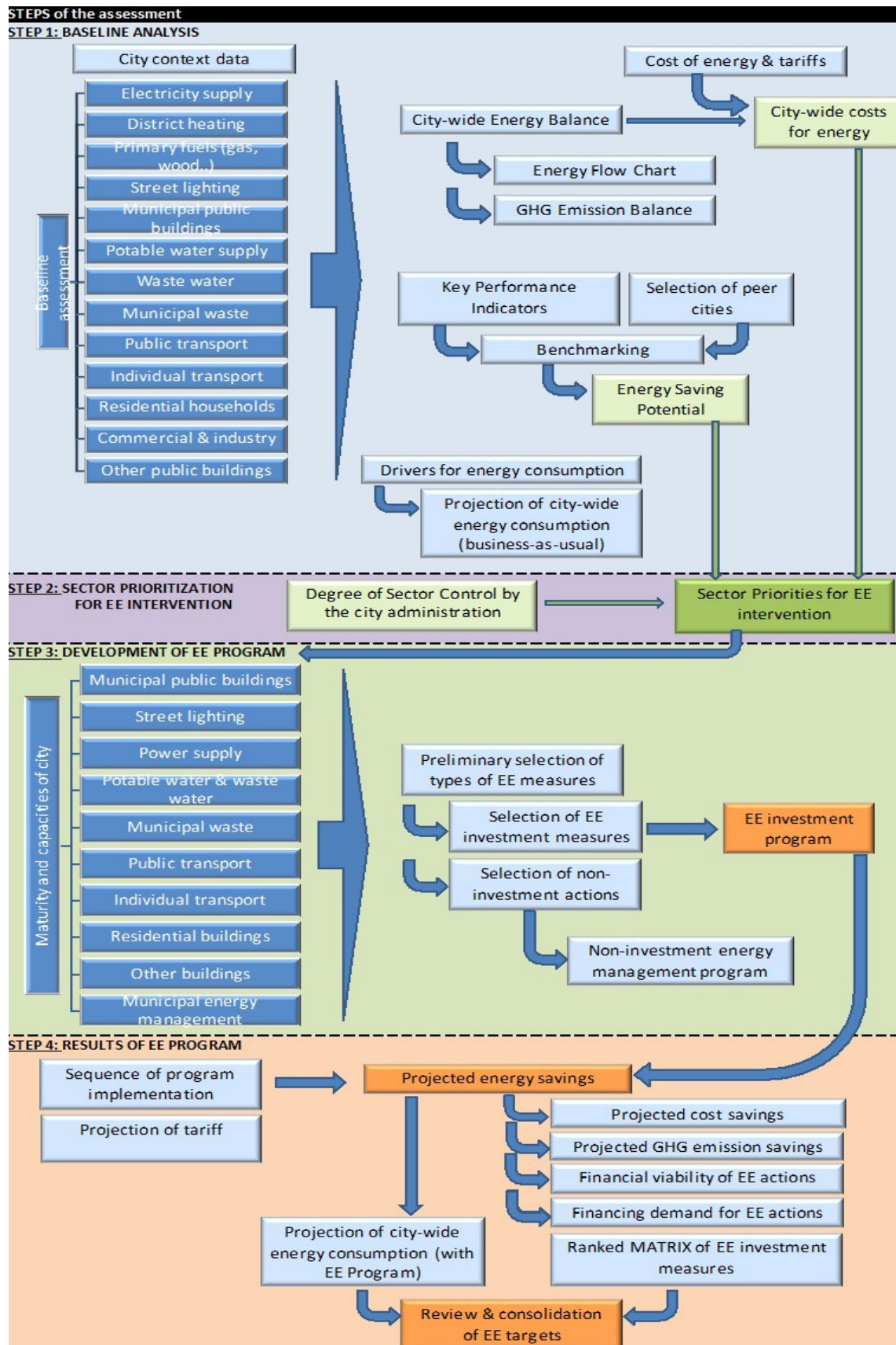


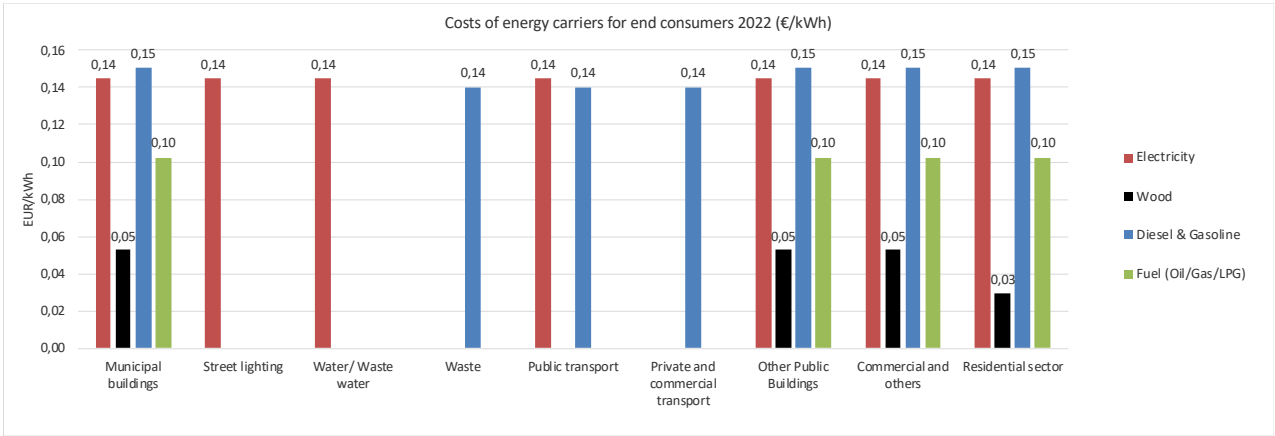
Figure E-3: Structure of quantitative assessment model for MECAP

Energy cost savings as result of reduced energy consumption are calculated at the average cost of energy over the implementation period 2024 to 2030 or 2040 respectively. The profitability of each recommended measure is expressed as simple Payback Time (PBT) by using the factors of initial costs and annual saved costs.

Assumptions on energy prices, tariffs and investment costs

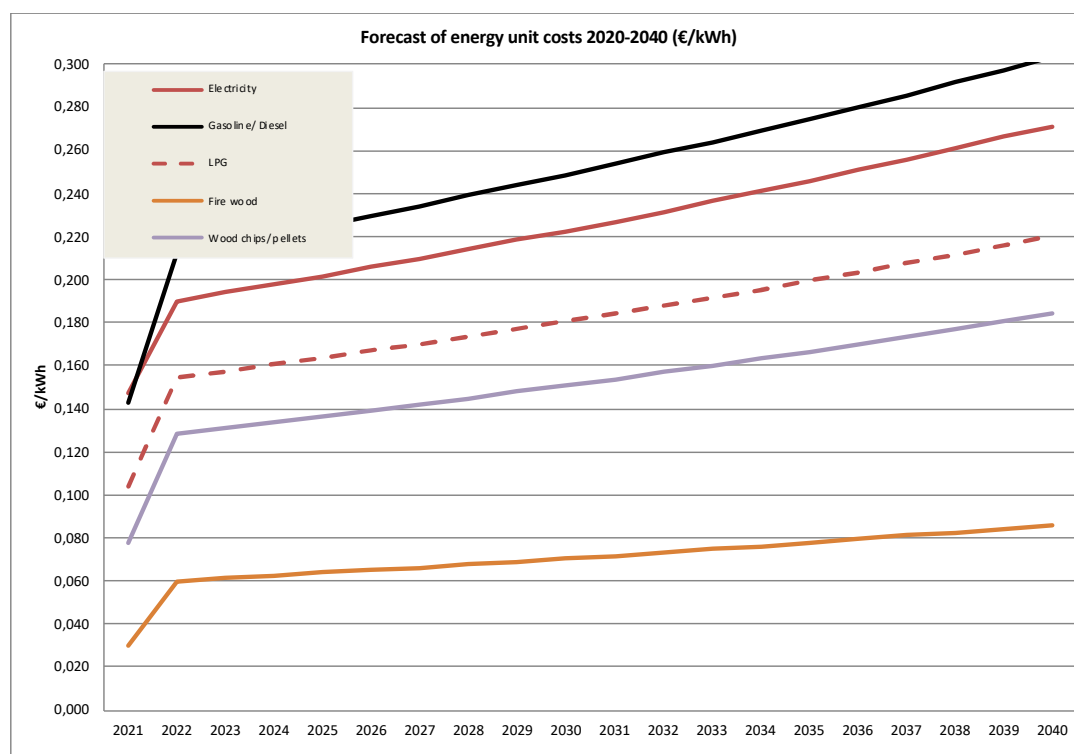
Average energy commodities prices used for carrying out simple financial calculation are indicated in the figure below.

Fig. E-4 Costs of energy carriers for end consumers 2022 (€/kWh)



The average cost of energy has been determined by a scenario considering the escalation of the energy price. It is necessary to apply such forecast to project the financial benefits and overall profitability of investments over the entire program implementation period from 2024 to 2040. The estimated growth patterns of the energy costs are presented as 2% annual.

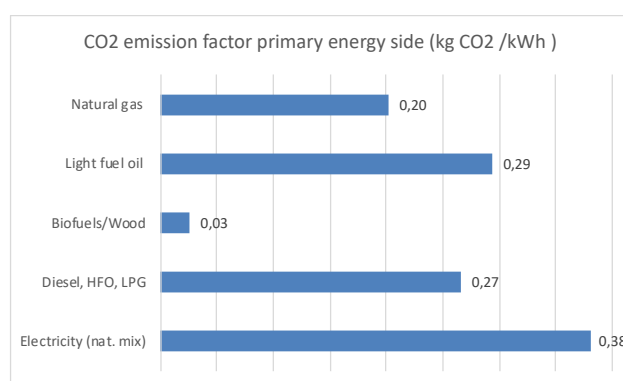
Fig. E-5 Forecast of energy unit costs 2020-2040 (€/kWh)



The following assumptions have been applied for the preliminary assessment of EE recommendations/ EE measures.

- *Investment costs* at the level of 2022 price, including import duties (on demand), installation, using the currency exchange rate as of 2022 (EUR 1 = 116 ALL)
- *Emission factors* for primary energy carriers of the baseline year 2022; the CO₂ emission factor are presented in table below.

Figure E-6: Coefficients of CO₂ emission factor primary energy side (kg CO₂ /kWh)



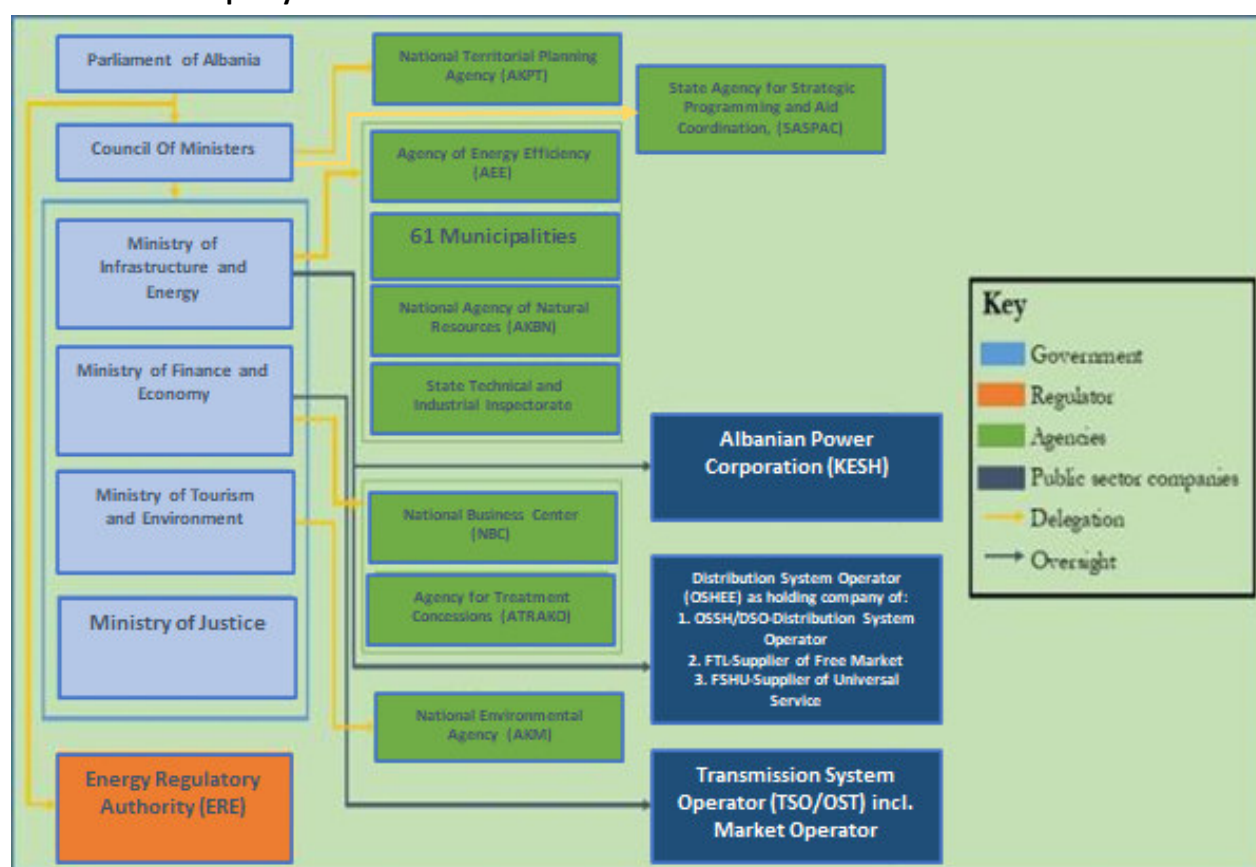
- *The payback time* is preliminarily calculated based on annually saved energy costs. For this purpose, the 20-year average tariff of the respective final energy carrier is used for the period 2022 to 2040. A moderate annual increase of energy costs of 2% was assumed.
- *The implementation period* of the EE measure begins in 2022, with the earliest delivery of EE benefits in 2024. Each EE measure is assumed to be completed by 2040. Energy savings with materialize one year after the investment measure.

Annex F: National energy and GHG situation

Regulatory Framework: The Albanian Government acknowledges the pivotal role of the public sector in formulating appropriate policies through laws and secondary regulations concerning the development of RES. To expedite this progress, the Albanian Government has passed the RES Law, the 1st and 2nd National Action Plans for Renewable Energy Sources (NAPRES), the National Strategy of Energy (NSE), the revised National Determined Contribution (NDC), the NECP, and introduced the Feed-in Tariff Scheme for all RES, as well as the Net Metering Scheme for Auto producers. Both the Albanian government and the international community have cultivated a supportive environment, particularly in specific sectors wherein municipalities also contribute, particularly regarding RES construction permissions.

Stakeholders: Figure 2-2 provides an overview of key institutions within the energy sector and public energy companies that either directly or indirectly engage with energy matters, particularly RES. This encompasses governmental and regulatory entities, which include government bodies, ministries, regulatory authorities, and agencies to whom ministries delegate sector-specific responsibilities for public buildings. Oversight extends from relevant ministries to municipalities, encompassing the issuance of diverse regulations, secondary legislations, and permits for constructing and operating RES systems. Additionally, public sector companies like OST and OSHEE/FTL directly link these RES Independent Power Producers (IPPs) to incorporate their electricity generation and manage their monthly invoices. To achieve the targets, in the near future OSHEE needs to intensify the promotion of PV Auto producer by reducing the time of submitting the connection permissions for all categories of customers (figure 2-2).

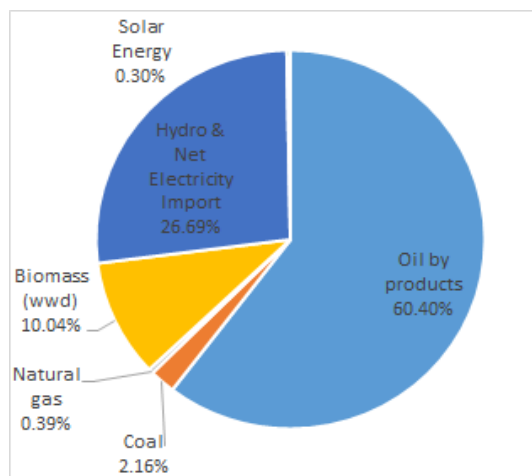
Figure 2-2: Key Energy Sector Institutions and Public Energy Companies at the national and municipality level



Source: Prepared by the SEMP Consultant.

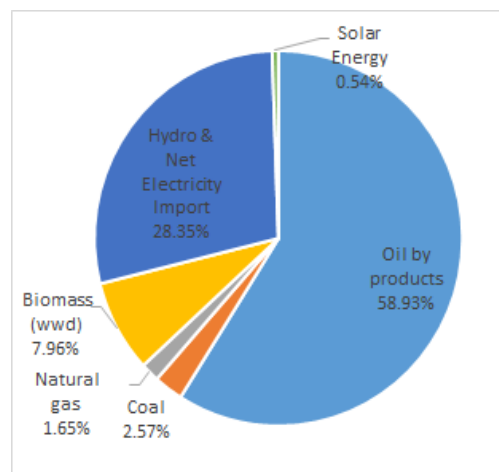
Energy Supply: The dominant sources of primary energy supply in Albania comprise oil by-products, hydroelectric power, net-imported electricity, fuel wood, and a limited quantity of coal and natural gas, as illustrated in Figures 2-3 and 2-4. Over the years, the share of oil by-products in the energy supply has decreased from 60.40% in 2010 to 58.93% in 2021. Conversely, the contribution of hydroelectric power and net-imported electricity has risen from 26.69% in 2010 to 28.53% in 2021. Additionally, the utilization of wood as an energy source has declined from 10.04% in 2010 to 7.96% in 2021.

Figure 2-3: Primary Energy Supply for 2010, %



Source: Yearly Energy Balance, 2010.

Figure 2-4: Primary Energy Supply for 2021 (%)



Source: Yearly Energy Balance, 2021.

Hydro: Historically, electricity generation in Albania has been primarily sourced from hydropower plants, collectively boasting a total installed capacity of 2,355 MW as of the close of 2021. This information is derived from the Yearly Electricity Report furnished by the Energy Regulatory Authority (ERE). While approximately 60% of the country's hydropower potential has been harnessed, there is potential for further hydropower capacity expansion along significant rivers like Drini, Mati, Devolli, and Bistrica.

Solar: The MoE has successfully conducted two auctions concerning solar photovoltaic power plants (PVPPs), achieving impressive outcomes. They managed to secure the lowest electricity price of 24.89 Euro/MWh from both the Karavasta PvPP and Spitalla PvPP, which boast an installed capacity of 150 MW and 100 MW, respectively. Additional auctions for Solar PvPPs with around 300 MW and Wind Power Plants (WPPs) with 228 MW are currently underway.

Biomass: The utilization of biomass energy, primarily sourced from forestry wood, has witnessed a decrease in its contribution from 10.04% in 2010 to 7.96% in 2021. This decline can be attributed to the rigorous forest protection policies implemented by the Albanian Government. Notably, it is essential to highlight that fuel wood remains a significant and reliable heating source for public buildings in every municipality.

GHG Emission: Albania, categorized as a non-Annex 1 country to the UNFCCC, has been systematically compiling data since 1990 to develop an inventory of human-caused emissions from sources and reductions through sinks of GHG released into or absorbed from the atmosphere. This effort is an integral part of the National Communications on Climate Change and is now furthered through the inaugural report, known as Albania's First Biennial Update Report. The estimates for GHG emissions and removals were initially presented in the three Albanian National Communications: The First National Communication (NC1) was

submitted in 2002; the Second National Communication (NC2) in 2009; and the Third National Communication (NC3) in 2016, followed by the Fourth National Communication (NC4) in 2020.

This comprehensive work encompasses the national GHG inventory for the years 2010 to 2019, with an additional revision of the inventory data for the year 2009. The purpose of this revision is to incorporate adjustments resulting from the application of the 2006 IPCC Guidelines. These inventories cover various sectors, including Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), as well as Waste. The scope includes key greenhouse gases such as CO₂, CH₄, N₂O, hydrofluorocarbons (HFCs), and additional gases not accounted for in the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report but covered by the 2006 IPCC Guidelines.

Moreover, the collected data provides an aggregated view of GHG emissions and removals, represented in CO₂ equivalent units. This comprehensive overview is presented within the framework of the table 2-5.

Table Fehler! Nur Hauptdokument-5: Anthropogenic GHG emissions by gas in Albania (Gg CO₂ eq.)

Sector	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CO ₂	7,028	6,773	9,731	10,589	6,678	6,919	7,022	6,939	7,057	7,177	7,299
CH ₄	2,103	2,151	2,190	2,253	2,925	2,381	2,361	2,370	2,396	2,422	2,449
N ₂ O	1,010	1,000	1,037	1,034	1,172	1,089	1,081	1,118	1,129	1,140	1,152
HFCs	NE	NE	NE	0.1	8	16	25	35	36	37	38
Total	10,141	9,924	12,957	13,876	10,782	10,405	10,489	10,461	10,639	10,820	11,004

GHG emissions, stemming from the energy sector, encompass emissions produced from activities like fuel combustion and fugitive emissions connected to the extraction of solid fuels, and the distribution of liquid and gaseous fuels. These emissions are classified into specific categories: Energy Industries, Manufacturing Industries and Construction, Transport, Other sectors (including Commercial/Institutional, Residential, and Agriculture/Forestry/Fishing), and Non-Specified. Furthermore, calculations have been conducted for fugitive emissions originating from the extraction of lignite and from activities linked to oil refining.

An analysis of the data reveals that the category with the most significant emissions across all years is Transport, followed by Manufacturing Industry and Construction, which is closely tied to fuel consumption.

Targets (2030)	Sector contribution	
GHG emission savings (Reduction related to Baseline (equal to WEM): -18.7% (only for Energy Sector); overall-26% reduction taking into consideration all sectors.		
GHG emissions [kt CO2eq] target:	GHG emissions [kt CO2eq] as projected with additional measures for 2030	
	Demand	4833.0
	Transformation	250.8
	Non-Energy (industry, LUCF, Waste)	5139.0
Energy Efficiency (Final Energy Consumption reduction relat. WEM): -8.4%		
Final energy consumption [ktoe] target:	Final energy consumption [ktoe] as projected with additional measures for 2030	
	Residential	348.9
	Services	195.2
	Industry	542.4
	Transport	1003.4

	Agriculture Forestry	110.5
	Fisheries	56.0
	Non energy	70.6
Renewable energy share in final energy demand: 54.4%		
Renewable energy target:	RES shares of final energy demand [Percent] as projected with additional measures for 2030. (Values over 100% are due to electricity exports.)	
	RES- Electricity	178.1 %
	RES-Transport	34.6 %
	RES-Heating & Cooling	16.6 %

Source: NECP (2021)

Annex G: Communication Action Plan 2024-2026

Nr.	Communication Action/Tool	Target groups (TG) concerned	Technical Specifications	Key Performance Indicators (Deliverables)	Monitoring Indicators	Target value	*Cost estimate (EUR)
1. Mass media - media relations							
	Media relations (Press Release and/or Press Conferences)	All target groups	Articles about different issues in different newspapers	Numbers of Press Releases published and/or Numbers of Press Conferences organized	Numbers of Press Releases published / Numbers of participants		0
	Media relations (Press talks / Journalist breakfast)	Journalists, bloggers, multipliers, municipalities (communication dept.)	Not more than 2h events to educate journalists on MECAP and related topics such as on research methods e.g. Also applicable to other multipliers. Can be done online or in presence.	Numbers of media relation events organised	Numbers of articles published / Numbers of journalists/bloggers etc. participating in those events / Electronic Feedback Surveys	2 per year	0
	Radio/podcasts: special programmes, talk shows (Participation of MEMU members)	All target groups	Participation only in case that the municipality does not have to pay for. No advertisement. Participation in talkshows, news etc., if related to EE.	Number of Radio-shows with SEMP related experts and/or mentioning of project	Difficult to monitor impact for the project as data provided by audience measurement might not be reliable and is not publicly accessible		0
	Newspapers: national / regional (Printed/ electronically)	All target groups	Non-paid articles. Should be a result of inviting journalists to gain knowledge on SEMP and related topics.	Numbers of articles published	Numbers of articles published / reposting - republishing of articles / mentionings		0
2. Internet and social media							
	Social media channels (e.g. facebook, Instagram)	All target groups, possibly with different content and focus	Via existing social media channels of the municipality and multipliers such as from Swiss Embassy, pilot municipalities, MoEI and AEE etc.	Number of mentionings /Number of posts and re-posts	Number of followers / Number of mentionings /Number of posts and re-posts		0
3. Publications and promotional material							
	Resulting from SEMP or other energy related activities of the municipality (Power Point Presentations and/or Reports)	Mainly stakeholders on municipal, regional and national level	If possible should be uploaded on municipality and SEMP website	Number of uploads on website	Number of outputs for dissemination created / Number of downloads from website		0
	Posters & Banners	All target groups	For larger events (printed and/or electronic)	Electronic banners produced / Poster produced	Number of promotional items produced/ Number of promotional material disseminated		0
	Exhibition counter for local events	All target groups	Mobile exhibition counter	Exhibition counters produced	Number of occasions/events when exhibition counter is used	1	0
4. Events							
	Organisation and conduction of local awareness raising events	All target groups; depending on type of events; Events for multipliers and/or stakeholder communication	General awareness raising on MECAP - supporting participation and engagement of all stakeholders. Organization of an energy day or energy week to present its commitment towards energy efficiency, use of renewables and climate action. Awarding pioneer efforts from various stakeholder groups. Awareness raising events targeting specific groups, e.g. school teachers on importance of EE. Promotion of subsidy programs	Number of events conducted	Number of attendees / Number of posts (communication related activities) Applying different feedback mechanisms	1	3.000
	Organisation and conduction of local awareness raising events - Promotion of zero waste	Pupils in high schools, chamber of industry and commerce, farmer associations	MEMU will carry out information / awareness meetings for promoting Zero Waste through sorting recycling and composting in 1) high schools; 2) chamber of industry; 3) commerce; and 4) farmer associations.	number of promotion events	number of attendees	1	1.000