

Energy Audit Report, AMF Lubinje e eperme, Prizren

Address

Village Lubinje e eperme, Prizren

Client

PRIZREN MUNICIPALITY

Document date

04/12/2020



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DEFINITIONS AND ACRONYMS

EBRD	European Bank for reconstruction and development
Heating load:	The amount of heating needed to maintain desired temperature in controlled air (e.g., in a structure). Accounts for heat loss through envelope and infiltration, and heat gains by solar and occupants. Does not include distribution system losses.
Heating system load:	The amount of energy needed to meet the heating load. This is calculated as the heating load divided by the system efficiency.
Fuel cost escalation rate:	Or simply escalation rate. Defined as the percentage increase of the cost of fuel or electricity each year. The fuel cost escalation rate can differ independently from the general inflation rate due to subsidies and other market conditions. This rate is an assumed forecast.
Specific consumption:	Specific energy consumption values are the total consumption divided by the total conditioned (heated) area.
Energy Efficiency Measure (ECM):	An energy efficiency measure is a single upgrade or change to the building envelope, mechanical system, or operation. Examples include replacing lighting, insulating walls, or changing the control set point of a thermostatic valve.
Energy Efficiency (EE) project:	An EE project is composed of one or more ECM's. For example, heating plant renovations do not make economic sense unless the building envelope is first upgraded, which reduces the load on the new heating plant.

1. INTRODUCTION

Energy auditing is the process by which an existing building is surveyed, a baseline performance level identified and energy efficiency measures are proposed to reduce energy consumption and reduce greenhouse gas emissions. Additionally, identified measures improve thermal comfort, indoor air quality, and reduce maintenance and operations problems in the building.

This report presents the results of the energy audit performed on the building.



Figure 1 – Building entrance

This report will identify the main energy consumers and provide a detailed analysis of energy usage, the savings that can be made and the cost of achieving these savings. The Energy Audit Report will provide an estimate of savings, costs, and financial performance indicators. The report provides recommendations for energy efficiency measures taking into consideration general economic and financial parameters. These recommendations should be followed by a detailed study to confirm the Assumptions and investigate the actual products on the market. The report should therefore not be used directly in the tendering process as it does not include a detailed specification of materials used or special circumstances which may arise in project implementation.

The audit findings comprise energy related and/or other non-energy related issues, with hazardous materials addressed in an accompanying report.

2. EXECUTIVESUMMARY

2.1. CONTACT DATA AND PROJECT OVERVIEW

Building	AMF, Lubinje e eperme, Prizren
Building owner:	Municipality
Address:	Lubinje e eperme, Prizren
Contact person:	Afrim Bajrami
Phone:	045-261-911
Role in the building:	responsible for ambulance

The Municipality of Prizren has requested assistance from the EBRD in reviewing its existing building stock and developing a prioritised investment programme aimed at renovating municipal buildings by encompassing energy efficiency and renewable energy solutions (“the Project”).

This assignment aims to support the Municipality’s efforts to improve the overall sustainability performance of the city by:

- i. Producing a detailed inventory of public buildings owned by the City, with emphasis on schools and healthcare buildings.
- ii. Providing an estimate of current energy consumption and performance of the identified building stock;
- iii. Providing an estimate of the total energy saving potential of the identified building stock, achievable through energy efficient refurbishment (based on at least two energy performance scenarios for refurbishment);
- iv. Prioritising buildings and investments required for all the scenarios

2.2. SUMMARY OF RESULTS

The energy efficiency measures identified and the specific project scenarios defined are as follows:

- **Scenario 1: Minor retrofit**

- i. Lighting upgrade - Replacement of incandescent light bulb and fluorescent with LED
- ii. Upgrade of heating system.

- **Scenario 2: Medium retrofit**

- i. Envelope upgrade - Roof insulation with rock wool $t=2*8\text{cm}$, replacement of old main entrance Doors with new Aluminum and replacement of windows
- ii. Lighting upgrade - Replacement of incandescent light bulb and fluorescent with LED.
- iii. Heating system upgrade – minor upgrades in heating system.

- **Scenario 3: Major retrofit**

- i. Envelope upgrade - Wall insulation with EPS $t=20\text{cm}$, windows and doors replacement U-value for windows is $0.8\text{ W/m}^2\text{K}$, roof insulation 30cm ,
- ii. Lighting upgrade - Replacement of incandescent light bulb and fluorescent with LED.
- iii. Heating system upgrade - minor upgrades in heating system.
- iv. Solar thermal - Construction of steel platform to support collectors, collectors, water tank and electrical works and connection with existing net for SHW

Scenario	EE measure	Investment (Eur)	Electricity savings kWh/a	Heating energy savings kWh/a	CO2 reduction (kg/a)
I	Lighting upgrade	310.00	634.8	0.0	0.39
	Replacing window mechanism	220.00	0.0	1,157.99	0.0000
	Total Scenario 1	530.00	634.8	1157.99	0.39
II	Envelope Upgrade- Roof insulation and replacing window mechanism	6,297.0	1,080.0	14,533.0	0.66
	Lighting upgrade	310	634.8	0.0	0.39
	Installing new heating system-new internal network, new radiators and new pellet boiler	5,100.0	0.0	6,542.9	0.0
	Total Scenario 2	11,707.0	1,714.8	21,076.0	1.0
III	Lighting upgrade	310	634.8	0.0	0.4
	Envelope Upgrade- Roof insulation and replacing window mechanism	6,297.0	1,080.0	14,533.0	0.7
	Installing new heating system-new internal network, new radiators and new pellet boiler	5,100.0	0.0	6,542.9	0.0
	Solar thermal	7,480.0	5133.3	0	3.1
	Total Scenario 3	19187.044	6848.09	21075.97	4.19

Table 1 - Scenarios with individual measures

A detailed analysis of all the above measures was carried out below summarizes the complete set of scenarios projects.

Scenario	Total annual primary energy consumption	Total annual CO2 emissions	Total annual primary energy consumption	Investment	Simple pay back
	kWh/a	kg/a	EUR	EUR	year
Scenario 1- Minor retrofit	1792.75	0.39	106.36	530.00	5.00
Scenario 2 -Medium retrofit	22790.72	1.05	1148.83	11707.04	10.19
Scenario 3-Major retrofit	27924.06	4.19	1148.83	19187.04	12.30

Table 2 – Scenarios measures

These projects should be implemented together as a whole package including several measures which have no direct impact on efficiency but have been identified as improving the safety or quality of the building.