

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

Enterprise Energy Efficiency - 3E

PILOT PROJECT PROPOSAL No. B3-1

SPORTS HALL IN LIVNO

SITE VISIT REPORT AND PILOT PROJECT PROPOSAL EVALUATION

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Chief of Party**

Sarajevo, August 12, 2011

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1. Pilot Project Proposal Screening Report

I Partners:		
Esco Eco Energija Company and Livno municipality		
II Proposed EE measures after USAID 3E analysis:		
1. Install new biomass boiler (500 kW)		\$115,000
2. Install district heating supply line		\$55,000
3. Replace and repair of windows and replace part of roof covering		\$60,000
4. Install heating substation		\$30,000
5. Repair existing heating and ventilation system		\$40,000
6. Install Monitoring and Verification System		\$10,000
Total cost of proposed EE measures		\$310,000
III Co-funding contributions:		
1. Direct co-funding from partner's own funds;		\$215,000
2. Partner co-financing from borrowed funds;		0
3. Other donors' co-funding:		
4. Provision of works and services (e.g., decommissioning of old equipment, installation of new equipment, design and supervision services, monitoring and verification (M&V));		0
5. Provision of materials and equipment (e.g., piping, wiring, insulation material, control equipment); and		0
6. Partnership with a private sector partner that might contribute any of above.		0
Total confirmed co-funding by partner/donors:		\$215,000
IV Co-funding by USAID 3E:		
Total 3E Project co-funding based on best estimate:		\$95,000
V Compliance with criteria for selection:		
1. Replicability potential and relative ease of implementation;	0 - 12	8
2. Readiness and ability to put in place clear M&V procedures for reporting on post-implementation energy savings;	0 - 12	12
3. Appropriate geographic location, building type and types of technologies so that the total portfolio of 10 pilot projects when implemented demonstrates various EE measures, technologies and practices applied to different building types or EE practices and are located across the country;	0 - 24	22
4. Amount of co-financing for the pilot project that the partner is willing to or able to secure, or the amount of assistance the pilot project can obtain from other donors or private sector;	0 - 24	24
5. For the public sector - willingness to introduce energy management practices into other public buildings that are responsibility of the partner;	0 - 12	12
6. For municipalities - readiness to sign the EU Covenant of Mayors on EE;	0 - 4	4
7. For all – a willingness to support the raising of EE awareness of building users and citizens at large.	0 - 12	12
Total:	100%	94%
VI Environmental Compliance:		
Confirm that the pilot project implementation does not cause any environmental concerns or adverse environmental effects.		Yes

2. Project evaluation summary

2.1 Basic data about the project:

- Project is to reduce thermal losses in the building, use biomass as a heating fuel, and improve thermal comfort
- The year of construction = 1982
- The building is not adequately thermally insulated
- Number of floors = 2
- Heated area = 1,700 m²
- Heated volume = 13,200 m³
- Outside wall area = 596 m²
- Window area = 236 m²
- Roof area = 1,793 m²
- Number of operating days = Official heating season= 214 days
- Heating supplied by a 300 kW fuel oil boiler
- Estimated annual heat energy consumption = 350 MWh¹
- Estimated annual heating cost for the building = 73,000 KM (\$56,000)

2.2 Recommended measures:

1. Install new biomass boiler (500 kW)
2. Install district heating supply line
3. Install heating substation
4. Repair existing heating and ventilation system
5. Replace and repair windows and replace part of roof covering
6. Install Monitoring and Verification System

2.3 Rationale:

1. The Sports hall is currently heated provided by a 300 kW fuel oil boiler located in a boiler room. Sanitary water is heated by the same boiler during heating season and by an electric heater outside of heating season. Because of the very high cost of fuel oil, the heating in the sports hall is often turned off to save money. To reduce costs and use a local energy source, the sports hall should be connected to the existing district heating network based on biomass boilers. The district heating system is owned by the Esco Eco Energija Company (Livno Municipality owns 10% of this company). The currently available boiler capacity is insufficient to supply heat to the sports hall, but the Company is willing finance the purchase and installation of a new boiler to provide the necessary heating capacity.
2. The type of biomass used is waste biomass. The Esco Eco Energija Company collects wood waste from the wood processing industry and has entered into negotiations with competent authorities for the following services:
 - cut and collect branches growing over roads that may impede traffic;
 - collect branches and trees from waterways; and
 - collect branches left in the woods after logging operations.

¹ The calculations for the heat energy consumption and cost for the Sports hall are based on the assumption that the building is adequately heated during the whole heating season.

These activities will create new jobs locally and tap into locally available resources, unused until now.

3. Boilers used in the district heating system are designed and manufactured by a company from Bosnia and Herzegovina and have proved their quality and reliability over the past two years.
4. This example of creating a biomass based district heating system can be followed by other municipalities that are using fuel oil as a main fuel source for public buildings and have biomass locally available. This will further create new jobs and savings and reduce dependence on imported fuel.
5. Waste biomass is considered an environmentally friendly fuel since it is a carbon neutral fuel, which means it neither contributes nor reduces the amount of carbon dioxide emissions. The boiler's advanced design ensures complete combustion, high efficiency and minimal amount of pollutant emissions.
6. To connect the sports hall to the district heating network, a supply line needs to be laid and a heating substation installed. The existing heating system can be improved to provide adequate heating. The radiator system needs minor repairs, and the ventilation system needs a new air heating unit with heat recovery. Ventilation is required by the building code for such buildings, and also the ventilation/air heating system in combination with the existing radiators will help achieve an adequate indoor temperature more quickly.
7. The roof was not properly insulated, but the Municipality already replaced most of the roof covering in the summer of 2011 with new covering of adequate thermal insulation; the same needs to be done with the remainder of the roof. The outside walls are already thermally insulated, made of two rows of bricks with of mineral wool sandwiched in between.
8. The windows are metal framed, single paned and cause large heat loss and need to be replaced. There are also large areas covered with double paned glass panels (kopelit) that can be repaired, but it is not a priority to replace it (Figure 1). If additional funds become available, replacement of kopelit with polycarbonate panels should be considered.
9. One of the goals of the project is to introduce the practice of energy management. In order to manage energy consumption, first it must be monitored. A monitoring and verification system serves to monitor energy consumption and verify projected (calculated) energy savings. Energy consumption, indoor and outside temperatures are monitored and recorded on an hourly basis and sent to a database that enables easy overview and analysis of data. Continuous monitoring will identify cases of excessive energy consumption and allow timely investigation and removal of its causes.

2.4 Benefits:

- Demonstrate practical energy savings, use of renewable energy and improved thermal comfort through new windows, thermal insulation, biomass based district heating, and energy monitoring
- Partnership with one of the first ESCO companies in BiH. Promote the ESCO business concept through a USAID 3E pilot project.
- Promote the application of these measures through achieved energy and financial savings and improved comfort to motivate citizens and governments to save energy and invest in energy efficiency measures
- Motivate local governments to implement such projects

- Stimulate local economy
 - Local companies will implement measures and use the acquired experience to expand their businesses
 - Waste wood collection will create new jobs
- Reduce of usage of fuel oil
- Reduce CO2 emissions
- Improve public health

3. Project Technical Description and Analysis

3.1 Introduction

The Sports Hall in is located near downtown Livno and is the center of town's sports activities (Figure 1). Exhibitions, concerts and other public events with larger audiences are also held in the Sports Hall. It is owned and operated by the Municipality of Livno.

3.2 Site visit report

The Sports Hall was built in the 1982, with thermally insulated roof and outside walls. However, because of improper maintenance, the roof covering needed to be replaced, most of which has been done. The windows are single paned and cause high heat loss. The building has two floors with a total surface area of 1,743 m². The building originally had a radiator heating and an air heating/ventilation system, but only the radiator heating system is working. The hot water is provided by a fuel oil boiler and central storage tank. Insufficient funds are available for heating costs; and as a result, the heating is turned off very often. The previously uninsulated roof and single paned windows, combined with frequent interruptions in heating, resulted in low temperatures in the hall and inadequate thermal comfort. There is no air-conditioning system; but since the hall is barely used in the summer, additional investment in an air-conditioning system is not justified at this time.

The only EE measure implemented to date was replacement of most of the roof covering with new covering with adequate thermal insulation in 2010.





Figure 1 Sports hall in Livno

3.3 Technical and financial analysis

The estimated energy consumption, before and after measures, for the Sports Hall is shown in the following table:

Table 1. Energy consumption

Energy carrier	Unit	Present	After measures	Savings
Fuel Oil	MWh	350	250	100

The reduction of CO₂ emissions achieved by implementation of the measures is 120-130 tons per year, since the heating will be provided by a carbon neutral fuel – waste biomass.

Besides reducing energy consumption in the Sports Hall, additional financial savings will be achieved by connecting to the biomass-based district heating network, since the price for energy is lower. The cost of district heating is negotiated between the Municipality of Livno and the Esco Eco Energija Company, and for the heating season of 2010/11 it cost 98.2 KM/MWh. The current cost of fuel oil is approximately 160 KM/MWh, and the efficiency of the fuel oil boiler is assumed to be 75% on average.

The cost for the measures and the payback period is shown in the following table. It is assumed that the price per MWh remains the same.

Table 2. Preliminary cost and benefit analysis for recommended measures

Measures	Investment [\$]	Annual Savings Est [\$]	Simple payback period [year]
Connect to biomass based district heating system; Replacement of windows and thermal insulation of façade; Installation of heating substation and ventilation system; Installation of Monitoring and Verification System	310,000	37,000	8,4

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LETTER FROM THE MAYOR OF LIVNO AND ESCO ECO ENERGIJA
COMPANY