

**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT**

**Enterprise Energy Efficiency - 3E**

***PILOT PROJECT PROPOSAL No. B1-3***  
***ELEMENTARY SCHOOL “PAZAR” IN TUZLA***

**SITE VISIT REPORT AND PILOT PROJECT PROPOSAL EVALUATION**

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**Chief of Party**

Sarajevo, April 29, 2011

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# 1. Pilot Project Proposal Screening Report

<b>I Partners:</b>	
Tuzla municipality and Cantonal Ministry of Education	

<b>II Proposed EE measures after USAID 3E analysis:</b>	
1. Installation of heating substation (150 kW)	\$12,000
2. Replacement of windows	\$80,000
3. Installation of thermostatic valves	\$3,000
4. Monitoring and Verification System	\$11,000
<b>Total cost of proposed EE measures</b>	<b>\$106,000</b>

<b>III Co-funding contributions:</b>	
1. Direct co-funding from partner's own funds;	\$43,000
2. Partner co-financing from borrowed funds;	0
3. Other donors' co-funding:	0
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
<b>Total confirmed co-funding by partner/donors:</b>	<b>\$43,000</b>

<b>IV Co-funding by USAID 3E:</b>	
<b>Total 3E Project co-funding based on best estimate:</b>	<b>\$63,000</b>

<b>V Compliance with criteria for selection:</b>		
1. Replicability potential and relative ease of implementation;	0 - 12	12
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	18
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	22
5. For the public sector - willingness to introduce energy management practices into other public buildings that are responsibility of the partner;	0 - 12	10
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
<b>Total:</b>	<b>100%</b>	<b>90%</b>

<b>VI Environmental Compliance:</b>	
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 and heating substation
- The year of construction = 1937
- The building is not thermally insulated
- Number of floors = 2 + basement
- Heated area = 2624 m<sup>2</sup>
- Top floor ceiling area = 877 m<sup>2</sup>
- Heated volume = 5572 m<sup>3</sup>
- Outside wall area = 1324 m<sup>2</sup>
- Window area = 385 m<sup>2</sup>
- Number of students = 600
- Number of operating days = = 150-180 days
- Heating supplied by a heating substation of the district heating network
- Estimated heat energy consumption = 200 MWh (130 kWh/m<sup>2</sup> annually)
- Heating is charged per area 1,4KM/m<sup>2</sup> + PDV=1.64KM (\$1.17/m<sup>2</sup>) monthly for 6 months
- Total annual energy cost for the building = 26,000 KM (\$18,500)

### 2.2 Recommended measures:

1. Installation of heating substation (150 kW)
2. Replacement of windows
3. Installation of thermostatic valves

### 2.3 Rationale:

1. Three quarters of the school windows are the original windows from 1937, and in 2010 one quarter of windows was replaced by double glazed PVC framed windows. The original windows haven't been painted regularly and are in very poor condition. Some of them had to be nailed shut to prevent them from falling down. They cause a very large heat loss, but more importantly, they represent a safety hazard and must be replaced.
2. A heat meter is already installed but the energy consumption data are not available. The energy consumption for the 2010/11 heating season should be recorded.
3. A heating substation of the city's district network, located in the school basement, is supplying this school with heat. This heating substation has outdated equipment and no water supply temperature control and is thus inefficient. The heating capacity needed for the building will be approximately 150 kW and a compact, high efficiency can be installed in the same room in the basement.
4. Thermostatic valves should be installed on all radiators in the building; and in conjunction with heating substation's automatic regulation of water supply temperature, significant energy savings and optimal thermal comfort can be achieved.
5. According to the Mayor's assistant Mr. Kemal Kurevic, the heating is charged on a monthly basis by square meter 1,4KM/m<sup>2</sup> +PDV=1.64KM (\$1.17/m<sup>2</sup>) for 6 months per

year and is sufficient for the publicly owned district heating company to cover its cost and invest in equipment. This price seems too low to allow enough profit for to invest in maintaining and upgrading the district heating system. One explanation could be that the heat is supplied by the Thermal Power Plant Tuzla, which is also a publicly owned company. Five hundred of 750 heating substations have been replaced with new efficient substations with heat meters. The City would like to replace all substations and introduce a system of payment for actual heat consumption.

6. A co-funding percentage by the City and the Cantonal Ministry of Education has not been specified in the application, and at this point it must be assumed to be zero until new information is supplied. The City submitted 3 proposals and indicated that the proposal for its Administrative building has the lowest priority from the City's point of view, which lowered the points for criterion 5 (Willingness to introduce energy management practices into other public buildings that are responsibility of the partner).

## **2.4 Benefits:**

- Practical demonstration of energy savings and improved thermal comfort through new windows and energy efficient heating substations
- Pave the way for introducing the practice of paying for actual energy consumed, which will motivate citizens to save energy and invest in energy efficiency measures
- Increase public awareness of benefits of energy efficiency measures to support the practice of paying for actual energy consumed
- Motivate local governments to financially support such projects
- Stimulate local economy – if the practice of paying for actual energy consumed is introduced, local companies will install thermal insulation, windows, repair roofs
- Reduction of usage of coal used in the Thermal Power Plant Tuzla which supplies the district heating network with heat
- Reduction of CO<sub>2</sub> emissions
- Public health improvement

### 3. Project Technical Description and Analysis

#### 3.1 Introduction

The city of Tuzla is interested in reducing energy consumption and signed the Covenant of Mayors. In achieving the targeted reduction in overall energy consumption, reduction in the building sector plays a crucial role. Most buildings including schools, commercial and apartment buildings are connected to the district heating network. A large number of the buildings have very large specific energy consumption; and to motivate citizens to save energy and invest in energy efficiency measures, the practice of paying for actual energy consumed needs to be introduced.

#### 3.2 Site visit report

The school was built in 1939 and is located in the downtown area of Tuzla. It has two floors and a basement (Figure 1). The entrance of the building is facing south-west. Its walls are made of solid brick are not thermally insulated. The windows in classrooms are of the type where two identical windows are located in one opening in the façade, separated by a 10 cm wide plank (

Figure 2). In the hallways the windows are single glazed. Both types cause high heat losses and need to be replaced (

Figure 2).

The only EE measure implemented so far is the replacement of about one quarter of all windows (Figure 3). The rest of the windows are in such deteriorated state that a stronger gust of wind may cause them to fall down and they must be replaced for safety reasons, not only EE reasons (

Figure 2). The top floor is also un-insulated, which leads to higher heat loss on that floor. The heating substation is not thermally insulated, uses antiquated equipment, has no automatic regulation and is therefore energy inefficient. There is a heat meter, but the data is not available (Figure 4).



Figure 1. Entrance (south-west side) of the Elementary school “Pazar” in Tuzla



Figure 2. Original windows of the Elementary school “Pazar” in Tuzla



Figure 3. New windows of the Elementary school “Pazar” in Tuzla



Figure 4. Heat meter in the heating substation

### 3.3 Technical and financial analysis

The estimated energy consumptions, before and after measures, for this building are shown in the following table:

**Table 1. Energy consumption**

Energy carrier	Unit	Present	After measures	Savings
District heating	MWh	200	100	100

The reduction of CO2 emissions achieved by implementation of the measures is 40-50 tons per year.

The cost for the measures and the payback period is shown in the following table. It is assumed that the price per kWh remains the same and the payment for actual energy consumed is introduced.

**Table 2. Preliminary cost and benefit analysis for recommended measures**

Measures	Investment [\$]	Annual Savings Est [\$]	Simple payback period [year]
Facade, top floor, heat. substation	186,000	9,250	20.1

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