UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

Enterprise Energy Efficiency - 3E

PILOT PROJECT PROPOSAL No. B2-4

KINDERGARTEN "LEPA RADIC" IN GRADIŠKA

SITE VISIT REPORT AND PILOT PROJECT PROPOSAL EVALUATION

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Chief of Party

Sarajevo, July 25, 2011

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1. Pilot Project Proposal Screening Report

I Partners:
UNDP and Gradiska municipality

II Proposed EE measures after USAID 3E analysis:	
1. Thermal insulation of the outside walls and top floor ceiling and replacement of roof covering containing asbestos (salonit)	$130,000
2. Replacement of windows	$40,000
3. Overhaul of the heating system	$9,000
4. Installation of heating automatic control and thermostatic valves	$5,000
5. Installation of solar thermal collectors for domestic hot water	$35,000
6. Monitoring and Verification System	$11,000
Total cost of proposed EE measures	**$230,000**

III Co-funding contributions:	
1. Direct co-funding from partner's own funds;	
Gradiska municipality	$77,000
2. Partner co-financing from borrowed funds;	0
3. Other donors` co-funding:	
UNDP	$76,500
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:	**$153,500**

IV Co-funding by USAID 3E:	
Total 3E Project co-funding based on best estimate:	**$76,500**

V Compliance with criteria for selection:		
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	20
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	20
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%**	**92%**

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 and improve efficiency of heating system
- The year of construction = 1973, addition to the building in 1978
- The building is not thermally insulated
- Number of floors = 1
- Heated area = 827m^2
- Heated volume = 2,812 m^3
- Outside wall area = 756 m^2
- Window area = 260 m^2
- Top floor ceiling area = 827 m^2
- Number of children and staff = 184
- Number of operating days = Official heating season= 198 days
- Heating supplied by a single 200 kW wood/coal fired boiler
- Estimated annual heat energy consumption = 150 m^3 of firewood and 10 tons of coal (250 MWh)
- Estimated annual heating cost for the building = 15,000KM ($11,500)
- Annual electricity consumption = 52 MWh
- Annual electricity cost for the building = 6,500KM ($5,000)

2.2 Recommended measures:

1. Thermal insulation of the outside walls and top floor ceiling and replacement of roof covering containing asbestos (salonit)
2. Replacement of windows
3. Overhaul of the heating system
4. Installation of automatic control of heating outlet water temperature and thermostatic valves
5. Installation of solar thermal collectors for domestic hot water
6. Installation of a Monitoring and Verification System

2.3 Rationale:

1. The façade walls are only 25 cm thick are not insulated and neither are the roof or the top celling slab. This creates a very large heat loss (much higher than allowed by today's construction code). This measure also has a short payback period.
2. More than three quarters of the school windows are the original windows from 1975, and in 2010 less than one quarter of windows was replaced by double glazed wood framed windows. The original windows haven't been painted regularly and are in very poor condition. They allow outside air and dust to infiltrate the building and also are a poor barrier to outside noise.
3. The heating system does not function properly as radiators in part of the building are very cold. An additional pump was added as an attempt to resolve the problem but it was unsuccessful. It is necessary to thoroughly inspect all parts of the heating system and

perform necessary actions, such as washing out the system, replacement of valves and inspection of pumps. The existing boiler is in a good condition and relatively new (built in 2003) and has sufficient capacity (200kW) and does not need to be replaced, just an overhaul is recommended. It can be fueled with firewood, coal and pellets which allows for flexibility in the choice of an energy source according to market conditions.

4. Currently, the heating system water output and return temperatures are not automatically adjusted according to outside temperature which is needed for efficient operation of the heating system. Thermostatic valves should be installed on all radiators in the building which will result in additional energy savings and improved thermal comfort.
5. To reduce electricity costs for domestic hot water, solar collectors should be installed. Not only is it expensive to use electricity to heat water it is also technically not justified. A local heat source should be used whenever possible, such as hot water from the heating system or the available solar energy. Solar thermal collectors are selected in order to demonstrate usage of another renewable energy source in the same building. The hot water tank will have electric heaters as a backup heat source. A hot water distribution system to all necessary locations in the building will be built.
6. One of the goals of the project is to introduce the practice of energy management. In order to manage energy consumption it must monitored first. A monitoring and verification system serves to monitor energy consumption and to verify projected (calculated) energy savings are being accomplished. Energy consumption, indoor and outdoor temperatures are monitored and recorded on an hourly basis and sent to a database which 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.
7. USAID 3E is cooperating with another international donor in the area of energy efficiency.

2.4 Benefits:

- Practical demonstration of energy savings, usage of renewable energy and improved thermal comfort through new windows, thermal insulation, solar water heating, overhauled heating system and energy consumption monitoring
- 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 responsible for financing kindergartens to financially support such projects
- Stimulate local economy – local companies will implement measures and use the acquired experience to expand their business
- Reduction of usage of firewood and coal
- Reduction of emissions
- Public health improvement

3. Project Technical Description and Analysis

3.1 Introduction

The "Lepa Radic" kindergarten is the largest kindergarten in Gradiska. It consists of three buildings, the building which is the subject of this proposal is the largest one. The building is owned by the Gradiska municipality, and its purpose is caring for pre-school children. The business hours are from 06:30 to 16:30. The number of employees is 28, who care for 156 children. The Gradiska municipality is interested in reducing extremely high energy consumption and improving thermal comfort in this kindergarten which will serve as an example for other kindergartens.

3.2 Site visit report

The kindergarten was built in 1973, and partial renovation took place in the period between 1975 and 1978 including construction of an addition to the building. The building has one floor with the surface area of 827m^2. The roof and façade are not insulated and most of the windows are in poor condition causing large heat loss. The heating system consists of a wood/coal fuel boiler and radiators (Figure 4). The heating system does not function properly as radiators in part of the building are very cold. The heating system is probably clogged and some parts are not functioning properly. The kindergarten reported an annual consumption of 206 m^3 of firewood and 11 tons of coal (365 MWh) which seems excessive for the building of this size even with such thermal characteristics. USAID 3E staff estimated that a more realistic value is 250 MWh which was used in this report.

The only EE measure implemented so far is the replacement of about one fifth of all windows in 2010 by double glazed wood framed windows (Figure 2). The rest of the windows haven't been properly maintained and are in poor condition (Figure 3).

Figure 1. Front side of the kindergarten "Lepa Radic" in Gradiska

Figure 2. New windows of the kindergarten "Lepa Radic" in Gradiska

Figure 3 Old windows of the kindergarten "Lepa Radic" in Gradiska

Figure 4 Boiler room of the kindergarten "Lepa Radic" in Gradiska

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
Firewood	MWh	250	85	165
Electricity	MWh	52	32	20

The reduction of CO2 emissions achieved through reduction of electricity consumption is 11-13 tons per year assuming half of the electricity is produced in coal fired thermal power plants (2010 Annual report of the State Electricity Regulatory Commission – SERC).

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.

Table 2. Preliminary cost and benefit analysis for recommended measures

Measures	Investment [$]	Annual Savings Est [$]	Simple payback period [year]
Thermal insulation of the outside walls and top floor ceiling and replacement of roof; Replacement of windows; Overhaul of the heating system; and Installation of heating automatic control and thermostatic valves	195,000	7,500	26
Installation of solar thermal collectors for domestic hot water	35,000	2,000	17.5

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LETTER FROM THE KINDERGARTEN DIRECTOR