

Efficient Energy use in preschool “VARPELIS” Utena city, Lithuania

SC “Energy Agency” department “Energy Efficiency Centre”, Lithuania

Summary

The main aspects of the project were in the year of 1998 to fulfil Energy Audit of preschool “VARPELIS” in Utena city, Republic of Lithuania; in the years of 1999–2001, according to results and proposals of Energy Audit analysis there was accomplished partial preschool’s building renovation and full renovation of heating system; after building renovation in 2002 there was carried out an Energy Monitoring in order to measure and compare energy consumption, climate conditions before and after renovation of preschool’s building. In summary the implemented projects has given an effect to satisfy Energy Audit recommendations by fostering and teaching kindergartners as well, as municipality administrative employees of rational and efficient energy use in public houses.

Recommendations of the projects could be identified as it may be of service to implement Energy Audit projects in public, industry or private buildings to ensure the energy efficiency, energy conservation and acceptable payback time of the projects.

The energy audit was financed from state budget. Renovation of the preschool’s building financed from municipality budget and the energy monitoring was financed from state budget.

End-user area	Target Audience	Technical
<input type="checkbox"/> New buildings	<input type="checkbox"/> Citizens	<input type="checkbox"/> Energy efficiency
<input checked="" type="checkbox"/> Refurbishment of buildings	<input type="checkbox"/> Households	<input checked="" type="checkbox"/> Heating
<input type="checkbox"/> Transport and mobility	<input type="checkbox"/> Property owners	<input type="checkbox"/> Cooling
<input type="checkbox"/> Financial instruments	<input checked="" type="checkbox"/> Schools and universities	<input type="checkbox"/> Appliances
<input type="checkbox"/> Industry	<input type="checkbox"/> Decision makers	<input type="checkbox"/> Lighting
<input type="checkbox"/> Legal initiatives (municipal regulations, directives, etc)	<input type="checkbox"/> Local and regional authorities	<input type="checkbox"/> CHP
<input type="checkbox"/> Planning issues	<input type="checkbox"/> Transport companies	<input type="checkbox"/> District Heating
<input type="checkbox"/> Sustainable communities	<input type="checkbox"/> Utilities	<input type="checkbox"/> Solar energy
<input type="checkbox"/> User behaviour	<input type="checkbox"/> ESCOs	<input type="checkbox"/> Biomass
<input type="checkbox"/> Education	<input type="checkbox"/> Architects and engineers	<input type="checkbox"/> Wind
<input type="checkbox"/> Other	<input type="checkbox"/> Financial institutions	<input type="checkbox"/> Geothermal
	<input type="checkbox"/> Other	<input type="checkbox"/> Hydro power
		<input type="checkbox"/> Other

Context

The Socio-economic reasons for the project to be carried out was that costliness of fuel for heat energy productions and municipality deficit budget stipulated inefficient comfort conditions in preschool. According to [National Energy Strategy of Lithuanian Republic](#) and based on energy conservation, rational and efficient energy use in 1998 there has been carried out an Energy Audit analysis and Energy Monitoring projects in preschool “VARPELIS“. Preschool was selected as exceptional attendance building, where

energy consumption could be reduced and comfort conditions of children and handicapped children (children with disabilities) being in preschool could be improved.

Before renovation there was overheat energy losses through the walls, the windows, doors, roof and 1st stage ceiling of the preschool building. The building had inefficient heating system and hot water preparation, main equipments of heating system were morally old, isolation of socle was in disrepair, the ventilation of premises was insufficient. The preschool’s building conditions were the technical reasons for the project.

The location was in Utena City, Republic of Lithuania. Mean temperature during heating season is 0,1 °C. Heating season for normal year start in 09-24 and continue till 05-03. It last around 221 days containing 3956 degree days.

Objectives

The main aim of the energy audit was to reduce energy consumption and to improve comfort conditions by implementing renovation of building and heating system.

Process

The main aspects of the project were in the year of 1998 to fulfil Energy Audit of preschool “VARPELIS” in Utena city, Republic of Lithuania. The energy audit started in 1997 and was completed in 1998. In the years of 1999–2001, according to results and proposals of Energy Audit analysis there was accomplished partial preschool’s building renovation and full renovation of heating system. After building renovation in there was carried out an Energy Monitoring in order to measure and compare energy consumption, climate conditions before and after renovation of preschool’s building. The energy monitoring started in 2002 and completed in 2002.

Technology means and characteristics

Means	Isolation means	U – value (after renovation) W/m ² K	Standard U – value W/m ² K
Windows and doors	Plastic frames with window package pasted with selective skin	1,300	2,011
Walls (facade side)	Plastered rock wool panels “PAROC RAL-4”	0,255	0,317
Walls (end side)	Rock wool panels “PAROC IL” covered with tin	0,298	0,317
1 st stage ceiling	Rock wool panels “PAROC IL”	0,323	0,317

In the “Standard U-value” column located values are standards that should be met by new and renovated buildings. The auditors should project U values under or equal to standard values, but there is always exceptions considering the amount of budget for renovation.

Financial resources and partners

Total investments were 438.014,00 LTL, the exchange rate in 2002-11-04 was 1 EUR = 3,4528 LTL. The energy audit was financed from state budget. Renovation of the preschool's building financed from municipality budget and the energy monitoring was financed from state budget.

Results

Table 1. Renovation of heating system, walls, windows, doors and roof reconstructing it to curb roof.

Energy saved	Total heat energy saved – 123,4 MWh/year*
Energy produced by renewables	–
Economic benefits	Savings per year – 5.182,17 EUR
Environmental benefits	reduction around 35,3 t of CO ₂
Jobs created	–
Behavioral changes achieved	–

*NOTE. Heat energy savings counted for normal year period.

Energy saving results of the projects are shown in the table below.

Table 2. Heat losses and savings counted before and after building renovation for normal year period.

Means	Heat losses				Savings after renovation	
	Before renovation		After renovation			
	MWh/year	kWh/m ² fl	MWh/year	kWh/m ² fl	MWh/year	%
Windows and doors	223,02	148,15	173,98	113,62	49,04	22,0
Walls	76,82	51,04	18,69	12,42	58,13	75,7
Roof	28,42	18,88	18,99	12,62	9,43	33,2
1 st stage ceiling	74,52	49,51	67,75	45,02	6,77	9,1
TOTAL	402,8	267,64	279,4	185,65	123,4	30,6

NOTE. "m²fl" – per square meter of premises floor.

Lessons learned and repeatability

The positive aspects of project implementation were the close co-operation with municipality representatives involved in energy conservation and efficient use sector. After preschool renovation was shown an object-lessons for kindergartners, municipality representatives about rational and efficient energy use in buildings and daily life by implementing one or another instruments.

Problems encountered and how overcome:

- every heating season before renovation of building, windows were insulated and air supplying to the premises was insufficient;
- there are not engineered mechanical ventilation system;
- heat losses were over norms.

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