

4.17 Annex 17 - Baseline Report

Municipality: Plovdiv
 Building code:
 Building: Medical University, Plovdiv
 Clinic of Microbiology
 Address: Bld. "Vasil Aprilov" 15A, Plovdiv
 Total floor area, m²: 1 587



Expected results	Value
Energy saved, MWh/year	115.52
Energy saved, €/year	4 510
CO ₂ emissions saved, tco ₂ /year	22.16
CAPEX, €	47 099
Simple payback period ¹ , year	10.44

¹ Simple payback including cost price of materials, labor, mechanization, profit and not including cost of finance.

4.17.1. Current status of the building

Infrastructure	Description
Commissioned	1977 year
Building structure	Solid reinforced concrete structure with three overground floors. On the first floor are situated administration, three classrooms and bathrooms; on the second are the Department of Clinical Microbiology and Immunology and the Department of Virology Diagnostics; on the third are administration and three classrooms
Facade walls	Masonry with hollow brick, inside plastered, outside insulated with extruded polystyrene.
Roof structures	Reinforced concrete structure with attic space, covered with waterproofing, inside insulated with rockwool.
Basement structures	Floor on the ground
Joinery	Old double glazed PVC joinery with $U \leq 2.20$ W/m ² K (~ 38%) New double glazed PVC joinery with $U \leq 1.70$ W/m ² K (~ 59%) Aluminium profile (with thermal break) double glazed joinery with $U \leq 2.00$ W/m ² K (~ 3%)
Heating	Individual substation for heating, connected to power station of water vapour. Bad condition of the pipe-line system - insulaton partially torn, leakage. Two-pipe system line and forsed circulation. Radiators of cast iron, not fully functioning. There is no heat armature for regulation.
Domestic hot water	The DHW system works with an 2.5 m ³ external boiler, heated up by power station of water vapour. Thermal isolation with torn places.
Electric appliances and lighting	Appliances, affecting and non-affecting the heating; Lighting with luminescent lamps and incandescent lamps.
Air conditioning and ventilation	There is no ventilating system. Few rooms conditioned by individual air-conditioners, split system.
Operational hours	Residents: 9 hours a day, 5 days a week, excluding holidays Heating: 24 hours a day, 7 days a week, including holidays

4.17.2. Current energy consumption

Energy	Heating			Electricity		DHW		Total	
	Year	Gcal/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year	MWh/year
2012	246.29	286.44	17 069	40.50	3 180	3.56	212	330.50	20 462
2013 ¹	124.20	144.44	8 283	38.40	3 681	3.56	204	186.40	12 169
2014	9.84	11.44	624	34.50	3 170	3.56	194	49.50	3 988
Average	126.78	147.44	8 659	37.80	3 344	3.56	203	188.80	12 206

¹ Reference year

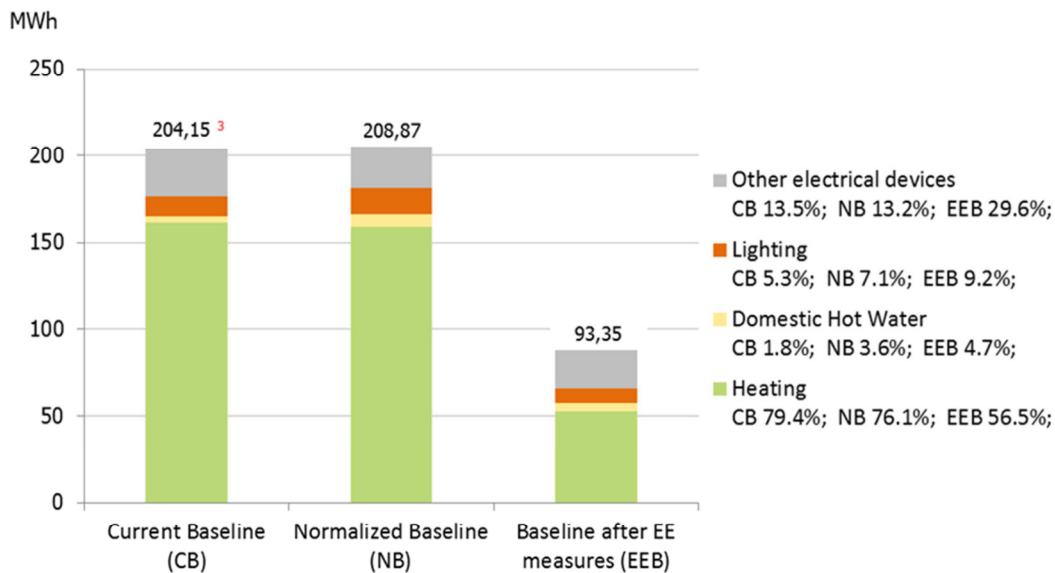
Actual prices of energy sources				
Nº	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	77.22	1/11/2015
2	Natural gas	€/MWh	36.29	1/1/2016
3	Central Heating Energy	€/MWh	35.20	1/10/2015

4.17.3. Analysis of the estimated energy savings

Nº	Discription	Energy saved ²			Capex	Pay-back
		MWh/year	€/year	t co ₂ /year	€	year
1	Switching the heating from local to DHS supply					
	- heating system renovation	106.01	3 847	16.76	40 800	10.45
	- change of energy source	-	58			
2	Switching the DHW from local to DHS supply					
	- connecting subsystem for DHW supply	3.26	118	0.28	1 919	15.59
	- change of energy source	-	5			
3	Lighting measure	6.25	483	5.12	4 379	9.07
Total		115.52	4 510	22.16	47 099	10.44

² The amount of the energy savings is calculated according to the normalized value of the base consumption.

4.17.4. Energy consumption share



№	Parameter	Measure	Baseline	
			Current	Normalized ⁴
1	Internal temperature	°C	23.2	23.2
2	DHW consumption	l/m ²	34.0	72.0
3	Lighting functioning	%	63.0	100.0

³ The difference between the numbers arising from the invoices and the software comes by technological deviation in the degree-days, used in modelling. According the methodology approved by the norm.

⁴ Values come from the norm according to type and functioning of the building, number of persons inside, etc.

4.17.5. Energy saving measures - description

Energy saving measures	Activities	Measure	Price ¹ (€)	Quantity	Sum (€)
1. Switching the heating from local to DHS supply	Design of a new HVAC project for reconstruction - stage: technical level	m ²	0.75	1 587	1 190
	Dismantling of pipelines and radiators, collection, transport and disposal of waste to landfill up to 20 kilometers	m ²	0.90	1 587	1 428
	Supply and installation of fan coils (Q heat / cool = 4,2 / 1,5kW) equipped with three-way valve for two-pipeline system	m ²	3.80	1 587	6 031
	Supply and mounting of a new pipeline system thermo-isolated for the heating system	m ²	16.70	1 587	26 503
	Supply and installation of pipelines for the condensate and connect the fan coil units to the internal electro grid	m ²	1.00	1 587	1 587
	Supply and installation of water collector and distributor with fittings and thermo isolation	m ²	1.00	1 587	1 587
	Supply and mounting of plasterboard decorations, mineral wadding isolated	m ²	0.40	1 587	635
	Supply and installation of an automated system for the HVAC monitoring	m ²	1.10	1 587	1 746
	Charge new accession to the central heating	psc	93.82	1	94
	Total ESM 1:				
2. Switching the DHW from local to DHS supply	Connecting the subsystem to the existing DHW pipelines, thermo isolation of pipelines	m	55.00	25	1 375
	Dismantling of the existing boiler and pipeline connections, transport and disposal of waste to landfill up to 20 kilometers	m	15.00	30	450
	Charge new accession to the DHS	psc	93.82	1	94
Total ESM 2:					1 919
3. Lighting measure	Dismantling of luminaires (whole units)	psc	2.81	129	362
	Removing fluorescent cigars, supply and mounting of LED	psc	10.74	330	3 544
	Installation of luminaire back	psc	2.30	129	297
	Dismantling of incandescent lamps, supply and installation of energy saving lamps	psc	3.58	32	115
	Collection, transport and disposal of lighting waste to landfill up to 20 kilometers	m ³	30.68	2	61
	Total ESM 3:				
Total:					47 099

¹ Cost assumptions are based on analyze of normal practice of local contractors and usage of the guide prices in construction - the last published edition (01.2016). Usage of trade marks is not permitted by the regulator. All the materials has to be chosen by their basic characteristics. All costs are considered at average level - neither conservative, nor optimistic.

4.17.6. Information about investments and savings according to the measures applying

Energy efficient measures

Type of Measures	Investments (BGN)	Savings (kW/h)		Savings (BGN)	
		Electrical Energy	Heat energy	Electrical Energy	Heat energy
Switching the heating from local to DHS supply	79 799		106 007		7 637
Switching the DHW from local to DHS supply	3 753		3 257		240
Lighting measure	8 565	6 251		944	
Total:	92 117	6 251	109 264	944	7 877
CO2 Savings		5.12	17.04		

Additional activities

Type of Measures	Investments (BGN)
Related to switching the heating from local to DHS supply	7 980
Related to switching the DHW from local to DHS supply	375
Related to Lighting ESM	857
Total:	9 212

Energy consumption

Items	Object
Type of object	hospital
Gross floor area (sq.m.)	1 587
Type of heat energy before the project	Natural gas
Type of heat energy after the project	Central Heating Energy
Class of the building before the project	C
Class of the building after the project	B

Energy Prices (BGN/kWh)	Before the project (historical)	After the project
Electrical energy	0.19	0.15
Heat Energy (type of fuel)	0.11	0.07
Example: Diesel		
Example: Gas		

Object 1	Pre-project Consumption		Normalized consumption		Consumption after the project	
	kWh	BGN	kWh	BGN	kWh	BGN
Total consumption	204 154	25 785	208 866	26 614	93 350	11 202
Electrical energy	38 457	7 211	42 439	7 957	57 162	8 633
Heat Energy	165 697	18 575	166 427	18 656	36 188	2 569