

4.3 Annex 3 - Baseline Report

Municipality: Plovdiv
 Building code:
 Building: UHAT „Sv.Georgi“ EAD
 Central Clinical Laboratory, Radioisotope center, Linear Accelerator
 Address: Bld.“Vasil Aprilov” 15A, Plovdiv
 Total floor area, m²: 5 933



Expected results	Value
Energy saved, MWh/year	1 292.88
Energy saved, €/year	48 278
CO ₂ emissions saved, tco ₂ /year	246.54
CAPEX, €	265 175
Simple payback period ¹ , year	5.49

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

4.3.1. Current status of the building

Infrastructure	Description
Commissioned	1962/68 year
Building structure	Solid reinforced concrete structure with one semi-underground, two overground and one attic floors. In the basement are located Central Clinical Laboratory and Clinic of radiation therapy; on the first floor is Transfusion Haematology; on the second is Radiation therapy; in the lofts are situated storage rooms, archive and bathrooms.
Facade walls	Basement - reinforced concrete surrounding walls, both sides plastered. Overground floors - masonry of hollow bricks, both sides plastered. The visible condition of all facade walls is good, but without heat insulation.
Roof structures	Concrete structure with a roof of a wooden edging, covered with roof tiles. The visible condition of the roof is good, but without heat insulation. The lofts are used and heated.
Basement structures	Floor over heated semi-underground floor.
Joinery	Wooden joined joinery (~ 40%) Double glazed PVC joinery (~ 55%) Single pieces of metal joinery with single glazing; solid metal joinery; solid wooden joinery.
Heating	Individual substation for heating, connected to power station of water vapour. Bad condition of the pipe-line system - insulation partially torn, leakage. Two-pipe system line and forced circulation. Radiators of cast iron, not fully functioning. There is no heat armature for regulation.
Domestic hot water	The DHW system works with an 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:12 hours a day, 7 days a week, including holidays Heating: the same as residents

4.3.2. Current energy consumption

Energy	Heating			Electricity		DHW		Total	
	Year	Gcal/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year	MWh/year
2012	934.94	1 087.34	52 044	548.56	49 741	341.65	16 353	1 977.55	118 137
2013	773.45	899.52	42 205	551.93	53 036	341.65	16 030	1 793.10	111 271
2014 ¹	916.35	1 065.72	49 143	569.41	40 155	341.65	15 754	1 976.78	105 052
Average	874.92	1 017.53	47 797	556.63	47 644	341.65	16 045	1 915.81	111 487

¹ Reference year

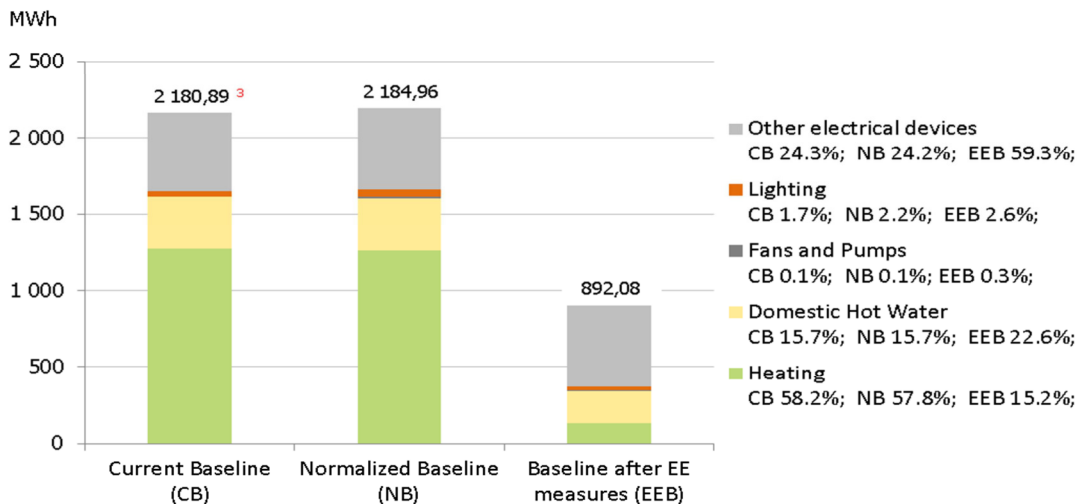
Actual prices of energy sources				
Nº	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	77.22	1/11/2015
2	Natural gas	€/MWh	36.29	1/1/2016
3	Central Heating Energy	€/MWh	35.20	1/10/2015

4.3.3. Analysis of the estimated energy savings

Energy saving measures		Energy saved ²			Capex	Pay-back
Nº	Description	MWh/year	€/year	t co ₂ /year	€	year
1	Insulation of external walls	114.26	4 147	23.08	45 575	10.99
2	Roof insulation	218.70	7 937	44.18	27 549	3.47
3	ESM on basement	47.44	1 722	9.58	9 798	5.69
4	Joinery replacement	74.34	2 698	15.02	26 607	9.86
5	Switching the heating from local to DHS supply					
	- heating system renovation	672.08	24 390	123.96	149 223	6.08
	- change of energy source	-	146			
6	Switching the DHW from local to DHS supply					
	- connecting subsystem for DHW supply	141.83	5 147	10.88	1 919	0.36
	- change of energy source	-	220			
7	Lighting measure	24.23	1 871	19.84	4 505	2.41
Total		1 292.88	48 278	246.54	265 175	5.49

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

4.3.4. Energy consumption share



Parameter			Baseline	
No	Description	Measure	Current	Normalized ⁴
1	Internal temperature	°C	26.2	26.2
2	DHW consumption	l/m ²	955.0	961.0
3	Lighting functioning	%	69.8	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.

4.3.5. Energy saving measures - description

Energy saving measures	Activities	Measure	Price ¹ (€)	Quantity	Sum (€)
1. Insulation of external walls	Preliminary preparation of external walls	m ²	4.62	1 307	6 038
	Thermal insulation EPS 10 cm, flipping edges with safety profiles; plugging 8 pcs. / m ²	m ²	21.37	1 307	27 931
	Plastering two layers of "scratched" mineral plaster	m ²	6.29	1 307	8 221
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	2.59	1 307	3 385
	Total ESM 1:				
2. Roof insulation	Mineral wool insulation 12 cm., covered with plaster	m ²	11.44	1 344	15 375
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ³	1.47	1 344	1 976
	Preliminary preparation of roof	m ²	0.72	298	215
	Thermal insulation EPS 10 cm on roof, covered with plaster	m ²	19.28	298	5 745
	Stucco 4 cm., reinforced with welded mesh	m ²	4.25	298	1 267
	Two layered waterproof, second layer with powder	m ²	8.67	298	2 584
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ³	1.30	298	387
Total ESM 2:					27 549
3. ESM on basement	Preliminary preparation of external walls	m ²	4.62	281	1 298
	Thermal insulation EPS 10 cm, flipping edges with safety profiles; plugging 8 pcs. / m ²	m ²	21.37	281	6 005
	Plastering two layers of "scratched" mineral plaster	m ²	6.29	281	1 767
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	2.59	281	728
	Total ESM 3:				
4. Joinery replacement	Mounting PVC windows with double panes (one multigrade and one float glass), exterior and interior window panels and anti-mosquito nets to the opening parts	m ²	88.61	254	22 507
	Sealing, patching and flipping edges ; plastering and painting from inside	m ²	10.6	254	2 692
	Dismantling of old joinery, collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	5.54	254	1 407
	Total ESM 4:				

5. Switching the heating from local to DHS supply	Design of a new HVAC project for reconstruction - stage: technical level	m ²	0.75	5 814	4 361
	Dismantling of pipelines and radiators, iollection, transport and disposal of waste to landfill up to 20 kilometers	m ²	0.90	5 814	5 233
	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	5 814	22 093
	Supply and mounting of a new pipeline system thermo-isolated for the heating system	m ²	16.70	5 814	97 094
	Supply and installation of pipelines for the condensate and connect the fan coil units to the internal electro grid	m ²	1.00	5 814	5 814
	Supply and installation of water collector and distributor with fittings and thermo isolation	m ²	1.00	5 814	5 814
	Supply and mounting of plasterboard decorations, mineral wadding isolated	m ²	0.40	5 814	2 326
	Supply and installation of a an automated system for the HVAC monitoring	m ²	1.10	5 814	6 395
	Charge new accession to the central heating	psc	93.82	1	94
	Total ESM 4:				149 223
6. 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 5:				1 919
7. Lighting measure	Dismantling of luminaires (whole units)	psc	2.81	86	242
	Supply and installation of new luminaires	psc	23.26	86	2 000
	Supply and mounting of LED cigars	psc	10.74	198	2 127
	Dismantling of incandescent lamps, supply and installation of energy saving lamps	psc	3.58	21	75
	Collection, transport and disposal of lighting waste to landfill up to 20 kilometers	m ³	30.68	2	61
	Total ESM 5:				4 505
Total:				265 175	

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.

4.3.6. 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
Insulation of external walls	89 137		114 256		8 110
Roof insulation	53 880		218 699		15 523
ESM on basement	19 164		47 437		3 367
Joinery replacement	52 038		74 338		5 276
Switching the heating from local to DHS supply	291 855		672 084		47 989
Switching the DHW from local to DHS supply	3 753		141 830		10 498
Lighting measure	8 811	24 228		3 659	
Total:	518 638	24 228	1 268 644	3 659	90 762
CO2 Savings		19.84	226.7		

Additional activities

Type of Measures	Investments (BGN)
Related to external walls ESM	8 914
Related to roof ESM	5 388
Related to basement ESM	1 916
Related to joinery replacement	5 204
Related to switching the heating from local to DHS supply	29 186
Related to switching the DHW from local to DHS supply	375
Related to Lighting ESM	881
Total:	51 864

Energy consumption

Items	Object
Type of object	hospital
Gross floor area (sq.m.)	5933
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	F
Class of the building after the project	C

Energy Prices (BGN/kWh)	Before the project (historical)	After the project
Electrical energy	0.14	0.15
Heat Energy (type of fuel)	0.09	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	2 180 886	224 736	2 184 956	225 658	892 084	107 827
Electrical energy	569 130	79 678	580 235	81 233	556 006	83 973
Heat Energy	1 611 756	145 058	1 604 721	144 425	336 078	23 854