

## 4.8 Annex 8 - Baseline Report

Municipality: Plovdiv  
 Building code:  
 Building: UHAT „Sv.Georgi“ EAD  
 Internal Clinics 1,2,3 and Hematology  
 Address: Bld.“Vasil Aprilov” 15A, Plovdiv  
 Total floor area, m<sup>2</sup>: 5 543



Expected results	Value
Energy saved, MWh/year	788.25
Energy saved, €/year	29 472
CO <sub>2</sub> emissions saved, tco <sub>2</sub> /year	126.89
CAPEX, €	252 637
Simple payback period <sup>1</sup> , year	8.57

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

### 4.8.1. Current status of the building

Infrastructure	Description
Commissioned	1936 year
Building structure	Solid reinforced concrete structure with one semi-underground, three overground and one attic floors. In the basement are located premises for a substation, also storage rooms. On the first floor is situated the clinic of Rheumatology; on the second is the Endocrinology; on the third is the Hematology; in the lofts are situated classrooms, lecture halls and bathrooms of the Medical University
Facade walls	Basement - reinforced concrete surrounding walls, both sides plastered. Overground floors - masonry with solid brick, both sides plastered. The visible condition of all facade walls is good, but without heat insulation.
Roof structures	Wooden 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 unheated semi-underground floor (~ 80%). The basement ceiling is plastered, in good condition, but without heat insulation. Floor on the ground (~ 20%)
Joinery	Wooden joined joinery (~ 44%) Double glazed PVC joinery (~ 51%) 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	DHW feeding by boiler of water vapour through tank of 5 m <sup>3</sup> . The tank is situated in the basement. Insulation 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: 24 hours a day, 7 days a week, including holidays Heating: the same as residents

#### 4.8.2. Current energy consumption

Energy	Heating			Electricity		DHW		Total		
	Year	Gcal/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year
	2012	643.36	748.23	35 127	226.52	20 379	281.11	13 197	1 255.86	68 703
	2013	564.94	657.02	30 831	112.49	10 819	246.85	11 583	1 016.36	53 234
	2014 <sup>1</sup>	626.39	728.49	33 593	107.46	7 496	273.70	12 621	1 109.65	53 709
	Average	611.56	711.25	33 184	148.82	12 898	267.22	12 467	1 127.29	58 549

<sup>1</sup> Reference year

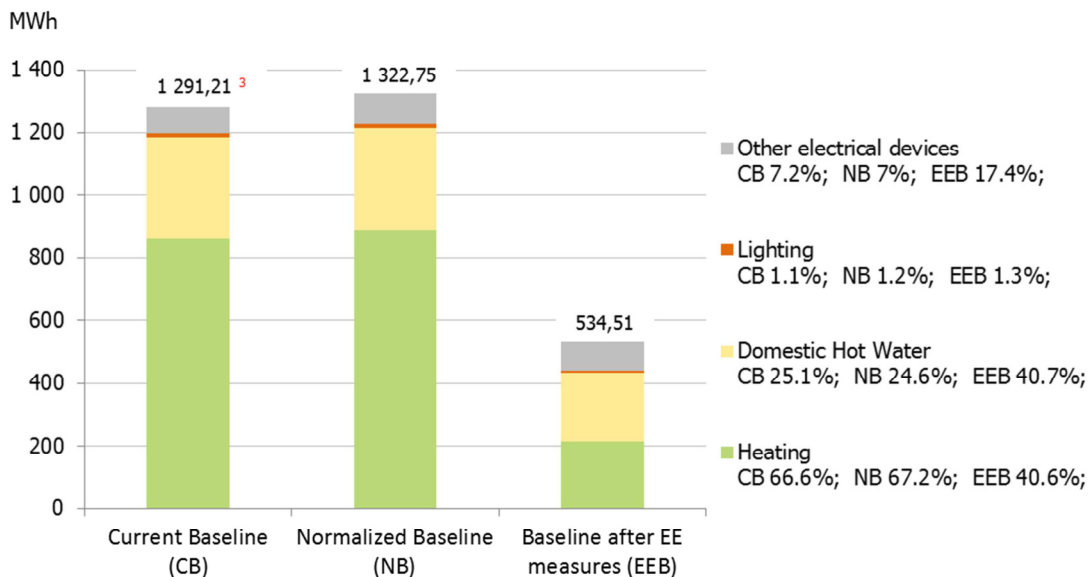
Actual prices of energy sources				
Nº	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	77.22	1/11/2015
2	Natural gas	€/MWh	36.29	1/1/2016
3	Central Heating Energy	€/MWh	35.20	1/10/2015

#### 4.8.3. Analysis of the estimated energy savings

Energy saving measures		Energy saved <sup>2</sup>			Capex	Pay-back
Nº	Discription	MWh/year	€/year	t co <sub>2</sub> /year	€	year
1	Insulation of external walls	224.48	8 146	45.34	78 946	9.69
2	Roof insulation	75.37	2 735	15.22	14 346	5.25
3	Joinery replacement	72.59	2 634	14.66	33 042	12.54
4	Switching the heating from local to DHS supply					
	- heating system renovation	297.91	10 811	41.08	119 572	10.82
	- change of energy source	-	237			
5	Switching the DHW from local to DHS supply					
	- connecting subsystem for DHW supply	108.31	3 931	2.74	1 919	0.46
	- change of energy source	-	237			
6	Lighting measure	9.59	741	7.85	4 812	6.50
Total		788.25	29 472	126.89	252 637	8.57

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

#### 4.8.4. Energy consumption share



Parameter			Baseline	
Nº	Description	Measure	Current	Normalized <sup>4</sup>
1	Internal temperature	°C	20.3	21.0
2	DHW consumption	l/m <sup>2</sup>	1217.0	1 225.0
3	Lighting functioning	%	85.0	100.0

<sup>3</sup> 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.

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

#### 4.8.5. Energy saving measures - description

Energy saving measures	Activities	Measure	Price <sup>1</sup> (€)	Quantity	Sum (€)
1. Insulation of external walls	Preliminary preparation of external walls	m <sup>2</sup>	4.62	2 264	10 460
	Thermal insulation EPS 10 cm, flipping edges with safety profiles; plugging 8 pcs. / m <sup>2</sup>	m <sup>2</sup>	21.37	2 264	48 382
	Plastering two layers of "scratched" mineral plaster	m <sup>2</sup>	6.29	2 264	14 241
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m <sup>2</sup>	2.59	2 264	5 864
	<b>Total ESM 1:</b>				<b>78 946</b>
2. Roof insulation	Mineral wool insulation 14 cm., covered with plaster	m <sup>2</sup>	11.44	1 111	12 713
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m <sup>2</sup>	1.47	1 111	1 634
	<b>Total ESM 2:</b>				<b>14 346</b>
3. 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 <sup>2</sup>	88.61	315	27 951
	Sealing, patching and flipping edges ; plastering and painting from inside	m <sup>2</sup>	10.6	315	3 344
	Dismantling of old joinery, collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m <sup>2</sup>	5.54	315	1 748
	<b>Total ESM 3:</b>				<b>33 042</b>
4. Switching the heating from local to DHS supply	Design of a new HVAC project for reconstruction - stage: technical level	m <sup>2</sup>	0.75	4 658	3 494
	Dismantling of pipelines and radiators, collection, transport and disposal of waste to landfill up to 20 kilometers	m <sup>2</sup>	0.90	4 658	4 192
	Supply and installation of fan coils (Q heat / cool = 4,2 / 1,5kW) equipped with three-way valve for two-pipeline system	m <sup>2</sup>	3.80	4 658	17 700
	Supply and mounting of a new pipeline system thermo-isolated for the heating system	m <sup>2</sup>	16.70	4 658	77 789
	Supply and installation of pipelines for the condensate and connect the fan coil units to the internal electro grid	m <sup>2</sup>	1.00	4 658	4 658
	Supply and installation of water collector and distributor with fittings and thermo insulation	m <sup>2</sup>	1.00	4 658	4 658
	Supply and mounting of plasterboard decorations, mineral wadding isolated	m <sup>2</sup>	0.40	4 658	1 863
	Supply and installation of a an automated system for the HVAC monitoring	m <sup>2</sup>	1.10	4 658	5 124
	Charge new accession to the central heating	psc	93.82	1	94
	<b>Total ESM 4:</b>				<b>119 572</b>

5. 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
	<b>Total ESM 5:</b>				<b>1 919</b>
6. Lighting measure	Dismantling of luminaires (whole units)	psc	2.81	103	289
	Supply and installation of new luminaires	psc	23.26	103	2 396
	Supply and mounting of LED cigars	psc	10.74	186	1 998
	Dismantling of incandescent lamps, supply and installation of energy saving lamps	psc	3.58	19	68
	Collection, transport and disposal of lighting waste to landfill up to 20 kilometers	m <sup>3</sup>	30.68	2	61
	<b>Total ESM 5:</b>				<b>4 812</b>
<b>Total:</b>					<b>252 637</b>

<sup>1</sup> 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.

#### 4.8.6 Information about investment and savings according measures applied

##### 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	154 404		224 480		15 933
Roof insulation	28 059		75 370		5 350
Joinery replacement	64 625		72 590		5 152
Switching the heating from local to DHS supply	233 862		297 909		21 607
Switching the DHW from local to DHS supply	3 753		108 308		8 151
Lighting measure	9 412	9 589		1 448	
<b>Total:</b>	<b>494 115</b>	<b>9 589</b>	<b>778 657</b>	<b>1 448</b>	<b>56 193</b>
<b>CO2 Savings, t CO2</b>		<b>7.85</b>	<b>119.04</b>		

##### Additional activities

Type of Measures	Investments (BGN)
Related to external walls ESM	15 440
Related to roof ESM	2 806
Related to joinery replacement	6 463
Related to switching the heating from local to DHS supply	23 386
Related to switching the DHW from local to DHS supply	375
Related to Lighting ESM	941
<b>Total:</b>	<b>49 412</b>

### Energy consumption

Items	Object
Type of object	hospital
Gross floor area (sq.m.)	5 543
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	0.14	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
<b>Total consumption</b>	<b>1 291 209</b>	<b>121 421</b>	<b>1 322 752</b>	<b>124 360</b>	<b>534 506</b>	<b>45 936</b>
Electrical energy	107 462	14 660	109 503	14 939	99 914	15 090
Heat Energy	1 183 747	106 760	1 213 249	109 421	434 592	30 846