

4.18 Annex 18 - Baseline Report

Municipality: Plovdiv
 Building code:
 Building: Medical University, Plovdiv
 Rectorate
 Address: Bld. "Vasil Aprilov" 15A, Plovdiv
 Total floor
 area, m²: 2 036



Expected results	Value
Energy saved, MWh/year	50.33
Energy saved, €/year	2 538
CO ₂ emissions saved, tco ₂ /year	14.85
CAPEX, €	39 907
Simple payback period ¹ , year	15.72

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

4.18.1. Current status of the building

Infrastructure	Description
Commissioned	1940 year
Building structure	Solid reinforced concrete structure with one semi-underground and two overground floors.
Facade walls	Basement - stonework, inside plastered, without heat insulation. Overground floors - masonry with solid brick, both sides plastered, with heat insulation.
Roof structures	Wooden structure with a roof of a wooden edging, covered with roof tiles, heat insulated. Small area is only with wooden ending with tiles.
Floor structures	Floor over not-heated semi-underground. Small area is in contact with the external air, heat insulated.
Joinery	The joinery of the overground froolr is double glazed PVC (~ 100%) The joinery of the not-heated semi-underground is wooden (joined or single solid)
Heating	Individual substation for heating, connected to power station of water vapour. Bad condition of the pipe-line system. The internal heating system of the building works with water vapour as medium. Radiators of cast iron, not fully functioning. There is no heat armature for regulation.
Domestic hot water	DHW suply by electrical boilers, situated inside the building.
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

4.18.2. Current energy consumption

Energy	Heating			Electricity		DHW		Total	
	Year	Gcal/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year	MWh/year
2012	77.39	90.00	5 369	82.00	6 468	-	-	172.00	11 837
2013 ¹	57.61	67.00	3 911	82.60	7 976	-	-	149.60	11 887
2014	34.39	40.00	2 224	78.00	7 158	-	-	118.00	9 382
Average	56.46	65.67	3 835	80.87	7 201	-	-	146.53	11 035

¹ Reference year

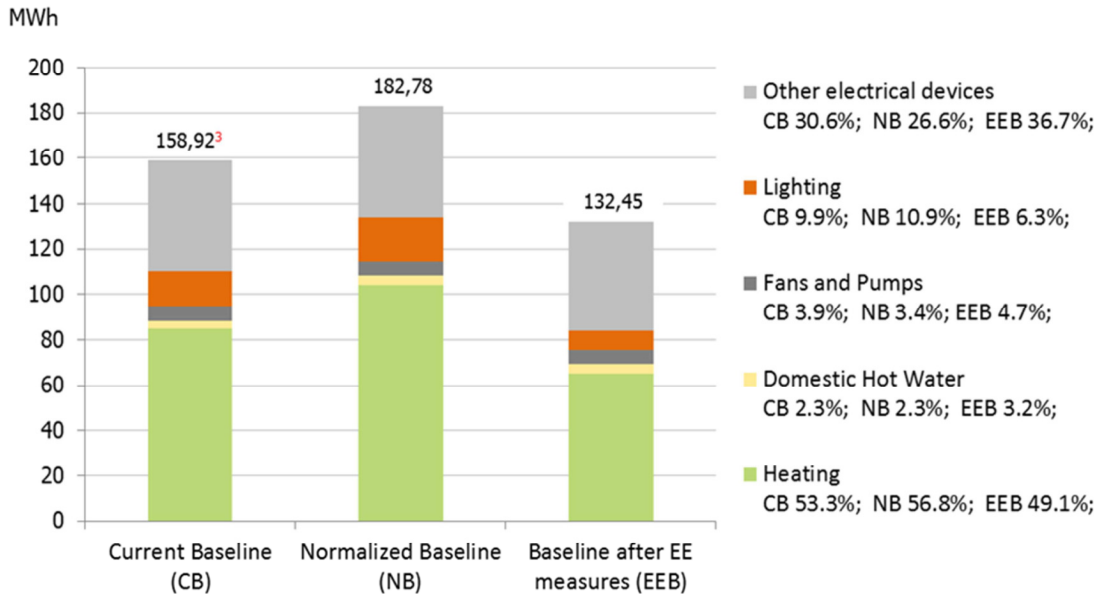
Actual prices of energy sources				
Nº	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	77.22	1/11/2015
2	Natural gas	€/MWh	36.29	1/1/2016
3	Central Heating Energy	€/MWh	35.20	1/10/2015

4.18.3. 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	Switching the heating from local to DHS supply					
	- heating system renovation	38.84	1 588	5.44	35 047	21.23
	- change of energy source	-	63			
2	Lighting measure	11.49	887	9.41	4 860	5.48
Total		50.33	2 538	14.85	39 907	15.72

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

4.18.4. Energy consumption share



Parameter			Baseline	
Nº	Description	Measure	Current	Normalized ⁴
1	Internal temperature	°C	16.9	21.0
2	DHW consumption	l/m ²	76.0	86.0
3	Lighting functioning	%	73.8	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.

4.18.5. 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	1 360	1 020
	Dismantling of pipelines and radiators, collection, transport and disposal of waste to landfill up to 20 kilometers	m ²	0.90	1 360	1 224
	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	1 360	5 168
	Supply and mounting of a new pipeline system thermo-isolated for the heating system	m ²	16.70	1 360	22 712
	Supply and installation of pipelines for the condensate and connect the fan coil units to the internal electro grid	m ²	1.00	1 360	1 360
	Supply and installation of water collector and distributor with fittings and thermo insulation	m ²	1.00	1 360	1 360
	Supply and mounting of plasterboard decorations, mineral wadding isolated	m ²	0.40	1 360	544
	Supply and installation of an automated system for the HVAC monitoring	m ²	1.10	1 360	1 496
	Charge new accession to the central heating	psc	162.59	1	163
	Total ESM 4:				
2. Lighting measure	dismantling of luminaire, removing transformers and chokes	psc	2.81	165	464
	removing fluorescent cigars, supply and mounting of LED cigars	psc	10.74	355	3 813
	installation of luminaire back	psc	2.30	165	380
	dismantling of incandescent lamp, supply and installation of energy saving lamp	psc	3.58	40	143
	Collection, transport and disposal of lighting waste to landfill up to 20 kilometers.	m ³	30.68	2	61
	Total ESM 5:				
Total:					39 907

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.

4.18.6 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	68 545	4 351	34 493	657	2 571
Lighting measure	9 506	11 489		1 735	
Total:	78 051	15 840	34 493	2 392	2 571
CO2 Savings		12.97	1.88		

Additional activities

Type of Measures	Investments (BGN)
Related to switching the heating from local to DHS supply	6 855
Related to Lighting ESM	951
Total:	7 805

Energy consumption

Items	Object
Type of object	University
Gross floor area (sq.m.)	2 036
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	E
Class of the building after the project	C

Energy Prices (BGN/kWh)	Before the project (historical)	After the project
Electical energy	0.16	0.15
Heat Energy (type of fuel)	0.10	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	158 917	20 912	182 782	23 705	132 449	15 373
Electrical energy	83 669	13 387	90 441	14 471	74 601	11 267
Heat Energy	75 248	7 525	92 341	9 234	57 848	4 106