

1. Annex 2 – Baseline Report

Municipality: Sofia
 Building code:
 Building: Military Medical Academy - Sofia
 Address: 3 St. Georgi Sofiiski Str., Sofia
 Total floor area, m²: 119,116.3



Expected results	Value
Energy saved, MWh/year	4 580
Energy saved, €/year	315 308
CO ₂ emissions saved, tCO ₂ /year	2 347
CAPEX, €	2 446 474
Simple payback period ¹ , year	7.76

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

2.2.1 Current Status of the building

Infrastructure	Description
Commissioned	1981 year
Building structure	The main building consists of eleven sections of solid reinforced concrete with one being underground, one semi-underground, two sections have seventeen overground floors, one section with eighteen overground floors, three sections with four overground floors, three sections with two overground floors and two sections with one overground floor. The fourth and seventeenth floors are technical rooms.
Facade walls	Basement – all surrounding walls are made of reinforced concrete, both side plastered. Overground floors - solid concrete construction and masonry with solid brick, both side plastered. Entire building is lined with stone. The visible condition of all facade walls is good, but without thermal insulation.
Roof structure	All roofs are flat with no insulation, except the roofs of section A and B, which have a layer of air. The structure is made of reinforced concrete and the condition of the roof waterproofing is very good. No leaks through the roof have been observed.
Basement structure	The floor is reinforced concrete structure and it is situated on the ground. The basement ceiling is plastered, in a good condition.
Joinery	Double glazed aluminum windows (~ 64%) with a heat transfer coefficient of 2,65 W/m ² K. Double glazed PVC windows (~ 36%) with a heat transfer coefficient 2,00 W/m ² K.
Heating	The hospital is equipped with central heating. The building has 8 heating stations located on the ground floor of the hospital. They are equipped with plate heat exchangers and are in good condition. Adjustments are performed by external temperature and return water temperature. With this type of regulation of the radiators the ones that are in the far side of the circuit lack sufficient amount of heat carrier. The heating system is a two pipe forced circulation. Cast iron radiators are present on every floor, but have no control valves.
Domestic hot water	The hot water in the hospital is supplied by central heating system through heat exchangers. The condition of the equipment is good and the distribution network is insulated.
Electric appliances and lighting	Most of the illumination system is luminescent luminaires with capacities 18, 36 and 58W. There are also lighting fixtures with power of 60W.

Air conditioning and ventilation	The microclimate in the hospital is maintained by the existing ventilation and air conditioning systems. The hospital has 30 ventilation systems and 33 air-conditioning systems serving the majority of the volume of the hospital. Part of ventilation systems (~60%) are equipped with systems for recuperation of discharge air. Part of air conditioning systems were replaced (40%).
Operation hours	24 hours a day, 7 days a week, including holidays

2.2.2 Current energy consumption

Energy	Heating and DHW		Electricity		Total		
	Year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year
	2013	12 616,85	525 468,03	7 961,02	556 386,05	20 577,87	1 081 854,08
	2014	10 807,67	452 791,59	7 734,24	643 008,92	18 541,90	1 095 800,50
	2015 ¹	9 063,00	357 131,06	6 932,50	744 723,19	15 995,50	1 101 854,25
	Average	10 829,17	445 130,23	7 542,58	648 039,38	18 371,76	1 093 169,61

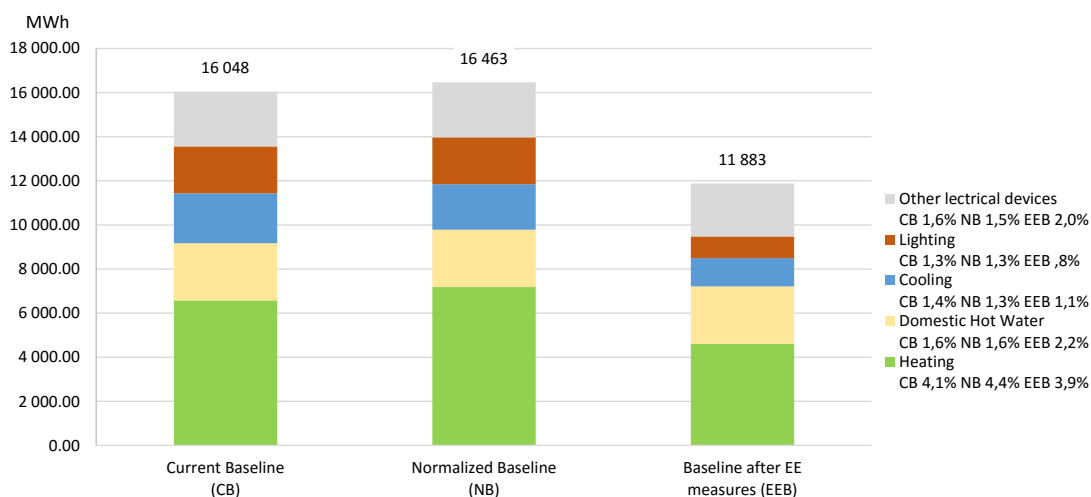
¹ Reference year

Actual price of energy source				
No	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	104,11	Dec-15
2	Central Heating Energy	€/MWh	43,28	Dec-15

2.2.3 Analysis of the estimated energy saving

Energy saving measures		Energy saved ¹			Capex	Pay-back
No	Description	MWh/year	€/year	tCO ₂ /year	€	year
1	Internal insulation of external walls	1 094	47 349	317	183 275	3.87
2	Joinery replacement	1 560	67 526	453	863 204	12.78
3	Lighting system improvements	1 150	119 769	942	971 455	8.11
4	Replacement of existing HVAC systems	591	61 537	484	281 211	4.57
5	Replacement of existing chiller machines and water cooling tower	184	19 128	150	147 330	7.70
Total		4 580	315 308	2 347	2 446 474	7.76

2.2.4 Energy consumption share



Parameter			Baseline	
No	Description	Measure	Current	Normalized ¹
1	Internal temperature	°C	21	21
2	DHW consumption	l/m2	230	230
3	Lighting functioning	%	95	100
Total				

¹ Value come from norm according to type and functioning of the building, number of persons inside, etc.

2.2.5 Energy saving measured – description

Energy saving measures	Activities	Measure	Price ¹ (€)	Quantity	Total (€)
1.	Preparation of the inner wall, incl. detachment of heating devices. Laying of mineral wool insulation with a thickness of 10 cm and thermal conductivity not higher than 0,034W / mK. Installation of drywall on wool and application of antibacterial latex.	m ²	23.52	7,792.3	183,275
Total ESM 1:					183,275
2.	Dismantling of the existing aluminum and PVC windows. Supply and installation of energy efficient PVC windows with thermal heat transfer coefficient not higher than 1,4W / m ² K. Flip and painting around windows.	m ²	66.47	12,986.3	863,204
Total ESM 2:					863,204
3.	Dismantling of existing lighting fixtures. Supply and installation of new energy-efficient lighting in accordance with the norms of light and color vision for the category rooms.	Pcs.	50.46	19,250	971,455
Total ESM 3:					971,455
4.	Dismantling of the existing air conditioning installations for surgical section 1 and 2, pre-surgical rooms and emergency unit. Supply and installation of air conditioning systems for surgical section with heating capacity of 312.6kW power and cooling capacity 180kW. Supply and installation of air conditioning to the pre-surgical section with preheater with capacity of 252.8kW power and cooling capacity of 44.7kW. Supply and installation of air conditioning to the pre-operative section with preheater capacity of 108kW power and cooling capacity of 60.2kW.	Pcs.	70,302.75	4	281,211
Total ESM 4:					281,211
5.	Dismantling of the existing water cooling machines and cooling towers. Supply and installation of water cooling machines (2 pcs.) with 459kW cooling capacity and installed capacity of 128kW. Supply and installation of a water cooling tower open-BAC model VTL-E 198-N - cooling capacity 1190kW, with the following options: PTC (only) (for fan motor), Baltiplus anti-corrosion coating, Pan heater package 2 * 4 kW (provides freeze protection to -18 ° C ambient).	Pcs.		4	147,330
Total ESM 5:					147,330
Total					2,446,474

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 have to be chosen by their basic characteristics. All costs are considered at average level – neither conservative, nor optimistic

² Total costs are without VAT