

## Report on audit of buildings and consultations with HOAs conducted in the period of ????

(10 October 2016 - 01 November 2016)

Within the period 10 October 2016 - 01 November 2016, Remissia's experts N.Kevkhishvili and T.Jishkariani representing the Technical University of Georgia were conducting the intensive meetings with HOAs of high multistoried (16 stores) buildings introducing the objective of the HOME project and explaining the benefits of energy efficiency and renewable measures. Expert –consultants carried out energy audits of 4 high buildings. All four buildings are located in Saburtalo district of Tbilisi city hosting the project.



Addresses are: #2 Ioseliani str. (16 storied building) #37 Balanchvadze street (16 storied building consisting of one independent block, one entrance) consisting of 6 entrances/ 6 bound blocks)



#1 Balanchvadze street (16 storyed#16 Chikovani street (8 storyed building consisting of 2 entrances/2 bound blocks)of 2 entrances/ 2 bound blocks)

During the energy audit of these buildings insulation of outdoor walls, heating and ventilation systems as well as water supply and lightening systems efficiencies were assessed through special software programme ENSI and the statistical results on energy consumption were discussed with homeowners along with the measures which could be implemented.



Most of result tables are in Georgian but some of them demonstrating the actual energy consumption against the standards and generated by the software are provided below.

**Project**

Tbilisi kor 16

Building type Userdefined -  
Standard condition Old  
Climatic zone Tbilisi  
Heating season 1.11 - 10.4

Budget item	Actual		Baseline		After Measures	
	kWh/m <sup>2</sup>	kWh/a	kWh/m <sup>2</sup>	kWh/a	kWh/m <sup>2</sup>	kWh/a
1. Heating	55,8	464 093	91,8	764 055	74,3	617 801
2. Ventilation (heating)	0,0	0	0,0	0	0,0	0
3. DHW	18,1	150 926	18,1	150 926	18,1	150 926
4. Fans and pumps	0,0	0	0,0	0	0,0	0
5. Lighting	10,4	86 766	10,4	86 766	5,2	43 383
6. Various	9,4	78 089	9,4	78 089	9,4	78 089
7. Cooling	1,0	8 320	1,0	8 320	1,0	8 320
<b>Total</b>	<b>94,7</b>	<b>788 194</b>	<b>130,8</b>	<b>1 088 156</b>	<b>108,0</b>	<b>898 520</b>

<b>Project</b>		Building type	Userdefined -	
Tbilisi kor 16		Standard condition	Old	
		Climatic zone	Tbilisi	
		Heating season	1.11 - 10.4	

  

Parameter	kWh/m <sup>2</sup>	kWh/a	Real kWh/a
1. Heating: U - roof	-4,58	-38 083	-38 083
1. Heating: Infiltration	-15,49	-128 917	-128 917
5. Lighting: Average power	-5,21	-43 383	-22 636

  

<b>Total savings</b>		-25,29	-210 383	-189 636
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<b>Measure</b>		<b>1. Heating : 52,2 kWh/m<sup>2</sup>a</b>						
U - wall	2,77 W/m <sup>2</sup> K	2,77	>	2,77	+ 0,1 W/m <sup>2</sup> K = 2,48	2,77	>	
U - window	3,30 W/m <sup>2</sup> K	3,30	>	3,30	+ 0,1 W/m <sup>2</sup> K = 0,63	3,30	>	
U - roof	1,80 W/m <sup>2</sup> K	1,80	>	1,80	+ 0,1 W/m <sup>2</sup> K = 0,35	0,50	>	-4,58
U - floor	1,00 W/m <sup>2</sup> K	1,00	>	1,00	+ 0,1 W/m <sup>2</sup> K = 0,35	1,00	>	
Compactness ratio	0,25 -	0,25		0,25		0,25		
Window factor	11,2 %	11,2		11,2		11,2		
Total solar gain	0,56 -	0,56	>	0,56		0,56	>	
Infiltration	0,50 1/h	0,50	▲	0,50	+ 0,1 1/h = 5,18	0,20	▲	-15,49
Indoor temperature	14,0 °C	14,0	▲	20,0	+ 1 °C = 6,26	20,0	▲	
Setback temperature	12,0 °C	12,0	▲	12,0	+ 1 °C = 3,13	12,0	▲	

  

<b>Contribution from</b>							
Ventilation (heating)	kWh/m <sup>2</sup> a	0,00	...	0,00	...	0,00	...
Lighting	kWh/m <sup>2</sup> a	4,37	...	4,87	...	2,44	...
Various equipment	kWh/m <sup>2</sup> a	3,94	...	4,38	...	4,38	...

  

<b>Energy need</b>		kWh/m <sup>2</sup> a	49,3	81,2	65,7		
Emission efficiency	100,0 %	100,0	▲	100,0	▲	100,0	▲
Distribution efficiency	95,0 %	95,0	▲	95,0	▲	95,0	▲
Automatic control	97,0 %	97,0	▲	97,0	▲	97,0	▲
TBM/EM	96,0 %	96,0	▲	96,0	▲	96,0	▲
<b>Sum</b>	kWh/m <sup>2</sup> a	55,8		91,8		74,3	
Generation efficiency	100,0 %	100,0	▲	100,0	▲	100,0	▲
<b>Energy use</b>	kWh/m <sup>2</sup> a	55,8		91,8		74,3	

For the building at #1 Balanchivadze str. the similar measures already implemented in Temka district were recommended. Building where EE measures along with solar energy were implemented in 2012 is on the photo below.

