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Assessment of Heat Energy Saving Potential in Schools and Kindergartens owned by Kaunas City Municipality

The major part of public buildings owned by Kaunas city municipality is schools and kindergartens. The heating area of these buildings is 525 701 m². Most of them are constructed during 1960-1990, therefore the energy systems and heat insulation characteristics of these buildings are not efficient and not comply with the EU standards.

A rough heat energy saving potential in Kaunas schools and kindergartens owned by municipality is calculated on the basis of summarized data of energy audits and heat consumption. Taking into account the possibly energy saving ways, the rough heat energy saving was calculated:

- the heat energy saving in the kindergartens owned by Kaunas city municipality is 20630 MWh;
- the heat energy saving in the schools owned by Kaunas city municipality is 40744 MWh.

The significant part of the heat is lost through the old windows due the air infiltration. The calculations show that the implementation of heat saving measures such as windows replacing, thermal insulation of walls and roof, modernization of heating systems permit to save by an average of 60 % of the total heat consumption of building. The energy bill savings could be use for improving education and training environment.

Table 1

Parts of building envelopes	Heat losses, %	
	Schools	Kindergartens
Walls	21,11	24,74
Windows and doors	28,81	25,63
Roof	14,21	18,02
Floor	5,73	1,79
Total losses through parts of envelopes	69,86	70,18
Air infiltration and natural ventilation	30,14	29,82
Total	100	100

Distribution of heat losses in schools and kindergartens before renovation

Table 2

	Kindergartens	Schools
Heating area of buildings, m ²	124071,05	401630,19
Heat energy consumption for standard year, MWh	34271,58	78410,26
Characteristic of heat energy consumption for standard year, kWh/m ²	276,23	195,23
Heat saving per year after renovation for standard year, MWh	20630,59	40744,14
Heat saving per year for standard year, %	60,20	51,96
Characteristic of heat energy consumption after renovation for standard year, kWh/m ²	109,95	93,78
Investments for 1 m ² heating area, Euros/m ²	122,4	104,3

Characteristics of buildings renovation

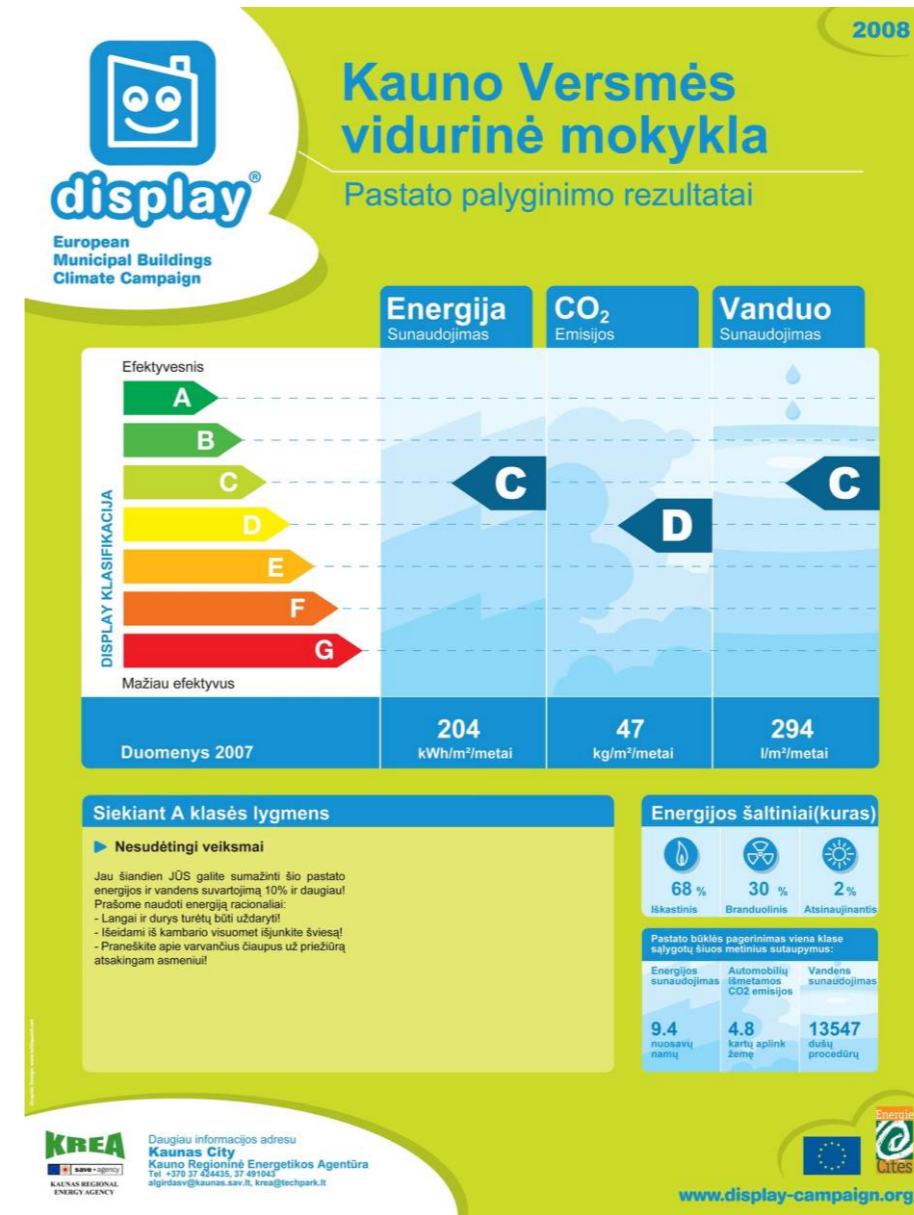
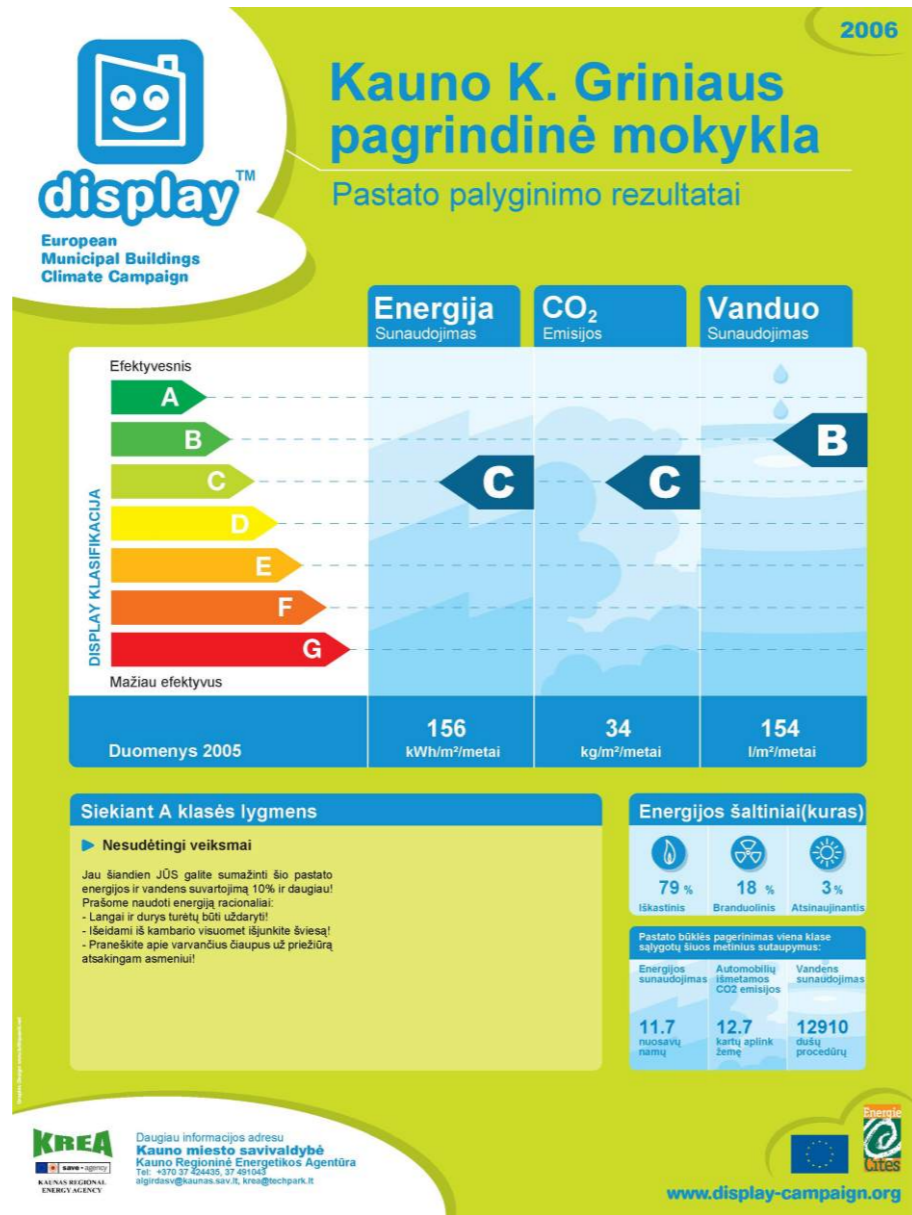
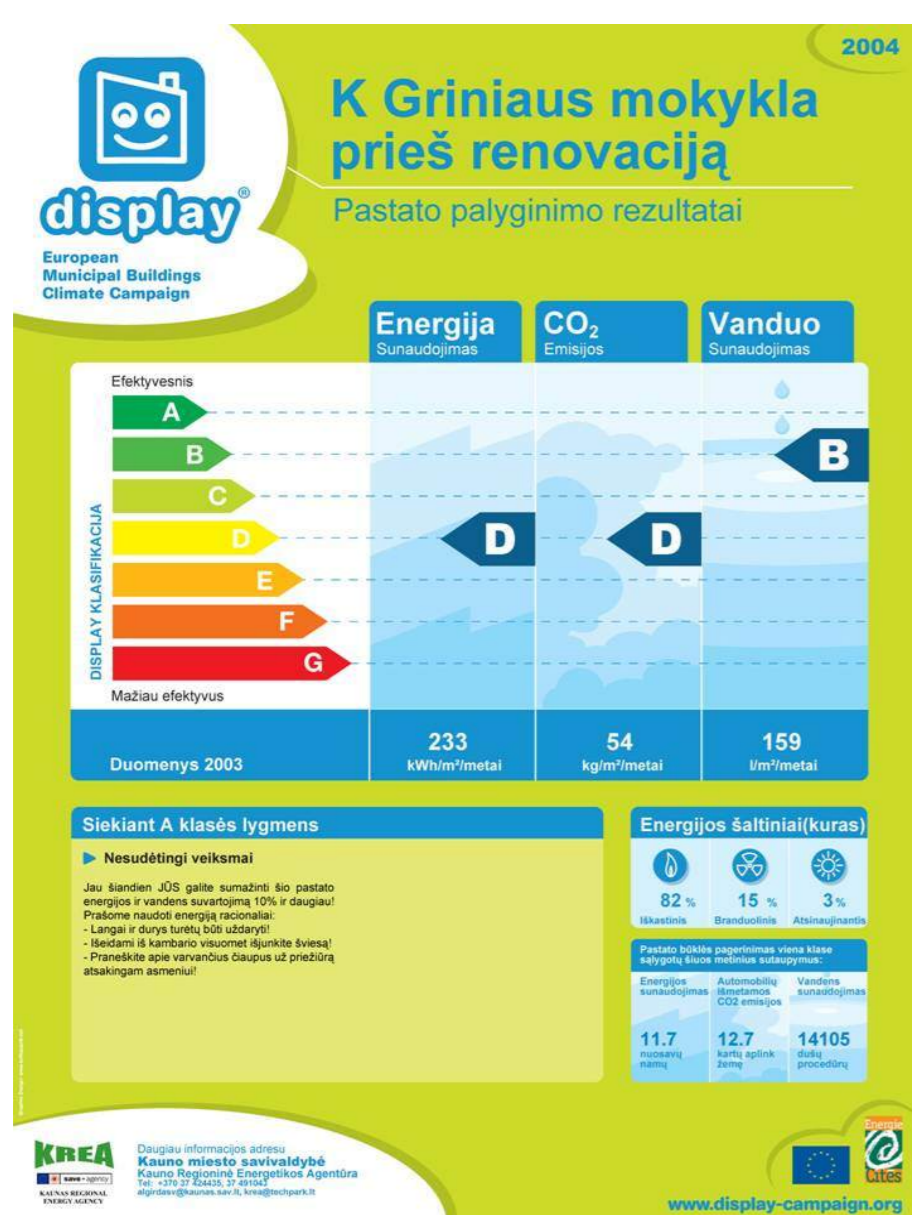


Table 3

No.	Object (schools and kindergartens)	National scheme	Display
1.	K. Griniaus	C	C
2.	Stulginskio	D	D
3.	Smalsutis	D	D
4.	Atžalėlė	E	E
5.	Lakšutė	E	E
6.	Vaivorykštė	E	E
7.	S.Nėries	E	E
8.	Naminukas	E	C
9.	Žiburio	D	D
10.	Versmė	D	C
11.	Martinaičio	D	C
12.	Purienų	D	C
13.	Vydūno	E	D
14.	Petrašiūnų	E	D
15.	Anima	E	D
16.	Žingsnelis	E	D
17.	Dobilėlis	D	E
18.	Pilėnai	D	G
19.	Rudnosiukas	D	G
20.	Sadutė	E	G

Comparison of results of buildings classification made by 2 methodologies: "Display" and national based on EU Energy Performance of Buildings Directive (2002/91/EC)

