

Methodological recommendations for the co-owners of apartment buildings : elaboration of energy-efficient projects

Practical issues

On behalf of:



of the Federal Republic of Germany

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On behalf of:



Federal Ministry
for the Environment, Nature Conservation,
Building and Nuclear Safety

of the Federal Republic of Germany



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1. Collection of data for the calculation of energy consumption



Consolidated data chart (1)

Data	Measure unit	Answer	Note
Year of construction	-		
Overall technical condition	-		
Number of floors	pcs.		
Number of sections	pcs.		
Dimensions as per the building plan	m		
Total height and floor height	m		
Purpose of use of the ground floor	-		
Basement (if available), its height and purpose of use	m		
Loft (if available), its height and purpose of use	m		
Roof type	-		
Materials and type of construction:			
• Walls	cm		
• Floors	cm		
• Surfaces	cm		



Consolidated data chart (2)

Data	Measure unit	Answer	Note
Heating system, type	-		
Individual heating system in the house (number, apartment numbers)	pcs.		
Individual heating point in the house (IHP)	-		
Total footage of windows	m ²		
Total footage of entrance doors	m ²		
Footage of north-side windows	m ²		
Footage of south-side windows	m ²		
Footage of west-side windows	m ²		
Footage of east-side windows	m ²		
Heated space	m ²		
Heated volume	m ³		



Consolidated data chart (3)

Data	Measure unit	Answer	Note
Total footage of dividing elements (inner side)	m ²		
Loft (roof) footage	m ²		
Basement footage	m ²		
Footage of the north-side outer walls	m ²		
Footage of the south-side outer walls	m ²		
Footage of the west-side outer walls	m ²		
Footage of the east-side outer walls	m ²		
Total walls' footage	m ²		
Perimeter	m		
Total amount of heating energy consumed by the house (meter or supplier's data) in the heating season	GCal		

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2. Spotting potential for energy saving



Potential of some energy-efficiency measures

Element(s)	Solution	Potential for energy saving	Average ROI term (years)
Walls	Insulation	18-25%	7-10
Windows, entrance doors	Replacement	15-20%	15
Loft and loft dividing elements	Insulation	5-15%	10-12
Basement	Insulation	5-10%	7-10
Ventilation systems	Installation of air intake and outflow valves; Installation of recuperators; Use of forced outflow ventilation	5-35%	5-8
Joint house-heating systems	Installation of individual heating point with a weather regulator	15-20%	2-4
	Hydro-chemical cleaning and balancing 5-10%	1-2	
Joint in-house electricity supply systems	Replacement of light bulbs	5-7%	2-3
	Installation of light regulation devices	5%	2-3



Solution for thermo-modernization	Potential for energy saving	Average ROI term (years)
Wall insulation, replacement of windows, roof insulation without modernizing and automating heating systems	10-35%	7-10
Modernization of the heating system (purging, automatic hydraulic balancing, automated regulation)	10-25%	2-5
Modernization of the heating system (purging, automatic hydraulic balancing, automated regulation) + wall insulation and replacement of windows	35-45%	7-10
Modernization of the heating system (purging, automatic hydraulic balancing, automated regulation) + wall, basement floor, roof (ceiling) insulation	35-45%	5-8
Wall insulation, replacement of windows, roof (ceiling) insulation + individual heating point with a weather regulator + automatic hydraulic balancing	35-50%	6-9
Heating system modernization (purging, automated hydraulic balancing, individual heating point with a weather regulator) + wall insulation and replacement of windows + ventilation with a humidity regulator	45-60%	7-10
Substitution of the heating system for a two-pipe system with an individual heating point with a weather regulator + wall and roof (ceiling) insulation, basement floor (ceiling) insulation, replacement of windows + ventilation with recuperation (individual recuperators with the efficiency of at least 75%)	65-85%	10-12
Substitution of the heating system for a two-pipe system with an individual heating point with a weather regulator + wall and roof (ceiling) insulation, basement floor (ceiling) insulation, replacement of windows + ventilation with recuperation (individual recuperators with the efficiency of at least 75%) + renewable energy sources (solar collectors, solar batteries etc.)	70-100%	10-15

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3. Approximate costs calculation



Formula

$$VP = C_{technical\ inspection} + C_{audit} + C_{project} + \sum_{j=1}^k VZ_j$$

$C_{technical\ inspection}$ – costs of the technical inspection of a house;

C_{audit} – costs of the energy audit of a house;

$C_{project}$ – costs of the project documents;

VZ_j – costs of the j measure for the upgrade of the energy efficiency, UAH;

k – number of measures.



Consolidated chart

Activities	Measure unit	Number	Costs per unit, UAH	Total costs, UAH
Insulation and hydro-isolation of the roof with IZOFRAM UTGI	Total roof footage, m ²	648	661.5	428 652
Façade insulation - Capatect A system with mineral wool for insulation, façade stucco and façade paint	Total façade footage, m ²	2699	390.0	1 052 610
Insulation of the basement floor (ceiling) with IZOFRAM UTGI	Basement floor (ceiling) footage, m ²	648	243.5	157 788
Replacement of windows (installation of metal plastic window sets)	Number of windows	444	1 818.2	807 280.8
Replacement of doors	Number of doors	102	1 774.4	180 988.8
Installation of a house heating meter	Unit	1	39 814.0	39 814
Installation of a house water meter	Unit	2	10 598.5	21 197
Installation of an individual heating point	Unit	1	198 877.0	198 877
Total				2 887 208



Project costs calculation

The costs of the technical inspection and energy audit depend on:

- Total house volume (footage);
- List of activities;
- Inspection / audit methods;
- Structure and amount of indirect costs;
- Average salary at the organization in charge for the technical inspection / energy audit.

Assume technical inspection costs – UAH **20000**, energy audit costs – UAH **30000**

Project work costs - 3-7%, assume 5.5% = UAH **160000**

Project costs = 2 887 208 + 20 000 + 30 000 + 160 000 = UAH 3 097 308

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