

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

**Stage 2 – pre-implementation: contents and specifics**

On behalf of:



of the Federal Republic of Germany

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## Pre-implementation stage (1)

**Goal** – to check the energy-consumption data of the building and its energy-saving potential

- to identify optimal measures for the upgrade of the energy efficiency of the building and their approximate costs

**Key issues** – selection of qualified contractors for the technical inspection and the energy audit of the building



- if necessary, engaging independent experts to evaluate the key technical and economic values of the measure proposed by the energy audit provider



## Pre-implementation stage (2)

### Contents

- ✓ Selection of contractors for technical inspection and energy audit.
- ✓ Inspection of the building:
  - Collection and clarification of the building data;
  - Technical inspection of all building elements and systems;
  - Energy audit;
  - Calculation of the expected reduction in energy consumption (cost saving).
- ✓ Calculation of the approx. costs of energy-saving measures.

### Performance indicators

- ✓ Technical inspection and energy audit reports.
- ✓ Feasibility study of the planned measures/investments.
- ✓ Approx. costs, sources and terms of funding have been clarified.
- ✓ Feasibility study and funding terms have been agreed at the general meeting, project elaboration has been decided.
- ✓ Terms of reference for the project have been prepared.



## **Selection of contractors/providers for the implementation of energy-efficient projects**

Customers can select contractors in a contest procedure on their own

Selection of contractors according to the following criteria:

- Working experience in energy efficiency;
- Previous participation in similar projects;
- Qualification of the contractor's key employees;
- Available equipment;
- Vision of possible optimal proposals regarding the tasks of the project's respective stage.

Possibility to engage energy-service companies (ESCO).



## Technical inspection of the building

**Technical inspection** – identification of the qualitative and quantitative parameters of the building, its parts and elements (networks) by means of visual inspection, local measuring and labor testing.

**Goal** – identification of the list, volume and value of the works necessary to recover the normal technical condition of the building.

### Technical inspection report -

- Overall technical condition of the building and its elements (*proper condition, operable, operable with restrictions, damaged condition*), damage details (*loss of the carrying capacity of the building's elements in %*).
- Recommendations regarding the repair (replacement) of the building's elements (if necessary).



## Energy audit of the building

**Energy audit** - inspection of the building aimed to identify possibilities to save energy through energy-efficiency measures.

### Energy audit:

- Identifies causes of unnecessary energy consumption and excessive costs;
- Delivers a basis for recommendations – based on technical and economic analysis - to remove energy losses and unnecessary costs;
- Identifies the sequence of the proposed measures and delivers the technical and economic analysis of costs and their ROI.

### Energy audit report:

- Information on the results of technical inspection and energy audit;
- Conclusions on the feasibility of the thermal modernization of the building;
- Description of the thermal modernization measures.



## Feasibility study of the measures (1)

**Goal of the feasibility study** – selection of the optimal combination of energy-saving measures and technical solutions ensuring the desired energy saving (highest possible energy efficiency of the building) with as low costs as possible.

**Feasibility study for investments** – study of the technical, economic, ecological and financial possibilities ensuring the desired profitability of investments:

- Description of the project's key aspects;
- Modeling of the project development taking into account various factors (organizational, legal, technical, financial, economic etc.);
- Analysis of the problem aspects of the project and possible solutions;
- Evaluation of the project feasibility.



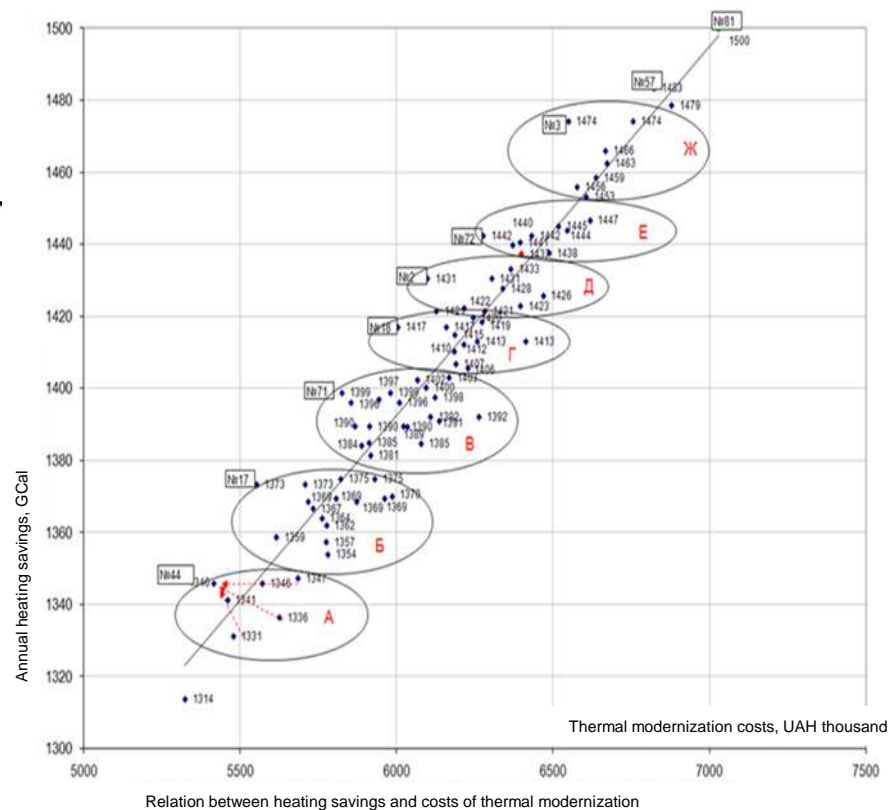
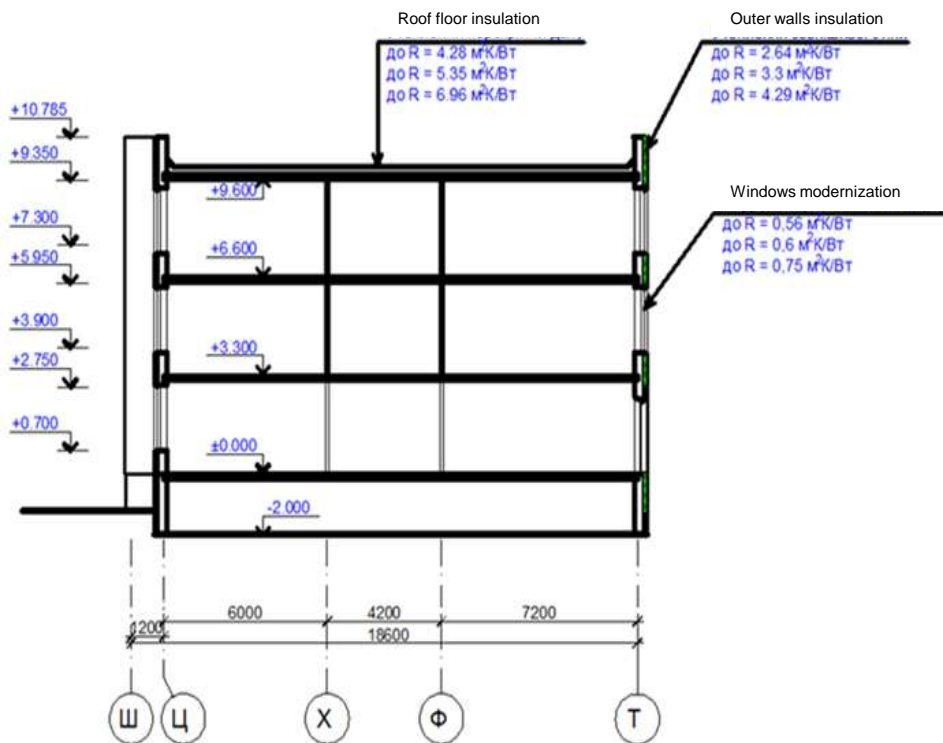
# Impact of various combinations of energy-saving measures

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





## Feasibility of the measures (2)



Possible options for the building insulation for the highest possible energy efficiency



## Example 5 – roof recovery measures (1)

Before



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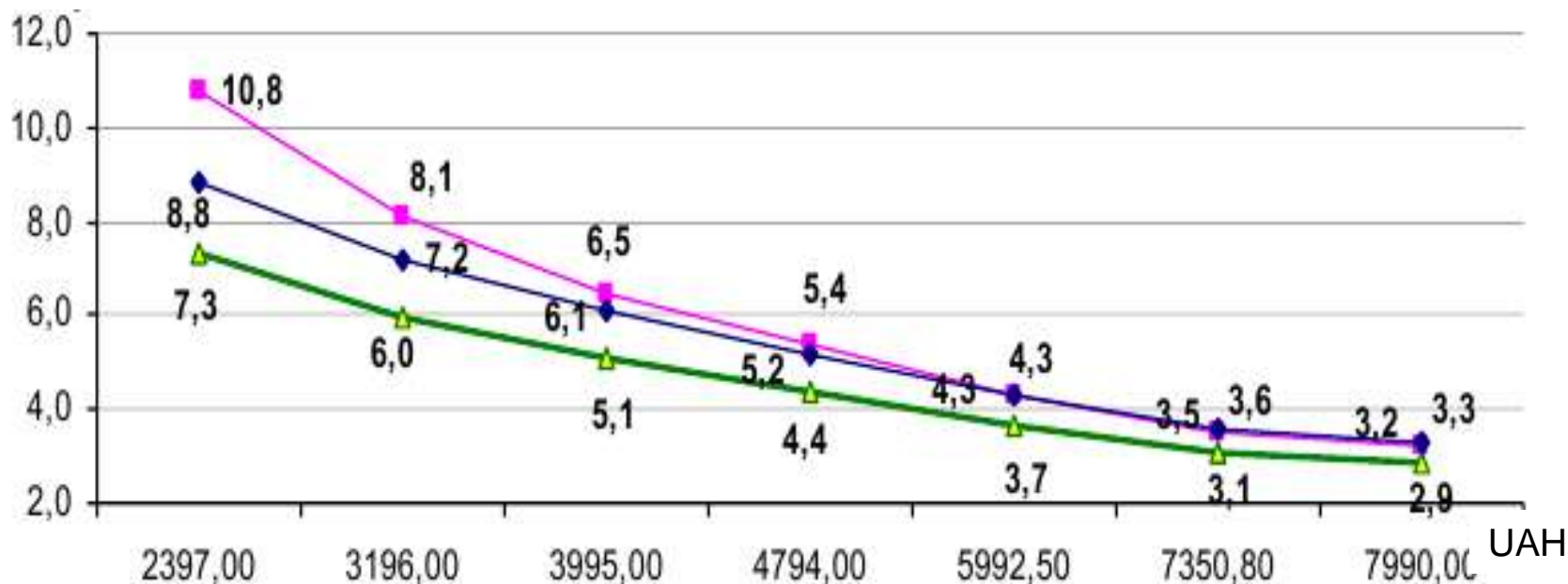
## Example 5 – roof recovery measures (2)

After





# Evaluation of the gas price impact



- ROI term without time factor
- ROI term with time factor
- ROI term with time factor and a loan



## Terms of reference for the project

Terms of Reference define the following points:

- Customer's requirements of the customer to the planning, architectural, engineering and technical solutions to be implemented;
- Key parameters of the construction object;
- Complexity level of the object (regulation DBN V.1.2-14-2009);
- Object's price;
- Organization of the construction works.

The ToR are prepared according to technical data (technical condition, feasibility study), urban construction regulations and restrictions.

Complexity categories for apartment houses:

- Category II – up to 50 residents;
- Category III - 50 to 300 residents;
- Category IV - 300 to 400 residents;
- Category V – more than 400 residents.



## Risks of the pre-implementation stage

Mistakes in the selection of contractors for technical inspection and energy audit:

- Insufficient qualification of providers;
- Mistakes in the measuring of the geometrical building's data;
- Gaps in the inspection of the building's elements and networks;
- Mistakes in the calculation of the heating-related data of the building;
- Incorrect preparation of the basic data for the project.



## Conclusions

No.	Stage/measure	Goal	Executed by	Final document
<b>2</b>	<b>Pre-implementation</b>			
2.1	Selection of contractors/providers	Ensuring proper quality of services	Co-owners	Protocol of the authorized body representing the co-owners/owner with the decision on the selection of contractors. Signed contracts
2.2	Technical inspection	Assessment of the building's technical condition	Certified specialists	Technical inspection report
2.3	Energy audit	Study of the building's energy properties	Certified specialists	Energy audit report
2.4	Feasibility study of activities (investments feasibility)	Identification of the optimal measures, technical solutions and approx. project costs	Certified specialists	Feasibility study of activities (investments feasibility)
2.5	Preparation of ToR for the project	Identification of framework conditions and requirements to project solutions	Certified specialists	ToR for the project

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# Thank you for your attention!

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