

WP 4 Energy Supply

Analyses of Energy Efficiency of Standard Buildings and Heat Supply Infrastructure

Target Area in Jelgava

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Jelgava City Council



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To prepare analyses of energy efficiency of the buildings the experts are elaborating the technical evolution of multi-storey residential houses on random. The documentation of the technical evaluation includes information about results on buildings technical inspection and survey of energy audits, including the calculation of energy efficiency. During the 1st round 36 multi-storey residential houses will be evaluated (11 houses - series 103, 3 - series 104, 7 - series 316, 15 - individual projects).

During the technical inspection of the buildings the following information was gathered:

1. General information about building
2. Description of situation:
 - 2.1. compliance of the land use with spatial plan ;
 - 2.2. location of the building on the land;
 - 2.3. layout of the building.
3. Improvement of the territory:
 - 3.1. carriageways, pavements, paths and domestic squares;
 - 3.2. children's' play grounds, recreation and sports grounds;
 - 3.3. greeneries and small forms of architecture;
 - 3.4. barriers and walls of bearing.
4. Parts of the buildings:
 - 4.1. substructures and foundations;
 - 4.2. supporting walls, beams of opening apertures and lintels;
 - 4.3. framework elements, columns, cross-bars, beams;
 - 4.4. self supporting walls;
 - 4.5. hermetic sealing of joints, hydro isolation, heat isolation;
 - 4.6. ceilings of basements, intermediate floors and attic;
 - 4.7. roof elements: supporting constructions, roof deck, roof covering, system of rainwater draining;
 - 4.8. balconies, loggias, porches;
 - 4.9. stairs and slopes;
 - 4.10. partition walls;
 - 4.11. floors;
 - 4.12. fill of opening apertures: gate, outer door, inner door, windows, hatches;
 - 4.13. fire security constructions and materials;
 - 4.14. airshafts and airholes;
 - 4.15. interior decoration and parts of architecture;
5. Inner and outer utilities:
 - 5.1. piping of cold water and sewerage;
 - 5.2.
 - 5.3. piping of hot water;
 - 5.4. heating system, its pipelines,
 - 5.5. central heating radiators, colorifers, convectors and their actuators, heat controllers;

- 5.6. systems of electric power supply and electro technical devices;
- 5.7. outer utilities.
- 6. Summary
 - 6.1. technical depreciation of the building;
 - 6.2. conclusions and suggestions.

Surveys of energy audits of building include the following information and calculations:

1. Basic information about the house manager;
2. Management report;
3. Basic information about the object:
 - 3.1. residential building;
 - 3.2. supply and distribution of heat and hot water
 - 3.3. data on energy consumption.
4. Photo documentation on building inspection or thermo-grams;
5. Suggestion for the renovation project of the building;
6. Energy rating of the building and prognosis of changes.

Performing analyses of the prepared documentation of technical evaluation of multi storey residential houses (at present information on 20 houses is available) it is possible to come to conclusions:

1. Supporting constructions of the houses are in satisfactory technical state, with some local defects;
2. Rain water collecting and draining systems are in satisfactory state, but furnace pipelines are in bad technical state;
3. Inner utilities (risers) in most cases are in bad state;
4. Technical depreciation of the buildings in relation to a new building is medium 40% under the influence of nature climatic conditions and weather factors as well under the influence of human action;
5. Heat resistance of bounding constructions does not correspond to demands of Latvia construction standard LBN 002-01 "Heat Engineering of Bounding Constructions of Buildings".

When the renovation / reconstruction projects for raise of energy efficiency in buildings will be elaborated, it is necessary to pay special attention to:

1. Change of the old wooden windows that are morally and physically obsolete;
2. Heat resistance of top floor, basement, attic and other bounding construction ceilings.
3. Repair and change of roof covering;
4. Change of sewerage and water risers;
5. Cleaning of natural airshafts. Air holes that have direct outer exit must be equipped with devices that control cold air inflow into rooms.

Prognosis of energy ratings of buildings and their changes.

Main conclusions of multi-storey residential building energy audits:

1. Prognosis of decrease in the year of estimation of the appointed building energy efficiency (Kwh/m²) after realization of the energy efficiency measures suggested in energy audits - on average **53%**
2. Prognosis of decrease in the year of estimation of carbon dioxide (CO₂) emission (kgCO₂) after realization of the energy efficiency measures suggested in energy audits - on average **52%**

Additional information on Target area (~ 170 ha / 1.7 km) 2

Existing building stock

Majority of buildings were constructed in period from 1960 to 1989 (56 per cent). 6 per cent of buildings were constructed in period up to 1948, and 38 per cent - in time period between 1948 and 1959. After 1989 only one house has been constructed and launched into operation (in 2009; 27 flats). Territorial plan foresees that both dwelling houses of mixed type and business-related buildings may be built here. Schools, kindergartens, shops, servicing companies, culture and medical and many other institutions are situated in TA. Majority of buildings is of 316 series (35 buildings), also 318 series (16 buildings) and individual projects (41 building), built mainly using bricks. Other buildings are also of 103 series (17 buildings), which are panel buildings with bricks bearing walls, and 104 series (5 buildings), which are panel buildings. Roof cover material - asbestos cement plates.

Ownership structures

Buildings consist of flat properties that include an apartment, shares of public premises in the building (e.g., staircase) and shares of corresponding territory. Type of ownership - private property.

District heating network/ pipeline system

Buildings are connected to gas fired district heating network. Within city 70km of pipelines have been renovated and insulated; only old pipelines are not under ground.

Status of Energy efficiency of typical buildings, how to raise EE??

According to data of energy audits, EE mainly can be raised through implementing such activities: insulation of facades and end walls (~20 per cent), insulation of roof and attic (~15 per cent), change of windows (~4 per cent). Other activities are modernisation of heat supply system, insulation of pipelines and renovation of hallways. Nevertheless, the standpoint of Jelgava city is that maximum EE in building can be achieved through complete renovation, including renovation of internal utilities.

Imprint

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