

Kohtla-Järve Town Energy Improvement District (EID)

A strategy for increasing energy efficiency in the historical area of the Järve district of Kohtla-Järve



Kohtla-Järve 2020

Järve Energy Improvement District

Järve, Kohtla-Järve, Estonia

Strategy on energy and climate

By

Tõnu Tiit, Igor Britikovski, Sevicehall OÜ & Kohtla-Järve Town Government

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1. Introduction

The aim of this Energy Improvement District Strategy is to develop measures for planning the preservation of the architectural appearance of the buildings and improvement of the indoor climate regarding apartment buildings located in areas of high environmental value in the Järve district of Town Kohtla-Järve. The objective of achieving energy savings in apartment buildings has also been considered in the planning of measures.

The work is being carried out within the framework of the project “Baltic Smart City Areas for the 21st Century” (AREA 21), which is under the auspices of the European Union's Interreg Baltic Sea Region programs.

In the course of the work, 12 typical buildings were selected from residential areas in the Järve district, covering all types of buildings in the area.

In the course of the work, all selected housing units had been:

- Defined energy expenditure at present;
- Identified possible structural improvements to reduce energy consumption;
- Defined existing distribution of heat loss between building structures and air exchange;
- Specified cost of the necessary investments;
- Detailed thermographic inspection of completed buildings.

The building areas of the town of Kohtla-Järve are defined in Hendrikson & Ko OÜ's 2011 work "Thematic Planning of the Historical Building Areas of Järve, Ahtme, Kukruse and Sompa Districts of Kohtla-Järve", Work No. 1056/08- The thematic plan sets out the conditions for maintaining a unique urban space while meeting urban development needs. The thematic plan also contains recommended standard solutions for the reconstruction of buildings with Stalinist architecture.

Energy saving measures will be developed with the possibility of using them for apartment buildings in all regions. They will be developed with the aim of clarifying the construction conditions of the above-mentioned thematic plan to enable people living in the houses to take useful measures in the coming years to improve the energy performance of the buildings. These measures are aimed to improve the indoor climate and the energy efficiency of houses located in areas of high environmental value without damaging the exterior appearance of the facades of these houses.

Achieving potential energy savings does not have to reach the appropriate level based on minimum energy performance requirements for buildings, but provides possible measures to increase energy efficiency in order to minimize household costs.

The energy consumption data of the building collected and transmitted by the representative of the apartment association in 2017-2019 has been used for the analysis of energy use.

Part of the Kohtla-Järve, Järve district has been selected as the research area. Kohtla-Järve is a young town with no so-called old town. The heart of the city is a central street, the Central-Alley (Keskalle, the centre of which is designed as a park. The area in question has apartment buildings from three eras: the oldest formation in the centre - the popularly named Sotsgorod - is Stalinist architecture, the 1950s. Next street circle (Olevi, Pärna) 4-storey Khrushchevs from the 1960s and 1970s mixed with Stalinist buildings. Some outlying areas, such as Outokompu, date back to the 1980s. There are also buildings from the 1980s in the observation area, on North Alley Street. The eastern part of the city consists of private houses. Most of the buildings have been renovated with convenient means at various points in time, and no attention has been paid to the architectural features and aesthetics of the buildings. Inappropriate materials and techniques have been used.

Internal climate measurements in selected apartment buildings in the study area revealed that the housings are largely under-heated and under-ventilated. House exterior walls and utility systems are partially depreciated. In some houses, many apartments are uninhabited (for example, Ehitajate 93 where 75% of the apartments in the building are without residents).

Major challenge identified in the EID in Kohtla-Järve (KJ) is achieving energy efficiency and at the same time preserving historical buildings that are mainly in private hands. As in other shrinking regions in Estonia, Järve EID is facing typical challenges related to the real-estate market situation, population and difficulties in decision making related to financial contributions (lack of knowledge & support mechanism). There is a need for mindset change, continued active dialogue with housing associations, (municipality) support mechanisms and standardized guidance to kick off the renovation decision making in accordance with a clean energy transition.

Table 1. List of buildings in EID pilot area (Source: Estonian Registry of Buildings 2018)

Address	Building type	Building ID	Year of Built	Building area, m ²	Floors	Closed net area, m ²	Volume, m ³	Num. of dwellings	Energy label**	Renovation condition 2019
Keskallee 6	Apartment building	102010420	X	733,4	3	1692,4	7440,0	19	X	Partly renovated
Järveküla tee 65a	Apartment building	102010646	X	537	4	1919,5	6486	44	X	Partly renovated
E. Vilde tn 6	Apartment building	102010284	1957	551	3	1472,6	7285	16	X	Partly renovated
Lõuna tn 9	Apartment building	102009784	1953	157	2	246,5	892	4	X	Partly renovated
Põllu tn 5	Apartment building	102009788	X	157	2	240,4	838	4	X	partly renovated
Keskallee 14	Apartment building	102010449	1953	329	2	458,1	2174	7	X	Partly renovated
Torujõe tn 11	Apartment building	102010541	X	529	2	776	3327	12	X	Partly renovated
Pärna tn 2	Apartment building	102010688	X	306	2	543,5	1958	8	X	Partly renovated
Järveküla tee 49	Apartment building	102010562	1957	450	3	1241,7	4411	18	X	Partly renovated
Olevi tn 14	Apartment building	102010483	1949	164	2	215,6	1190	4	X	Partly renovated
Total	-	-	-	3913		8806,3	36001	136	-	-

* Average number of inhabitants per 10 apartment buildings, building years 1950-60.

** Energy efficiency classes of apartment building as of 21.01.2019 (unit of kWh / (m²a)): The Energy Performance Number (ETA) is determined for the standard use of a building according to the values and methodology specified in the regulation "Minimum requirements for energy performance of a building". A-class ≤ 100; 101 ≤ B-class ≤ 120; 121 ≤ C-class ≤ 150; 151 ≤ D-class ≤ 180; 181 ≤ E-class ≤ 220; 221 ≤ F-class ≤ 280; 281 ≤ G-class ≤ 340; H-class ≥ 341

2.1. Reference to the city's environmental and spatial policies

Urban planning

The main policy goals of the efficient renovation are defined in Hendrikson & Ko OÜ's 2011 work "Thematic Planning of the Historical Building Areas of Järve, Ahtme, Kukruse and Sompa Districts of Kohtla-Järve", Work No. 1056/08. The development plan of Kohtla-Järve town 2016-2034 is a strategy document guiding the development of the city, which defines the urban planning development goals, the main developments and outlines the investments and activities necessary to achieve the objectives pursued. Describing the ideal city to be by 2034. Kohtla-Järve's development strategy is based on its strengths and analysis of the situation challenges. The mission of the city states the idea of a municipality and essence, the development vision describes the desired state of the city by 2034, strategic development trends define key areas for urban development.

There are buildings in the Järve District that have largely been preserved in their architectural form during construction. The goal of the local government is to create an architecturally authentic urban space, precisely in the historically established form of its buildings.

To date, Kohtla-Järve has conducted various analyses (energy audits, Area21, etc.). In addition, self-monitoring has been launched to inform the population of the need for renovation. This way, residents can see what the effect is after renovating a roof, replacing windows, doors, insulating a building, and so on. To give a boost to the renovation, the city wants to help supporting refurbish various standard building projects so that the community can have the experience and a good reference for the benefits of a well-renovated building.

Energy Policy

Integrity: designing strategies by settlement to promote coherence across sectors and synergies with existing processes, actions and resources.

Cooperation: Applying new forms of cooperation to improve the public sector's capacity to use appropriate communication and planning tools. Participation: activating parties in energy planning, implementation and decision making.

Involvement: Involving citizens in strategic energy planning to better understand the interests of end users and to promote energy efficiency measures. Technology: The use of smart technology to facilitate energy planning, experiment with new forms of public engagement, raise awareness of personal energy consumption and steer behavior change.

Education: developing new concepts, testing solutions and transferring knowledge to other cities and regions to support the emergence of low-carbon urban settlements in Europe

Purpose of the work within the framework of the project “Baltic Smart City Areas for the 21st Century” (AREA 21):

1. Enhance the energy performance of buildings in areas of high environmental value by preserving their architectural appearance;
2. Improve the indoor climate (indoor temperature and ventilation) of buildings in areas of high environmental value.

The general purpose of the district plan

The buildings in the Järve district are largely preserved in their architectural form during construction. The aim of the local government is to create an architecturally authentic urban space, especially in the historically established form of its buildings.

Investment and funding of renovation

The KredEx Fund's public subsidies (funded by the Cohesion Fund) are financially supported for housing repairs and renewable energy:

1. Public reconstruction subsidy (up to 50% of costs) for housing associations (year of construction before 1993) to improve energy efficiency - Phase III started in 2019, establishing the annual budget for the renovation subsidy.
2. National investment support for the installation of PV panels for public, private and legal entities (including housing associations) up to 30% of costs (up to € 30000 per applicant, <200 kW installed capacity) to increase the share of renewable energy in buildings.

In terms of initiatives and empowerment, the public sector should seek to target investment in neighborhoods that are undergoing a major overhaul. Housing associations need convincing plans, schemes, designs and solutions that need to be updated and improved in every situation, from the city level to private interests and micro-dwellings. Neighborhood communities will certainly be activated, and volunteer movements and activities will play a more important role. However, all activities require institutional management and coordination, which is likely to be the Kohtla-Järve City Government.

2.2 Energy efficiency potentials

The energy saving potential of the EID region is about 5.2 GWh of current annual average consumption. Energy consumption can be reduced from 29 GWh to 23.5... 24.5 GWh. Most of the energy savings are achieved with reconstruction of the buildings (ca 4.5 GWh). Installing on-site renewable energy production systems, such as PV panels, can reduce electricity consumption from the grid by up to 0.35 GWh. Tables 2 and 3 describe the energy efficiency potential by size and by sector.

Table 2. Overall measures and impact for buildings in EID

All buildings	Heat	Electricity	Gas	Total
Potential measures				
EID area post-reconstruction change of energy usage, %	-15%	26%	-9%	-
On site renewable production usage (PV panels, 50%), GWh/yr	0	0.7	0	-
Potential results				
Energy consumption after measures, GWh/yr	10,1	3,45	11,8	25,35
Renewable energy use, GWh/yr	-	0,35	-	0,35
Local renewables to grid, GWh/yr	-	0.35	-	0.35

Table 3. Sectorial energy saving potentials

Sector	Reference year 2017-2019 situation	Energy Improvement District
Residential buildings	29 GWh/yr	4,5 GWh/yr (including -0.35 GWh PV electricity and 0.35 GWh PV production to grid)

The potential of reconstruction measures cannot be resumed quickly. Several challenges and processes have to be considered. These are for instance large-scale renovation over a long period of time, informing owners, making reconstruction decisions, selecting and designing buildings, designing the entire project, drafting the construction project, quoting the construction costs, selecting the construction company and contracting. Renovation grants for apartment buildings may be used to carry out the renovation process.

The renovation includes the insulation of the ceiling of the building, the addition of a new window / doors and a strong air heating and ventilation system. Reconstruction will reduce heating costs the most, up to 35% per building.

2.3. Key challenge to energy efficiency

The following main EID challenges for the Järve EID will be formed in conjunction with the SWOT analyses (Table 4), which will be prepared through meetings with citizens and the knowledge of local and foreign experts.

- A) Lack of awareness about energy consumption potential energy savings among energy house owners and housing associations.
- B) High percentage of elderly owners - owners are not interested / able to make long term mortgages.
- C) High proportion of leases - owners are not interested in financing as renovation does not improve return on investment.
- D) Private interest and self-interest: Establishing cooperative energy planning - Reluctance on the part of (some) residents to cooperate or to trust the expected energy efficiency or financial results.
- E) Narrow financing options: lack of financial resources (incl. lack of corresponding grants, no bank lending) and low affordability
- F) Low level of real estate prices in area, residents do not want to invest more than the cost of the apartment.
- G) Energy suppliers and operators are passive in promoting energy efficiency in buildings due to reduction of generated income.

To address these challenges, the themes and objectives listed in section 4 will be established. Theme 3 aims to solve challenges A, C, D. Raising awareness can also alleviate challenges B, C and slightly alleviate G. The purpose of Themes 1 and 2 is to achieve a result that makes Theme 3 better understood. The implementation of Theme 1 will help alleviate B, C, as running costs will not increase after reconstruction, and if well-designed

on-site renewable energy production and intelligent automation energy efficiency measures, they can optimize energy costs.

Table 4. SWOT analysis

<p>Strengths:</p> <ul style="list-style-type: none"> • Compact area where building renovation is needed • Sustainable district heating is available and used in the district • Solar Energy Prospects: Roofs Suitable for Solar Panel Renewable Energy Production (PV) 	<p>Weaknesses:</p> <ul style="list-style-type: none"> • Low awareness of energy consumption and potential energy savings among homeowners and apartment associations • High percentage of elderly owners - owners are not interested / able to make long term mortgages • Large share of rental space - owners are not interested in financing because renovation does not improve return on investment. • Low real estate market prices - do not support renovation and home mortgage loans from the bank
<p>Opportunities:</p> <ul style="list-style-type: none"> • Support Schemes (KredEx National Agency). • Reconstruction lessons learned (process, technologies, renovation materials) thanks to many renovations in recent years (including in neighboring buildings) • The use of smart ICT tools to engage and guide residents to improve energy efficiency (from behavioral changes to homeowners' in-depth refurbishment) • Testing of joint energy planning - energy planning is carried out in cooperation with third parties (municipality, energy advisors) and apartment owners, apartment associations and neighboring apartment associations • The price of energy seems to be rising • Support activities of the City Government 	<p>Threats:</p> <ul style="list-style-type: none"> • Narrow financing options: lack of financial resources (including lack of corresponding grants, no bank lending) and less affordability • Energy suppliers and operators are passive in promoting energy savings • The policy framework may change • The population of apartment buildings is decreasing • The level of depreciation of a building may increase the cost of renovation

3. Vision

Conscious people want to live in buildings tailored to the demands and needs of the 21st century.

The purpose of developing the regional buildings of the Järve EID is to provide the overall quality of life and living environment in the area. Technological, investment and consumption choices and decisions made at district level, apartment buildings and households level form and determine the role of whole district regarding reducing greenhouse gas emissions, reducing energy demand, improving energy efficiency and increasing the share of renewable energy in the energy system. The district needs to be redesigned in style during the construction period and if necessary for the city dwellers. The vision is a broadly defined goal of the Soviet era in terms of overall appearance and atmosphere. Urban residents, as end-consumers, are facing the highest expectations of the challenge in terms of renovation. At the same time, they will be able to mobilize all other climate and energy organizations, starting with the city government's urban policy and opening up their governance principles to the governance process.

4. Goals

The Järve EID strategy is based on 4 main themes supported by a total of 4 goals. The reference year shall be 2017-2019 for which performance shall be measured.

Theme 1: Energy saving

Goal 1: Reduce the energy consumption of buildings

Theme 2: Indoor climate

Goal 2: Ensure the necessary indoor climate level and quality

Theme 3: Public Awareness in Energy Saving

Goal 3: Raise public awareness on energy saving and increase/strengthen cooperation between key stakeholders

Theme 4: Improving urban living by 2034

Goal 4: To transform underserved urban areas into better living environments

5. Objectives

Specific objectives	Indicators
Implementation for 2034, comparison 2017-2019	
Goal 1: Reduce energy consumption by 2034	
Objective 1.1 Promote the renovation of buildings in the area	Number of buildings that underwent major renovation
Exercise 1.2 Improve Achieving Energy Savings by 5%	% energy savings in behaviour change
Goal 2: Improve the indoor climate of housings	
Objective 2.1 Achieve a stable indoor climate with temperature control and ventilation	% of homes with smart management Exceeding CO2 concentration
Objective 2.2 Raise citizens' awareness of the quality of the indoor climate	Number of citizens directly informed, in a control survey
Goal 3: Public awareness of energy saving	
Objective 3.1 Raise public awareness on energy saving	Number of people supporting energy saving measures as % of total ICT users in buildings
Objective 3.2: Provide IT solutions for energy performance monitoring and analysis design	% Of ICT solution users across buildings
Objective 3.3 Early education on energy saving and consumption in cooperation with schools and kindergartens	Number of educational institutions / young citizens reached
Goal 4: Improving urban living by 2034	
Objective 4.1 Improve housing association support measures, methods and techniques for reconstruction	Number of apartment associations consulted Number of reconstruction measures carried out
Objective 4.2 Increase the aesthetic appeal of apartment buildings	Number of renovated housings in the EID

There are many aspects to how urban district projects can contribute to the energy performance of buildings and the quality of life in urban areas while supporting EU energy and climate policies. Sharing experiences on renovation processes will help to start new renovation processes and work more effectively to save energy. The efficiency of activities can be increased if energy efficiency projects rely on the expertise of experts and stakeholders. The effects of building renovation on urban renewal and improvement of living conditions will be demonstrated. The change to becoming more energy efficient in one area will ensure a more systematic change in an even larger urban area. The results of houses already renovated in terms of cost-effectiveness will also enhance the scope of urban renovation in an energy-efficient way. The aspect of active people-to-people interaction is crucial for successful urban renewal in relation to the objectives set out in 4.1 and 4.2.

6. References

1. Thematic Planning of the Historical Building Areas of Järve, Ahtme, Kukruse and Sompa Districts of Kohtla-Järve
2. The Development Plan of Kohtla-Järve 2016-2034