Tartu Retrofitting Package

Main sector

- Smart buildings

Overview

The main idea of Tartu's lighthouse project is to turn khrushchyovkas (a type of panel buildings that were constructed during the reign of Nikita Khruschchev starting from the 1950s) into smartovkas (i.e. high-quality living environments that inspire the community to make environmentally aware decisions and to change their patterns of consumption behavior) with a drastic reduction in the energy use of the buildings. With an average life cycle of 30-40 years, many of the khrushchyovkas have already outlived their time, meaning that the shortcomings in quality are becoming increasingly evident and might even pose a threat to their residents. Hereby, the SEC approach proceeds from an understanding that new buildings are constructed according to high contemporary standards and are thus energy-efficient anyways – the true challenge is how to retrofit the old panel buildings that have great energy saving potential.

As a response, Tartu will pilot a series of retrofitting solutions in 17 khrushchyovkas in the city center. Increasing the energy performance of the demo area's housing stock through the smartovka renovation package will reduce energy consumption from the current ca. 270 kWh/m2y to 90 kWh/m2y (i.e. meeting class A requirements). The solutions will include:

- Insulating all the outer walls of the buildings with pre-insulated panels (weighted average level U≤0.22 W/(m^2*K));
- Replacing all windows with triple-glazed windows (integrated thermal transmittance level U≤1.10 W/(m^2*K)) and adding an insulation layer;
- Replacing all front doors to reduce heat loss;
- Insulating and reconstructing the roofs (heat transfer coefficient U≤0.12 W/(m^2*K));
- Installing a ventilation system with heat exchangers;
- Reconstructing the central heating system and installing thermostatic valves that allow to adjust room temperature in the range of 18-23°C;
- Adding low-temperature cooling systems to complement the district heating system;
- Installing 400-500 kWp PV panels to provide additional energy for the buildings;

- Applying art solutions on the facades to increase the aesthetic appeal of the buildings (see more under citizen engagement solutions);
- Setting up a smart home system (see more under ICT solutions).

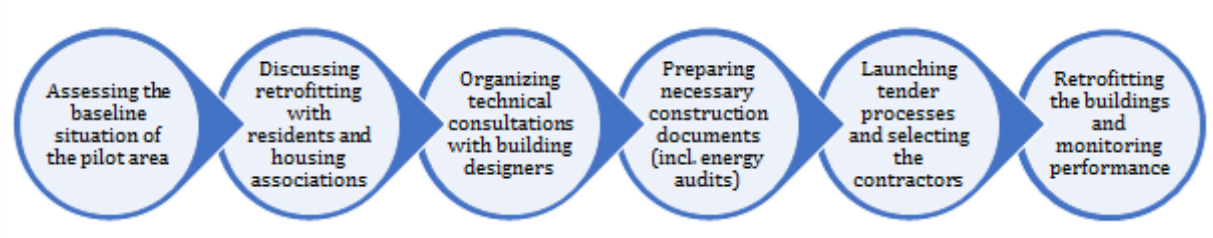
Business model

In Tartu, the renovation activities will be funded in combination of H2020 funding (ca. 45%), a national support scheme for renovation activities (ca. 25%) and additional loans taken by the dwelling owners themselves (ca. 35%). The apartments are privately owned and organized into housing associations. Whereas the average price of renovating apartment buildings in Estonia is 250 €/m^2, ca. 300 €/m^2 is foreseen for this considerably more ambitious retrofitting package.

Citizen engagement

Besides significantly increasing the energy efficiency of the pilot area buildings, providing a stable interior climate through temperature control and ventilation as well as increasing the aesthetic appeal of the panel buildings, one of the main aims of the retrofitting activities is to encourage behavioral changes in the way residents consume energy and adapt to new technologies. After all, there are not a lot of changes that can be implemented without cooperation and willingness of the users. For boosting participation and interest in the project, several measures have been taken into use, including regular information meetings, technical consultations, study trips to similar construction sites and forum discussions (see more under citizen engagement solutions). Once the retrofitting activities have been completed, these awareness-raising actions of the citizen engagement strategy will be replaced by a social innovation model that focuses on how to motivate residents to use the installed smart devices and to save energy.

Process



Benefits

- Increased resource and energy efficiency, smaller energy bills
- Better interior climate (adjustable temperature, fresh air, controlled CO_2)
- Autonomy from fossil fuels and independence of energy supply
- Stable long-term return on investment
- Improved data availability, simple monitoring and energy consumption feedback
- New business opportunities
- Increased comfort, behavioral change and social integration (community feeling)
- Increase in the value of the pilot buildings as real estate
- Increase in the quality of the living environment

Stakeholders

Owner of the solution	Property/private owners
Service/technology provider	Contractors and technology providers tbs.
Users	Pilot area residents, property owners
Investors	H2020, housing associations, KredEx Foundation

Investment/Finance

Ca. 9 million€

Potential for replication

The planned retrofitting package tackles one of the greatest challenges of Europe's existing building stock – quickly deteriorating precast panel apartment buildings that were quickly produced in response to housing shortages. The market and replicability of the respective solutions is enormous, evidenced by the variety of panel buildings in different countries. It is estimated, for example, that 3.5 million people in the Czech Republic and 1.7 million people in Hungary live in these types of apartments. In Estonia alone, there are ca. 6,000 *khrushchyovka*-type apartment buildings that were constructed between 1961-1990. Tartu, also having a wealth of panel and *khrushchyovka*-type apartment buildings, aims at piloting the retrofitting package in its central area, after which best practices could be transformed to its residential areas and anywhere else in Europe and beyond.

Contact

Martin Kikas Tartu Regional Energy Agency martin.kikas@trea.ee	Kaspar Alev Tartu City Government kaspar.alev@raad.tartu.ee