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Pilot project ‘Information Centre’, Riga

LATVIA

Measures done and the energy saving effect

The pilot project is a common idea and the project of several institutions:

- Riga City Development Department (project management)
- Riga Technical University (technical and intellectual support)
- Chief Architect Office of the Riga City Council (historical and architectural information and other support)
- East District Council of the City of Riga (main benefit recipients, owners of the project idea)
- NGO “Development of the Spikeru warehouse district” (planning)

In this partnership the ideas were developed and the financial support for the after investment period and maintenance of the building, which will function as the information point for the brick façade building reconstruction and tourism, culture and recreation information centre for the district, was raised.

There is no measured heat energy consumption data available for this building since it was not heated for some years prior to renovation. Detailed calculations were made in order to estimate the energy consumption for space heating in this building. These calculations show that the building will consume 37.8 MWh of energy when heated for the whole cold season. The building has a high energy consumption because the heat transfer coefficient for the building shell is very high (the measured heat transfer for the walls shows that it is 5 times higher than it should be according to the Latvian building code) and the building itself is very small (the smaller the building the bigger the specific heat consumption). Savings from implementing energy efficiency measures were calculated based on the calculation model. These calculations show that heat energy consumption will be reduced by 80%, which means that the energy consumption in this building will be 7.56 MWh per year after implementing the energy efficiency measures. The specific energy consumption for space heating will be lowered from 671 kWh/m²/a to 134 kWh/m²a. After the renovation the building will be heated by using an air-water heat pump. This means that the actual consumption of electricity will be even lower. Using an assumption that the heat pump will operate with COP (Coefficient Of Performance) equal to 3.0 it was calculated that the consumption of electricity for heating this building will be at 2.52 MWh per year or 45 kWh/m²/a. The selected measures to achieve these goals are:

- Reconstruction of existing floor structure and cover, wall cladding, partitions, doors, windows, roof support structure, the roof deck and the dismantling of the settlements
- Opening of the base and enhancement of existing foundations — repair and reinforcement, under the existing foundations constructing concrete with paling, waterproofing of foundation
- New floor construction
- Roof deck covering to be built, new tin roofing and rainwater drainage systems to be built; construction of ventilation channels
- Façade renovation – the existing brick wall restoration, brick replacement to equivalents bricks, brick priming and painting; reconstruction of the entrance porch
- Wall insulation from the inside, floor and roof insulation (roof) in 4 divisions
- Replacement of the windows, the front pad and doors
- Individual heating and ventilation system
- New plumbing installation like internal water supply and sewage network
- Installation of internal wiring, lighting network and lightning protection systems.
- Installation of internet and telephone for network of security alarm, fire alarm, computer networks and video surveillance systems

The exterior wall inside-insulation is planned with three different types of insulation materials. This will be done in accordance with the architectural plans where there are specified the distribution of insulation materials between two different thicknesses of layers.

Wall insulation materials are installed between the wooden vertical slats. For exterior wall insulation there will be used following insulation materials (or equivalent):

- Polyizocianurate (PIR) of Recticel Insulation Eurothan GP, b = 100 mm (insulation sheets with aluminium foil coating, thickness of 100 mm, 1200 x 2400 mm, installed in 1 layer with 100 mm, the material is allowed to be cut)
- Aspen Aerogel-Spacelof Classic, b = 50 mm (insulation material of roll system with a width of 1475 mm and a thickness 10 mm, installed with 5 layers of 10 mm each, the material is allowed to be cut)
- Vacuum insulation panels "NanoPor VIP ", b = 50 mm (closed panels with a thickness of 25 mm, 600 x 450 mm, installed in 2 layers with 25 mm each, the material is not allowed to be cut, pierced or exposed to mechanical loads, it is prohibited to place objects or walk on it)

The floor is equipped with polyizocianurate (PIR) of Recticel Insulation Eurothan GP, b = 200 mm or equivalent (insulation sheets with aluminium foil coating, thickness of 100 mm, 1,200 x 2,400 mm, installed in 2 layer with 100 mm, the material is allowed to be cut). For the ceiling polyizocianurate (PIR), Recticel Insulation Eurothan AL, b = 300 mm, or equivalent (insulation sheets with aluminium foil coating, thickness of 100 mm, 1,200 x 2,400 mm, installed in 3 layer with 100 mm, the material is allowed to be cut) was used. Before the installation of roof decking there will be insulated steam isolation film (SIG-5 or equivalent Majpell).

The main basis for choosing the measures was the onsite measurement of the energy efficiency of the building and the calculations made by the experts from the Riga Technical University. The chosen technical solutions were based on the competence of experts and on the necessity to gain experience in using innovative and rarely used materials in Latvia in local conditions. We consider that the materials chosen for this kind of building will be a good example and will help to gain great competence in this field not only in Latvia, but in the whole Baltic see region. Specific materials still need to be tested to be sure that they will bring maximum results.

Summary / conclusion and lessons learnt

This pilot project showed that the energy efficiency level of historical buildings in their un-renovated state can be very low. The energy consumption in this type of buildings can be reduced significantly without affecting the appearance of the building and lowering its historical value. By using innovative insulation materials and solutions it is possible to reduce the building's energy consumption by 80%. The costs of this kind of a renovation are higher than for a typical renovation of a non-historical building. This project should be viewed as a pilot project where the aim was not only to do an economically feasible renovation and refurbishment work, but rather to push the boundaries of the existing

knowledge and existing experience about the energy efficiency of historical buildings. This renovation is state of art not only for historical buildings but also for buildings as such.

Detailed measurements that will be carried out after all energy efficiency measures are implemented will show the real energy savings. With the measurements it is planned not only to investigate the heat energy savings but also to monitor how these energy efficiency measures have affected the indoor air quality. We hope that this pilot project will open doors for a new thinking on energy efficiency in historical buildings and will be the first step towards more efficient and sustainable buildings cross-sectoral. From the legal and technical point of view we found several issues that we need to work on at local level. First of all the preparation of the technical specification for the procurement of the technical project had to be made. It took some effort to work with the state institutions which are issuing the technical rules. The main problem is the failure to understand the specific goals of the project regarding the need for innovative solutions in order to reach the two main aims – the reduction of the energy consumption and the protection of the historical architectural values. During the development process of the technical project the main difficulty was the lack of competences and experiences from the architects and engineers, so that we needed to integrate the experts from the RTU.

Currently, at the phase of the procurement of the construction, there are a lot of questions concerning the materials chosen within the project because, as it was mentioned previously, they are innovative and mostly unknown within the local market. This is considered as a great risk because there will be a need of a total supervision of the construction process from the experts who know the technical parameters and instructions for the use of the materials. Riga City Council needs to admit that the help from the Riga Technical University was crucial to reach this point because it is essential to point out the lack of knowledge in this sphere not only for the project managers and technical personal in Riga City Council but also in the whole construction sector in Latvia. Riga City Council admits that for future projects it is necessary to attract only the best experts and for this we hope on the dissemination of the results achieved in RTU.