



OLD BUILDING BECOMES ATTRACTIVE AND ENERGY EFFICIENT: INFANT NURSERY »IVANČICA« CITY OSIJEK (Croatia)

Summary

Organized and systematic attention to energy efficiency is being conducted in Croatia based on National Energy Programmes that were launched by the decision of the Croatian Government in 1997, the co-ordinator being Energy Institute "Hrvoje Požar". The main aim of the National Energy Efficiency Programme, KUEN building, is to ensure mechanisms that would result in a constant decrease of energy demand through design, construction and utilisation of new buildings and settlements, as well as the refurbishment and reconstruction of the existing ones, to create favourable micro-climatic parameters within the building together with the diminution of impact on environment.

Infant Nursery "Ivančica" in Osijek is a free-standing single-story facility built in 1974, which has suffered major damage through shelling during the war. The analysis of the present state showed an extremely poor condition of the outside wall membrane and flat roof, with an almost non-existing facade coating, insufficiently insulated walls, thermally poor-quality windows and flat roof leaking at many spots. The results of the facility's thermographic analyses reveal major thermal losses through windows and the outside membrane. Evidently, the facility is a sub-standard nursery in need of urgent reconstruction and protection from further decline.



Before reconstruction

For more detailed information please read below...

Short presentation of City Osijek

Osijek is 4th is the fourth largest city in Croatia with a population of 114,616 in 2001. It is the largest city and the economic and cultural centre of the eastern Croatian region of Slavonia, as well as the administrative centre of Osijek-Baranja county. Osijek is located on the right bank of the river Drava, 25 kilometers upstream of its confluence with the Danube.



Sustainable energy development approach

The situation before reconstruction was that the nursery is a free-standing expanded single-story facility with three dilatations and total construction surface of 858 m². Outside walls measuring 25 and 38 cm, were partly constructed with facade bricks (25 and 38 cm) or full bricks (25 cm). The carrier construction is made of reinforced-concrete banded foundation with dilatations into pillar foundations and skeleton of reinforced-concrete pillars and beams with basic distance of 6.00/4.00 m.

Stone paneled facade layers have completely fallen off. As there was no additional thermal insulation of the walls, particularly the concrete facade surfaces, the thermographic analysis and calculation confirmed major thermal losses.

The examination of glass walls established that they had been constructed with anodized aluminum profiles with unfavorable thermal characteristics, poor casement insulation and inadequate glass quality. This was also maintained through the results of the thermographic analysis and calculation.

Waterproofing of the roof had been mended several times ("patched") and damage to the ceiling reveals a need for a thorough solution of the flat roof reconstruction. Since the replacement of waterproofing is essential and based on the thermographic analysis and calculation it is recommended that an additional thermal insulation be constructed.

Main achievements

Based on the results achieved through the thermographic analysis and evaluation of thermal demand and the state of the facility, an intervention plan on the existing facility was drawn in order to refurbish it and save as much energy as possible. The procedure includes facade and roof treatment, i.e. facility's sheath, as well as the reconstruction of heating installations within the facility.

The sheath reconstruction consists of two phases:

Replacement of the existing glass panels with new ones having much better thermal characteristics ($k=1.30 \text{ W/m}^2\text{K}$ instead of the present $k=3.50 \text{ W/m}^2\text{K}$), which would decrease thermal demand by around 40%.

Performance of additional outside wall thermal insulation mineral wool with a thickness of 8-10 cm and standard surface treatment; the flat roof reconstruction by means of 12-cm-thick thermal insulation, and new waterproofing, which would reduce the facility's thermal demand compared to the first reconstruction phase by further 60%.

The realisation of both phases would reduce thermal demand of the facility compared to the present state from 238,000 kWh to 69,000 kWh, i.e. by 71% and the thermal load of the facility from 134,000 W to 37,000 W, i.e. 72%.



After reconstruction

Suggestions for other municipalities

The prices for energy are every day higher and higher. For that reason investment in that kind of reconstruction in buildings owned by local authorities is very cost effective. Second reason is increasing the comfort in these buildings, which make people more efficient in their work.

Very important suggestion for making this project successful is EDUCATION. Education for all the participants involved in planning and rebuilding. The most important is to educate people who will use these buildings because only with properly usage installations and other equipment, result of these reconstructions will efficient.

MODEL NATIONAL COORDINATOR FOR CROATIA

Energy Institute Hrvoje Požar (EIHP)



Energy Institute Hrvoje Požar-EIHP has been founded as a non-profit institution. Its goals are to provide expert and scientific support to: the strategic development of the Croatian energy system and its sub-systems, the processes of legislative reform and development, the advancement of economic relations, and to the development of relevant institutions.

The Institute's main tasks include: expert and scientific research in the field of energy for state, regional and local administration and energy companies; expertise and analyses for the Croatian Energy Regulatory Council; management of National Energy Programmes and pilot projects; organization of seminars, workshops and courses; publication of editions, periodicals and other forms of communication with experts, scientists and the general public, especially via Internet. The Institute carries out its mission in cooperation with numerous scientists and institutions from Croatia and abroad.

Further information

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