

Contributions to the civil buildings projection concerning the concept of sustainable development

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Summary

The sustainable development is the only means to be used by the contemporary society, taking into consideration the demographic expansion, the accelerated industrialization, the increasing consumption of raw materials, the environment degradation and the exhaustion of some essential natural resources. The Brundtland Report (1987) is eloquent in defining defines the sustainable development as "the development that fulfills the present generation's necessities, without affecting the future generation, in order to satisfy its own necessities".

The obvious climate changes, the ongoing increase in the price of energy obtained from fossil combustibles and the need for contributing to the diminishing of gas emission with hothouse effect according to the Kyoto agreement, all contributed to the increased concern of most world states for the sustainable development, including Romania's.

The building sector considers sustainable development as a very important aspect for the society, nevertheless a major consumer of energy and raw materials. This



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aspect must be viewed as a means for the factors which affect nature and human health, taking into account its effects on the resource consumption, the impact on the environment and the quality of the interior environment.

The efforts made for discovering and exploiting of new clean regenerated and cheap sources of energy (sun, wind, water, etc.) are essential. However, the easiest and most vital thing is our modernizing the existent housing resources, through major actions for preserving the energy. This requires significant efforts nationally and locally.

The introduction of the Quality System in Constructions – stipulated by the 10/1995 Law and the 29/2000 Order of the Romanian Government, referring to the building thermal rehabilitation and promoting the thermal energy savings – is part of our country's current approach. Our country's initial projects for the improvement of the heating system of several buildings that are local authority property are essential for the sustainable development. The requirement for an energy certificate for every building is an important measure, enabling the energy audit.

The European Union (EU) has investigated all the above mentioned issues. The EU has also compiled various studies on our country's current building environment. This paper is focusing on experimental and practical aspects of such studies. Its author took part in realizing the rehabilitation project for the common block of flats at 7 Tabacului Street, Iasi, Romania. He monitored and analyzed the project outcome throughout almost three-year usage of the building after the completion of its rehabilitation work.

The conducted public surveys revealed the need for adapting the building heating system to the new conditions following the rehabilitation, as well as the need for a thorough assessment of each consumer's energy consumption.

The "in situ" investigations revealed the fact that the thermal rehabilitation of the building enabled a high level of comfort of the interior heating, a better window glazing and a lack of wet and condense of the outside walls. Nevertheless natural ventilation for the interior environment – mainly the bedrooms – was not achieved. Hence the need for a frequent airing of the rooms by opening the windows, this leading to a significant heat loss.

The utilization of the IR thermograph was an efficient means for verifying the quality of the heat protection projects. One could obtain information concerning the status of different components which make up the building envelope using the analysis of the thermograph images. In the same time, the projects outcome contained details about the presence of thermal bridges, of faults in the isolation system, of spots affected by condense and penetration of water or air. Other results coming out from the projects revealed the fact that additional isolation reduced the



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negative effect of the thermal bridges and the heat loss through the building components that form the envelope.

An important conclusion is that the adjustments made for increasing the building's efficiency can not be limited to works at the envelope of the buildings and installations. The natural ventilation of the rooms is an essential factor, thus the present paper describes a method for airing a flat. Using the analogy between the flowing of air – considered an ideal, incompressible fluid without viscosity – and the thermal transmission through the conduction into a solid element, a new method of numerical simulation has been applied for the common block of flats from Iasi. By comparison, the results obtained before the thermal rehabilitation of the building and after its rehabilitation emphasize the need of means for the entrance of fresh air and for the evacuation of polluted air, due to the insufficient intermittent ventilation created when opening the windows.

The use of an advanced machine for reading the concentration of carbon dioxide allowed significant calculations of the ventilation rate for several spaces in the room. A low level of natural ventilation was once again noticed from values that resulted lower than those indicated by the current norms for thermo-technical projection. Taking this into consideration, new machines for realizing the ventilation were installed in the building, but the people living there did not use them, to avoid the energy consumption. Therefore means for natural ventilation were required for the spots with fixed carpeting.

In addition, we must emphasize the need for education on comfort and energy efficiency. The analysis of the microbial presence in the rehabilitated block of flats resulted from the researches conducted in the present paper are emphasizing the possible risk factors affecting the human habitat. The above-mentioned combined efforts would have significant contributions towards achieving the desired objectives.

The paper's objective is the efficiency assessment of the current measures used for the rehabilitation of the above-mentioned common block of flats in Iasi, in order to adjust them in line with the building sustainable development. The paper's topic is of great concern nowadays, given the society's technological progress, its compliance with the requirements for energy preservation for the civil buildings and its need for lowering the living expenses.

Keywords: sustainable development, civil buildings, energy conservation, interior environment, comfort and hygiene.

