

THERMAL ASPECTS OF BUILDING CONSTRUCTION

BACKGROUND AND PERSPECTIVES

(Supplement to sustainable development)

SUMMARY

Even though energy efficiency in buildings has been known as a term only since recently, this is definitely not a new branch of technical science, which is the main message of this book. We could say that energy efficiency has followed the development of mankind and civilization continuously, regardless of climatic and cultural diversity on our Planet. Having in mind the exhaustability of fossil fuels, it is necessary to provide certain guidelines for the generations to come, as they will inevitably be faced with the issue of rational fuel consumption, thus having to find new solutions in designing low energy buildings.

Even though this is a narrowly professional topic, knowledge from various scientific and professional areas – architecture, meteorology, archeology, ethnology and history - was used for the purpose of the necessary interdisciplinary profiling of the book. Ideas on construction which have to be borne on mind on designing new, low energy buildings are very old. Although thermal engineers can contribute to solving the issues of energy efficiency to the largest extent, it is also necessary to establish cooperation primarily with

architects, in order to achieve integrated designing of new, low energy buildings.

The contemporary passive solar architecture is in favour of the southern orientation of buildings. Such orientation is in line with the greatest gains from solar radiation. Buildings themselves, however, function thermally in the climatic surroundings dominated by daily fluctuations of the outside temperature. Non-stationary heating processes, as well as accumulation of heat in the walls, should be taken into consideration. Due to the fact that the need for heating is at its greatest in the morning, it is only logical that this should be the period of the day when solar radiation should be made most use of. This is why the southern orientation of buildings has become a problem. It is necessary to harmonise the supply of heat from solar radiation with thermal losses. This issue of optimum building orientation is very complex, and there is no simple, explicit answer to it.

The book consists of three chronologically sequenced units: the past, the present – the age of scientific approaches, and the future.

The first part of the book treats topics from the past, starting from prehistoric times, relating to the issue on house heating. Even though we may not be positive in stating the reasons which made the ancient builders resort to their architectural solutions, we can still state that the remains of their buildings do feature explicit bioclimatic aspects.

The second part of the book treats individual prominent architects of the later period whose work was an interesting topic for discussion from the thermal building construction standpoint: Frank

Lloyd Wright, Richard Buckminster Fuller, John Douglas Balcomb, Norman Foster, and others.

The third part of the book describes some problems which may arise in the future in terms of big cities with developed district heating systems, as well as application of renewable energy sources in district heating. Apart from individual building construction, sustainability of big cities, which rely on fossil fuels for heating, should also be taken into consideration. This especially relates to the regional issue of sustainability of Belgrade, so that special attention was paid to bioclimatic improvements which may be implemented in Belgrade, as well as implementation of renewable energy sources in a district heating system.

Unless thermal aspects of building construction are not taken into consideration, we may reach the situation in which buildings could become useless throughout a larger portion of a year. Apart from this, interest in implementation of renewable energy sources may contribute to sustainability of rural regions and their accelerated development.