

## Press Report

The research plan MSMT 6840770005 financed by the Ministry of Education, Youth and Sports of the Czech Republic under the name “Sustainable Construction” was carried out during the period 2005 - 2011 at the Czech Technical University, in the Faculty of Civil Engineering, where Professor Eng. Ivan Vaníček, DrSc. was the responsible lead researcher.

The wide spectrum of research workers available in the Faculty of Civil Engineering, leaving aside the individual building specialists, also enabled the incorporation into the research team sociologists, architects, ecologists and economists and this greatly helped to elaborate the basic thoughts on the Sustainable Development of Society, defined at the highest world level at Rio de Janeiro in 1992, bringing them into the field of civil engineering and subsequently to help offer solutions to the problems and thus giving to research in civil engineering a new dimension. All this comes under a general objective which seeks to respond to the sensitive questions of society with regard to energy savings, raw materials, land property (green fields) or as the case may be to the questions connected with the risk of endangering human health and lives during natural disasters, crashes, and accidents. A technical solution thus looks for new dimensions in close connection with ecological, sociological, architectural and economic solutions, which, however, must be competitive.

The effort to save the acquisition of natural land (green fields) with a daily consumption of about 180,000 m<sup>2</sup>, leads to the necessity of creating the conditions for a preference of construction on plots of land already used before, now undervalued and even devalued, labeled as brownfield sites. The outputs of the solutions give not only the technical solutions to specific problems but also practical recommendations for example from the viewpoint of the decision procedure, giving practical examples of the solution and an appropriate form for incorporating the results into the new territorial plan.

From an energy saving viewpoint, big possibilities are connected with a new look at all phases in the lifetime of buildings, where about 40% of entire energy is consumed. The research solution concentrated on three basic spheres - on structural systems with a significant limitation of energy loss, on building services, in general on a healthy internal environment where people spend most of their time, and last but not least, on alternative energy resources for the minimization of the demand for consumption of external energy, and in the case of passive houses leading to their elimination. From alternative resources the main attention was focused on solar and geothermal energy. Experimental models and buildings enabled the definition of basic principles in this direction.

The protection of raw material resources, also for following generations, is from the civil engineering viewpoint connected with savings of natural aggregates and bitumen, their recycling or replacing by waste such as building and demolition waste, power plant fly ash and other large volume waste. Regarding bitumen savings, attention was focused on roads surfaced with asphalt with the aim to reach a 100% recycling. For large volume waste there were elaborated individual phases from the method of demolition, collection, classification, development of the commodity exchange for trading with waste, and right up to the applied research, the direct use of the recycling agent into concrete or earth structures, or its use for the production of new building materials with new specific properties.

With the common feature of natural disasters, crashes and accidents there is the question of risk, connected with the frequency of occurrence and consequent damage along with the aim of decreasing the negative impact on economic optimization of protective measures. With regard to this risk there were also specified technical solutions. This is given from the viewpoint of natural disasters, to floods, slope failures and rock fall. The accident rate was monitored for the transport infrastructure, for road transport, that is in relation to the participants in road traffic, their clash with partial structures, from the viewpoint of crossroad

solutions, sign efficiency, possible collision with animals, or crashes involving containers of dangerous material. The impact of fire on the behaviour of structures was studied on experimental models in the scale 1:1. The results from this work package influenced new European research project which just started under the leadership of researchers of our project.

For example more than 60 defended PhD theses, almost 1,000 outputs from monographs and on up to patents point to the extent of the set of problems solved. The outputs from the First International Conference “Sustainable Construction”, Prague 2011 are made accessible at web pages [www.udrzitelnavystavba.cz](http://www.udrzitelnavystavba.cz).

Looking back from the time of the preparation of the project to the present, it is possible to unequivocally state that the public perceives the need for such solutions that through time, would allow to be created not only the technical conditions for the successful solution of the basic idea, but also the legislative conditions. At the same time it is possible to state that the process is very long- term, indeed not finite, because it has to be continuously adapted to new situations, needs and conditions.