

# **ENERGY EFFICIENT BUILDING IN THE CONTEXT OF DEVELOPMENT STRATEGY OF MALOPOLSKA**

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## **Summary**

This paper presents a scale of Malopolska region with particular emphasis on the actions taken by the team of Cracow University of Technology in cooperation with local government Malopolska. Cracow University of Technology activities are intended to bring the region into the new building standards by providing research opportunities through the implementation of training and research to the economy. It has to contribute to the development and dissemination of nearly zero energy buildings in Małopolska. The first objective of these activities is to run the Malopolskie Laboratory of Energy-saving Building.

**Keywords:** energy efficient, NZEB, Malopolska region, Malopolska Laboratory of Energy-saving Building, Cracow University of Technology

## **1 Introduction**

Polish development strategy is consistent with European, including the development of an innovative knowledge-based economy. In the area of construction requirements and the provisions of the European Commission (EU Directive, the Accession Treaty, the Kyoto Protocol) are particularly important for Poland and can be seen as an attempt to implement them. Consistent with the policy of the EU Member States require our many clever and quick decisions. Particularly important are deadlines laid down in Directive 31/2010 EPBD, determining the date of the introduction of the standard "nearly zero energy construction."

The building of nearly zero energy requirements, as defined in Directive 31/2010 EPBD recast [5], is a building of very high energy performance. The nearly zero or very small amount of energy required should be covered to a very significant extent by energy from renewable sources produced on-site or nearby.

In the light of these requirements, construction in Poland awaits a thorough transformation of traditional construction into construction of a very low power consumption. This involves activities in many areas and the need to adapt to new challenges very quickly.

## **2 Building the future of Malopolska**

In many areas, the researchers use their intellectual potential of implementing innovative projects, opening new prospects for development. Possibilities for financing large projects

are within easy reach. Using the available EU funds, we can plan and implement interesting and innovative projects at the highest level of technological advancement. Authorities from Malopolska decided to determine the development potential of the region, selecting 10 technology from the point of view of the needs, experiences and facilities (including research) that are most urgent to implement in region and have the best chance of rapid development. The analysis was conducted by Foresight project 'Technological Perspective Krakow – 2020 "[1], [2]. Selected by experts technologies have generated the development of industry and the economy, but in close conjunction with research potential from universities in Malopolska. As one of the 10 future technology, experts bearing in mind inter alia, the need to fit the standards in the construction sector to the requirements of the EU and the fact that construction is the direction leading to the Cracow University of Technology (faculty, postgraduate studies, laboratories, specialists from various sectors of construction), have chosen Self-sufficient Energy Construction technology.

By definition, self-sufficient energy construction are materials, technologies and know-how necessary to build self-sufficient houses, adapted to local conditions. They provide energy for heating, cooling, cooking and electricity for lighting.

It's part of the construction of the so-called passive houses technology. It can be assumed that this definition fits quite well in the context of "nearly zero energy buildings", which is really the Poland has not defined yet.

The challenges imposed by the European Union's policy in the area of energy use and emissions, particularly in the construction sector are very demanding. With the approval of the climate package [4] in 2007, which obliges member states to reduce energy consumption by 20 %, reducing greenhouse gas emissions by 20 % and increase the share of renewable energy by 20 % (for Polish 15 %) until the adoption by the European Parliament 18.05.2011 the Directive 31/2010 EPBD [5] outlining the changes in the design, implementation and use of buildings. The concept of building "nearly zero energy" or "zero energy", formerly the theory, which recently have become a requirement for the foreseeable future.

EU obliges Member States to develop plans to increase financial support mechanisms of actions taken, from 31. 12. 2020 (after 31. 12. 2018 all newly designed buildings occupied by public authorities) that this type of construction has become a standard. According to estimates of the communal household, with it's determined energy consumption of 40 % of total energy consumption is an important potential in contributing to energy savings. There is no nationally agreed definition of the 'nearly zero energy', and there are no examples of the implementation of such construction. Knowledge of the design and erection of such buildings is not common. Demonstration buildings, often called "passive" there are only few in Poland, [8], but confirmation of their real passivity takes time and verification.

One of the most promising concept is taken in several European countries initiative to study low-energy objects in the real scale [6], they are called. study "in situ". They consist in designing and building an elevated laboratory where installed and tested during use different equipment or building construction elements. Such studies make it possible to formulate more accurate assessments of the solutions, and also allow you to check prototype innovation studies.

Government budget allocated Malopolska MRPO [3] 3.5 million for a project to research laboratory energy-saving technologies. "Malopolska Laboratory of energy-saving buildings". Funding has been granted under the action of the Cracow University of Technology, Krakow Metropolitan Area as an important node of the European Research Area.

### **3 Malopolskie Laboratory of energy-saving buildings (MLBE)**

Motion MLBE consists of two complementary parts and coherent.

The first element of the project is to design and erect a research and diagnostic laboratory for the testing and evaluation of technologies and solutions to material and construction and installation used in buildings with reduced energy demand, on a plot of Cracow University of Technology. This action is in response to the current needs of the construction market (producers and traders), which offers an opportunity for emerging laboratory research products and technologies, especially in terms of thermal performance of building materials and installation systems for energy-efficient building. In Poland, the research on the characteristics of the materials in the field of thermal protection is provided by a separate laboratory facilities. Lack of competition is the reason that entrepreneurs perform the test in a cheaper, more easily available to foreign centers, or open laboratories for their own needs. Malopolskie Laboratory Energy-saving building having adequate research facilities, in line with the expectations and needs of Malopolska manufacturers market research products, in particular qualities of thermal insulation. During the first 5 years of the MLBE will promote its research capabilities by offering free tests on the basis of analyzes and studies. Such action will be to identify the needs of the area, as well as indication of the uses of specific technologies and products.



*Fig. 1 Visualization of MLBE*

Another integral part of the project is to design and run a "Polygon efficiency" in the School of Construction in Tarnow. "Energy-saving Polygon" will be an area comprising studios and workshops to learn and practical implementation of building technology "nearly zero energy". This action will provide a highly trained workforce for what is essential to achieve the objective of the project. Polygon activity energy efficiency will also be the nature of laboratory. Students of the School Building will rise building model with low energy demand (nearly zero energy, passive), then under the patronage of Cracow University of Technology researchers, will perform confirmatory testing the energy efficiency of the technologies involved. Reference buildings made by students of the School of Construction will be demonstrated, and by making them available to the public, they will be part of Malopolska increasing public awareness of the needs and benefits of investing in the construction of the reduced demand for energy.

MLBP is the start-up stage of the construction process, the subsequent stages of the Polish-scale pilot project, the team will inform MLBE to date.

#### **4 MAŁOPOLSKA CENTRE OF ENERGY-EFFICIENT CONSTRUCTION – Project SPIN, transfer of innovation in Galicia**

Lesser Energy Efficient Building Lab is dedicated to both scientists and entrepreneurs, mainly from the region of Malopolska. The purpose of this unit is to develop innovative technologies and advanced research on them. Laboratory and research facilities, the position of laboratory test procedures. To function well it still needs to create a group of interested customers and partners. For this purpose, Cracow University of Technology in cooperation with authorities of the region as well as other Universities are responsible for implementing the other leading technologies drafted SPIN – model of technology transfer in Galicia.

Assumptions SPIN project is to develop a platform of cooperation between science and industry. The aim is a partnership of scientists and entrepreneurs develop innovative new technologies, creating the region as a leader in the implementation of energy efficient construction as standard, resulting in fulfillment of the obligations Polish to run EU policy in this area. Cracow University of Technology is engaged in the elaboration of cooperation between entrepreneurs working in the field of energy-saving construction with groups of scientists, ready to take up challenges such as involving the development of better tech materials. The project involves the operation, ie adjust the curricula of Cracow University to new needs in the construction industry and a number of other activities.

The most important effects of the Project SPIN – Cracow University of Technology is calling MAŁOPOLSKA CENTRE OF ENERGY-EFFICIENT CONSTRUCTION (MCEC). This is the body responsible for all activities under the project.

MBE staff will collect information about entrepreneurs in the region to meet with them and present opportunities for cooperation with the Technical University of Cracow, offering assistance in the development of innovative new products. Also, staff will present entrepreneurs MCEC research capabilities of the University, including MLEC. The study will be conducted for those interested in non-profit organizations. Another important measure is to create a directory MCEC finished low energy building design solutions with cost-effectiveness analyzes. The projects will be made available to interested parties free of charge, subject to the obligations that the building will be completed. MCEC will also

provide consulting services and expert analysis. In addition to workers on permanent contracts MCEC, research work will be performed by students from the established interdepartmental academic circles, as well as graduates and researchers interested in the PK. MCEC also conduct campaigns for vocational education, training of teachers and students of construction work for the correct execution of low-energy buildings. MCEC activities will also be based on international cooperation, exchange of experience and ongoing review of best practices in the European Union. SPIN project is financed by the Operational Programme, Human Resources.

## **5 CONCLUSIONS**

The European Union has for several years carried a strong and effective policies in the field of energy efficiency. Member states with better or for worse join in it, moving the display Directives and other documents to the national laws and actions. Malopolska wanting to stand out from other Polish regions, for several years very successfully and comprehensively take action in regional politics. The authorities in the region include Higher Colleges of action where intellectual capital is accumulated and create links with different sectors of the economy. Cracow University of Technology operates in the development of energy efficiency in buildings. The result has been the development Malopolska Laboratory of Energy-Efficient Building and the establishment and operation of the Malopolska Centre for Energy-Efficient Building. We hope that this comprehensive approach will result in tangible benefits for the economy as a result, Polish European Union.

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