

„Preliminary studies of selected materials, technologies, buildings and their management systems in terms of compatibility, impact on the quality of life and sustainability to clarify the solving problems “

General conclusions

In the result of completion of project activity, No 3 “Preliminary studies of selected materials, technologies, buildings and their management systems in terms of compatibility, impact on the quality of life and sustainability to clarify the solving problems” (next activity after activity No 2) which was implemented during a period of 9 months from 1 July 2017 till 31 March 2018 the following aspects of nZEB were preselected, described and characterised in this report:

- Possible local (regional) and innovative materials and structural solutions (especially also light weight and wooden product structures) for nZEB;
- Potentially usable heating, ventilation and cooling systems (HAVAC) which include both passive solutions (for example phase change materials (PCM)) and usage of different assessable renewable resources (e.g. heat pumps) which is mandatory for nZEB;
- Management systems of smart buildings (BMS), data exchange protocols and alternatives for its software;
- Necessary sensors (especially wireless) for management and monitoring, data collection and accumulation;
- Possible options for using energy efficiency calculation programs that ensure correspondence to both EN standards and Latvian Building regulations (Regulations of the Cabinet of Ministers) for designing nZEB's;
- Aspects important to ensuring good environment quality for people's lives and the sustainability of building structures;
- Possible solutions for small public nZEB's as well as for light carcass and container type buildings for further evaluation.

Different sources of information (scientific and technic literature, scientific and technical reports, other information sources including materials on the internet, also seminars, conferences and exhibitions, as well information from branch professionals) are also listed and characterised in this report.

The main goal of this project activity - to identify and made preliminary studies for possible sustainable materials, constructive solutions, building systems and their management software that in principle can be used in nZEB in a temperate climate zone, including Latvia, and for which it would be useful to do deeper analysis and testing of relevant physical characteristics in laboratory (Activity No 4) and also in real exploitation conditions - is reached.

Objects for trials in real climate conditions and long-term monitoring activities are chosen:

- Existing energy efficiency testing plant at the Botanic garden of University of Latvia with five small buildings equipped with different heating, ventilation and cooling systems and with sensors and data acquisition systems for long-term monitoring;

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- Business support centre SALA in Aloja which is built in 2016 according to nZEB requirements;
- Business park in Riga constructed several years ago with high level energy efficiency requirements.

Focus directions of future research activities are formulated:

- testing of different perspective for nZEB local and innovative materials in laboratory conditions and also in real climate conditions;
- development of light weight structures and using of wooden products for nZEB applications (because wood is typical local resource) in combination with innovative insulation materials;
- Analysis of sustainability of complex and energy saving building structures, especially dynamic of moisture and mould growth risks;
- Solutions for the public nZEB because already from 2019 the public buildings in Latvia should be built according to nZEB requirements on energy efficiency set out in the EU Parliament directive 2012/27/ES which are described in detail in Regulation of the Cabinet of Ministers from 2013 No 383 about energy certification of buildings.

To work out the possible solutions for future research and applications in this stage several nZEB project sketches were developed and discussed, they will be developed in details and their energy efficiency analysis is planned in future phases of work.

Data collected and analysed in this project activity is sufficient for future in deep research and for successful realisation of project as whole.