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Contemporary low-tech as sustainable approach in constructions

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https://www.activehouse.info/construction-sector-is-key-to-europes-energy-and-resource-efficiency/

The circular economy package, adopted by the EC on 2 December 2015, has created an important momentum to support the transition towards a more circular economy in the EU. This package included legislative proposals on waste, with long -term targets to reduce landfilling and increase recycling and reuse.

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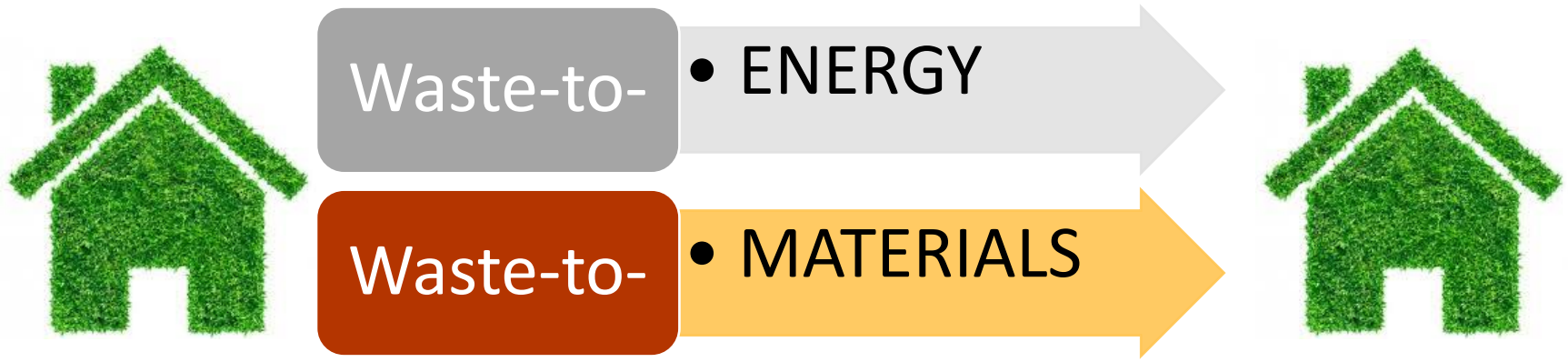
IN THE CONTEXT OF BUILDING SECTOR



The Waste Framework Directive 2008/98/EC establishes a target of 70% of construction and demolition waste to be recovered by 2020. However the potential for reuse and recycling of this waste stream is not being fully exploited. One obstacle is the lack of confidence in the quality of construction and demolition recycled materials.

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BUILDING MATERIALS MADE FROM WASTE

AGRICULTURE WASTE

Straw, hemp, reed, flax etc. as pure and asaggregate

DOMESTIC WASTE

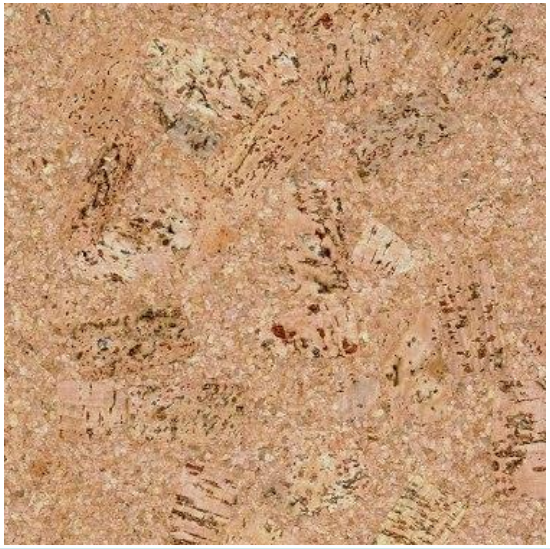
Newspaper Wood

http://www.newspaperwood.com/about/

Nappy roofing

http://www.buildersmerchantsnews.co.uk/news/archivestory.php/aid/551/From_nappy_to_roof_tile.html

Wine cork panels



INDUSTRIALIZED EXAMPLES

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HOME-MADE INDIVIDUAL APPROACH

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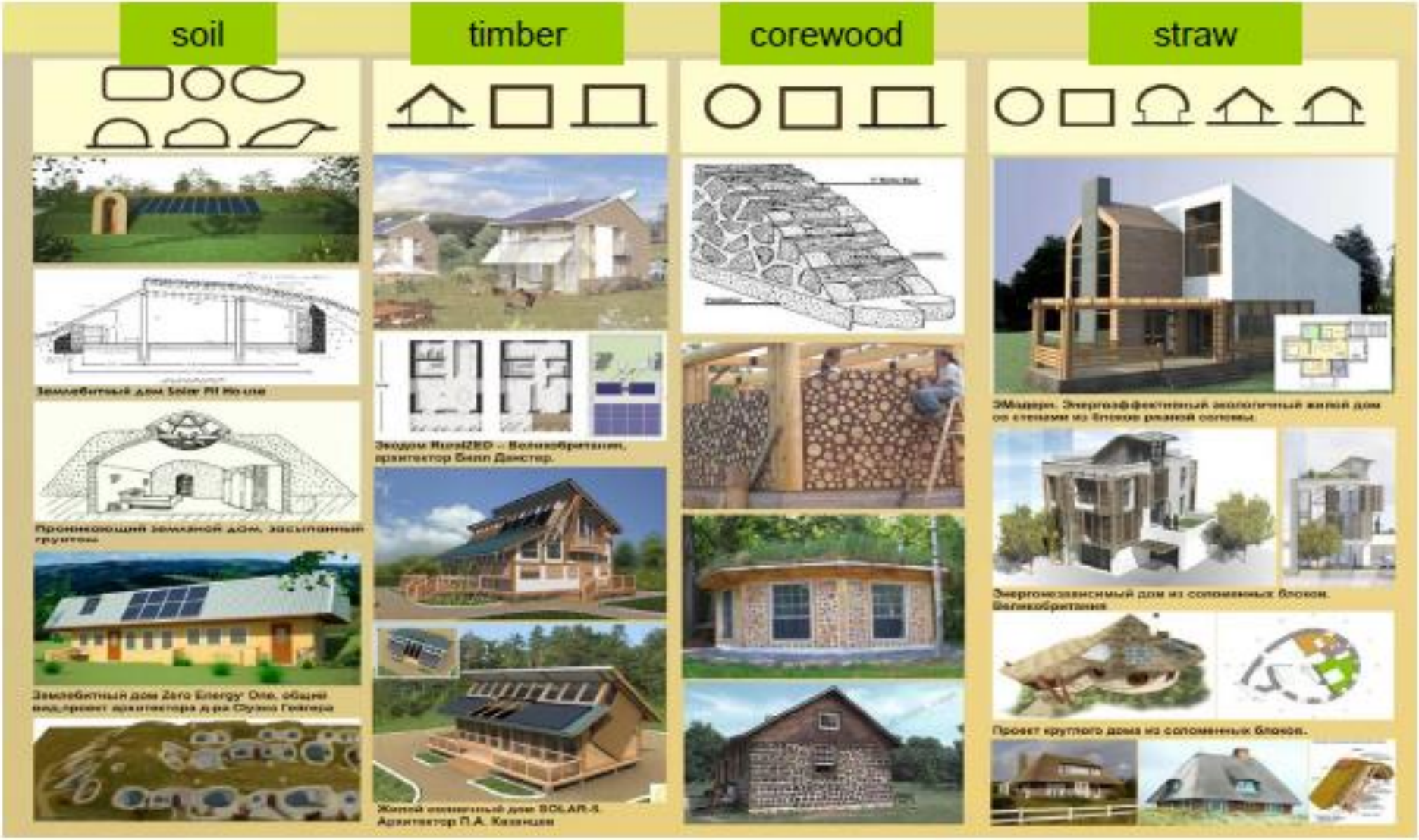
soil
timber
corewood
straw

Innovative projects of reconstruction of first mass series residential buildings

First ukrainian energy efficient individual building
Optima House
http://www.optimahouse.com.ua/

First ukrainian earth-sheltered building

Landscape and recreational center “Quiet Lake”

Social ecological complex "Bogdanovka"

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CONCEPTION TRIPLE ZERO

IT IS NOT ABOUT GOING TO ABSOLUTE ZERO
IT IS ABOUT COMPENSATION

Zero here is considered not in the absolute, but in the conventional sense, according to this concept, it is a question of compensation on a global scale (for the preservation of the ecology of the planet) and in the local application (concrete steps) of the principles of sustainable development. At the same time, the global effect can only be achieved through an integrated approach that combines the principles of environmental and energy efficiency both in the reconstruction of buildings and in new construction.

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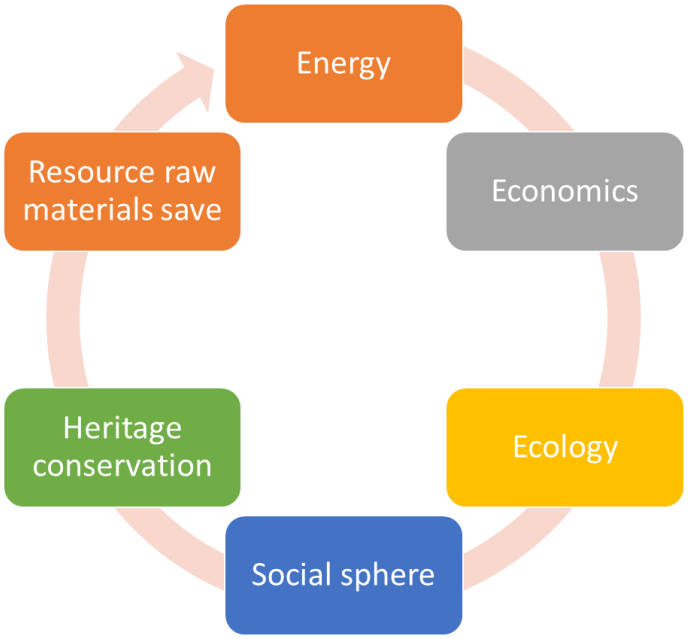
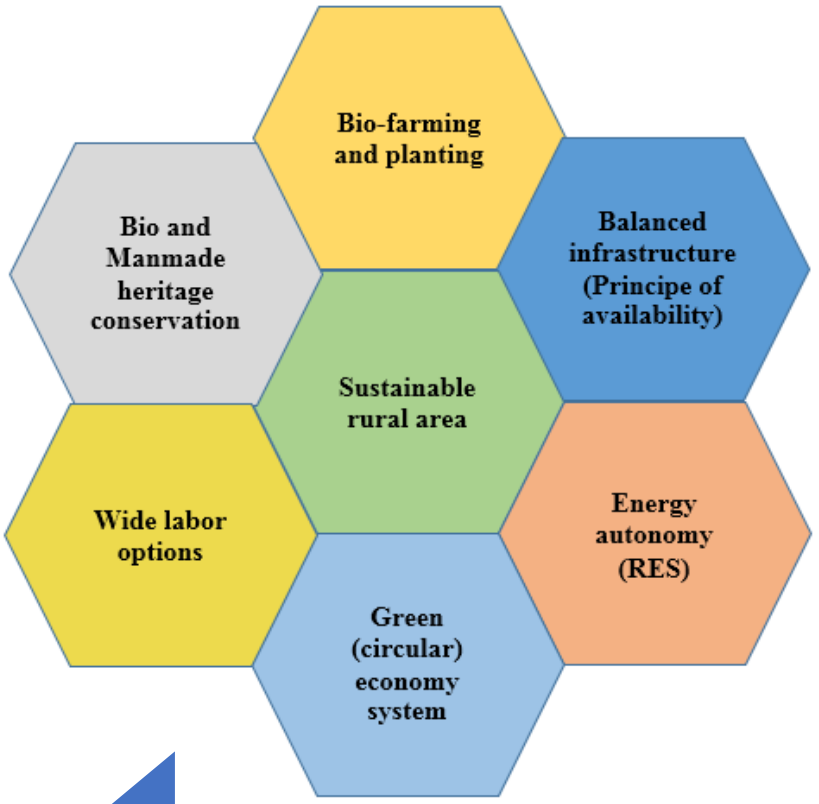
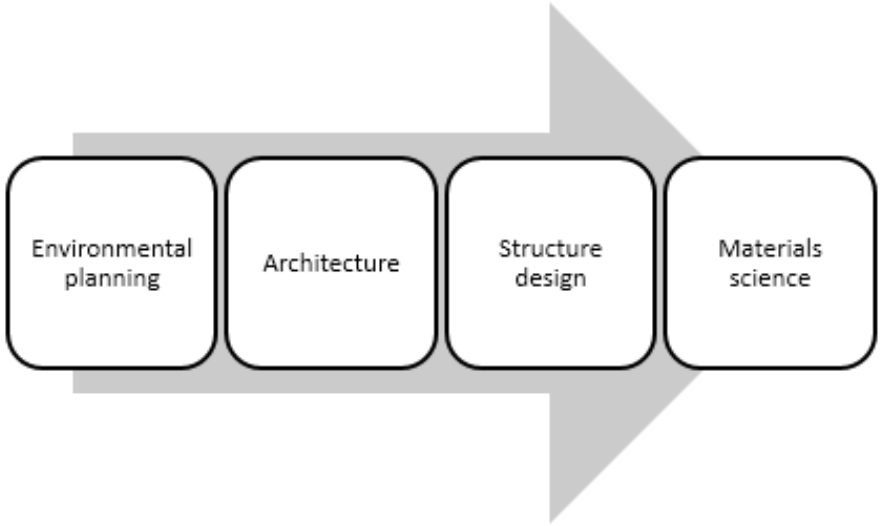
Fundamental approach of the research







Eco-Law-Tech

Smart-High-Tech

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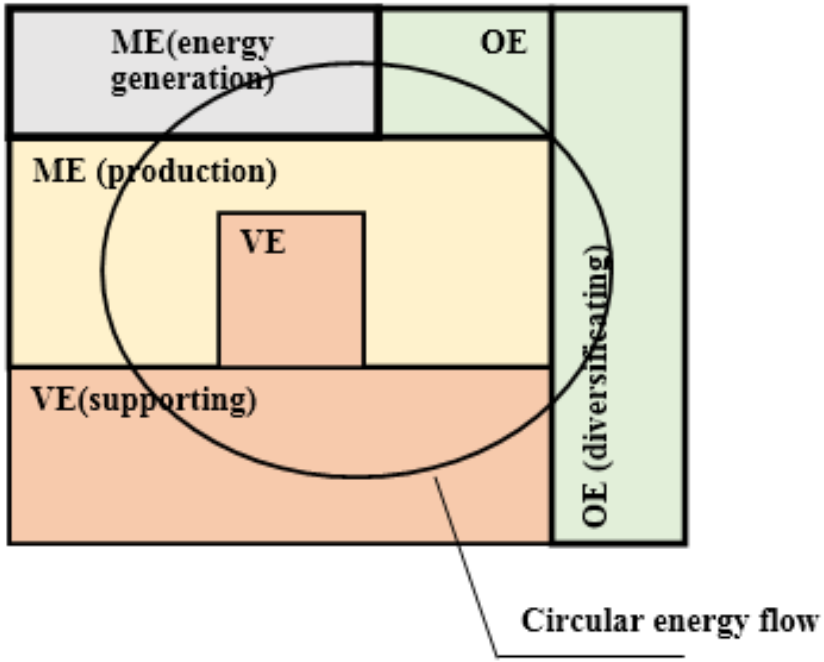
Elements of hybrid multi-functional building solutions

The main idea of the research work is the development of design solutions of energy and ecology positive structures (buildings and combination of buildings) for rural area with wide application of renewable energy sources including agriculture waste. This approach is based on combination buildings with different functions to the autonomic unite. The cost minimization is considered in line with economical, ecological and comfort quality, e.g. building sustainability.



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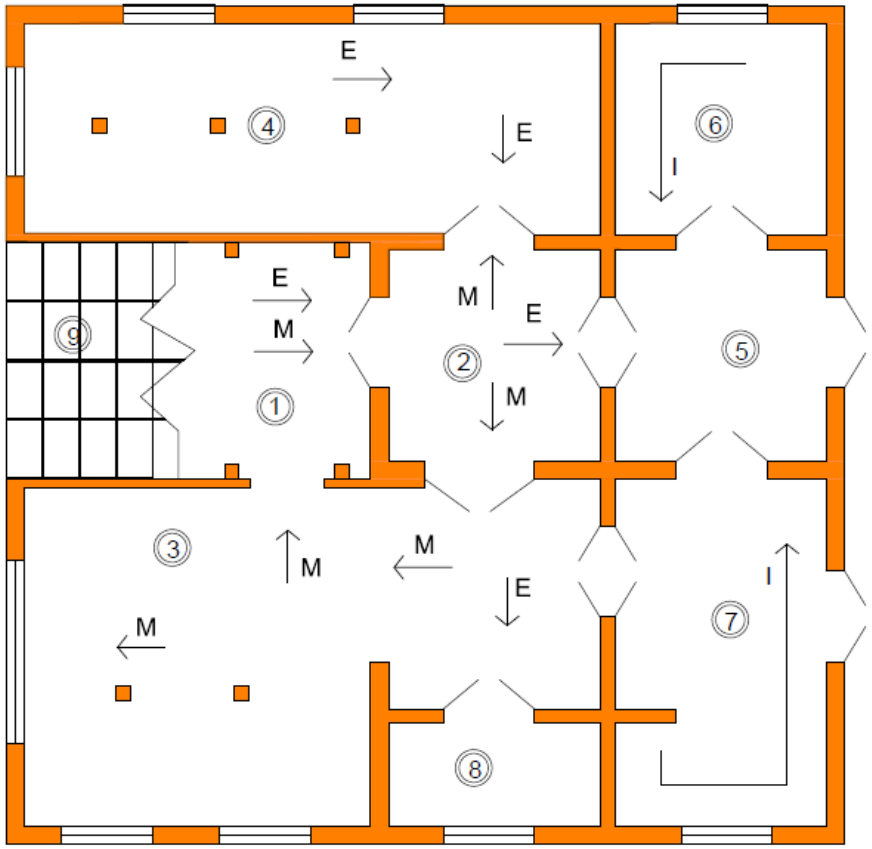
Elements of hybrid multi-functional building solutions



1-Raw materials stock; 2- Dissemination section; 3 – Line for eco-buildings frame elements production with the laboratory; 4 – Engineering center of the energy production and distribution; 5 – Communication and logistic administrative office; 6 – Bureau of design of eco-buildings` elements; 7- Conference, presentations, meeting space; 8 – Staff rest area; 9 – Fragment of the complex installation for solar energy use (PV + helio panels)
E – energy flow; M – materials flow; I – information flow.

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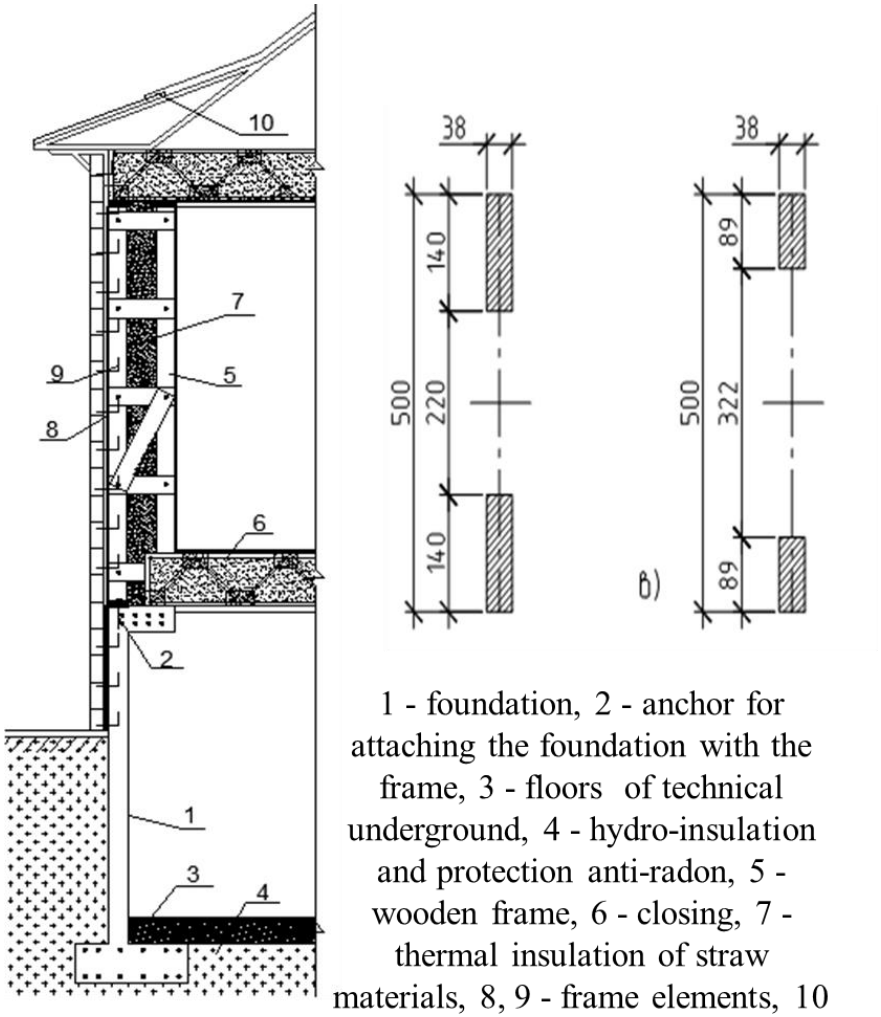
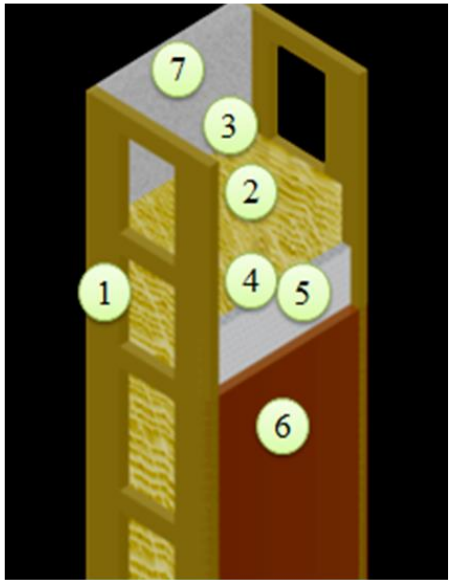
Elements of hybrid multi-functional building solutions



1 - foundation, 2 - anchor for attaching the foundation with the frame, 3 - floors of technical underground, 4 - hydro-insulation and protection anti-radon, 5 - wooden frame, 6 - closing, 7 - thermal insulation of straw materials, 8, 9 - frame elements, 10 -roofing;



1 - wooden frame, 2 - thermo-insulation, 3 - vapor barrier, 4 - windscreen 5- grid, 6 - clay plaster, 7 - smoothing

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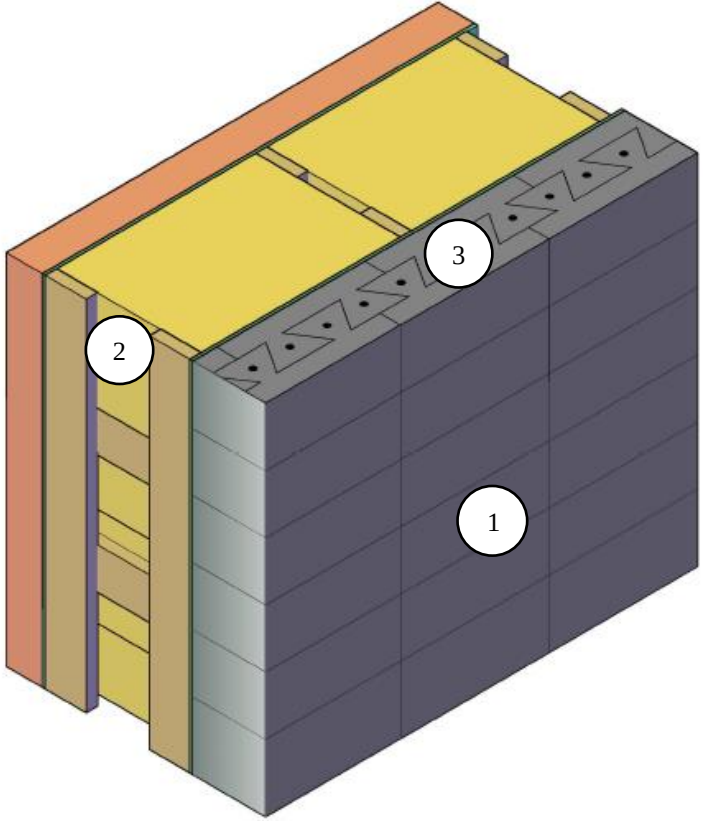

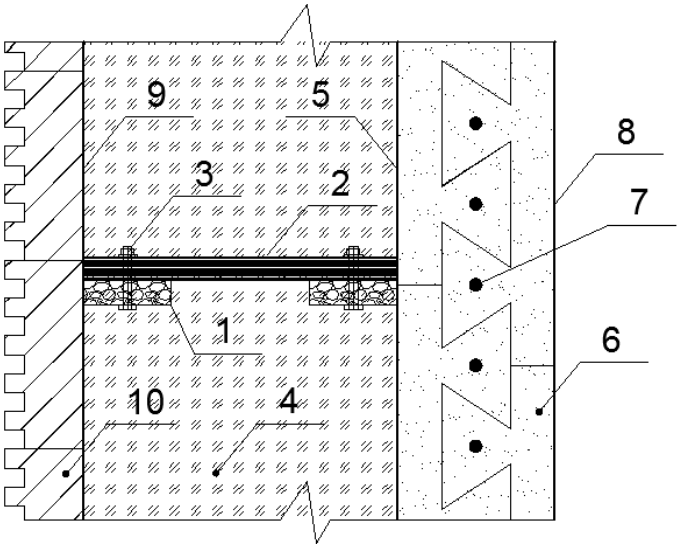

General view of the element of wall, where 1- accumulation layer; 2 – thermal insulation layer; 3- protective layer.

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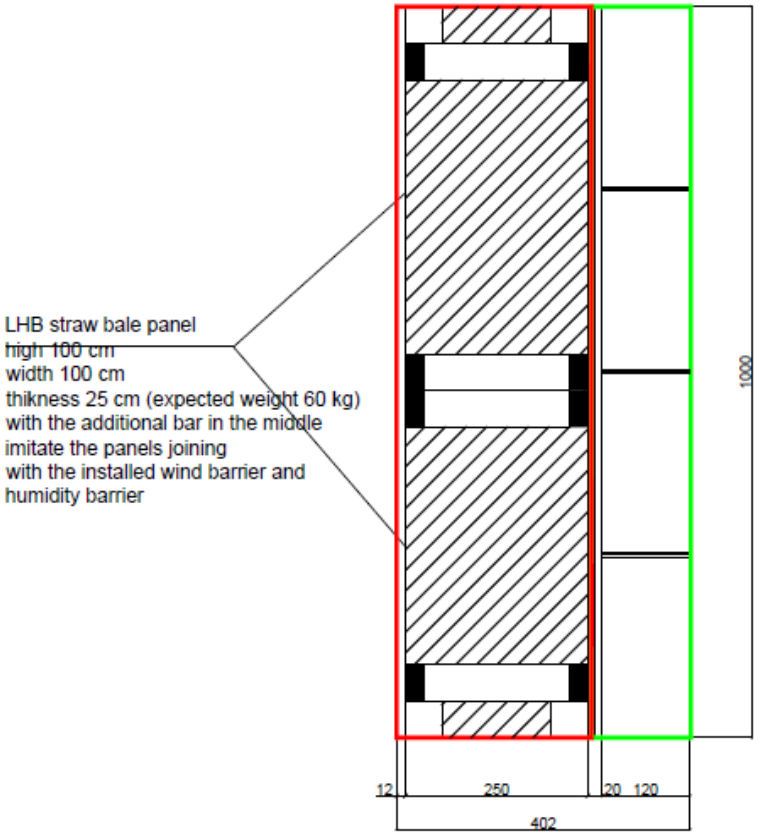

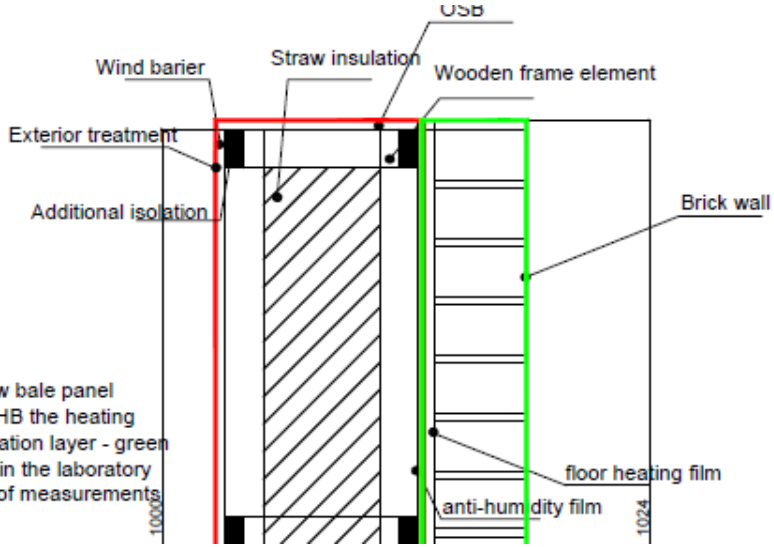

*in red square the straw bale panel element provided by LHB the heating elements and accumulation layer - green square - will be added in the laboratory STU for second stage of measurements

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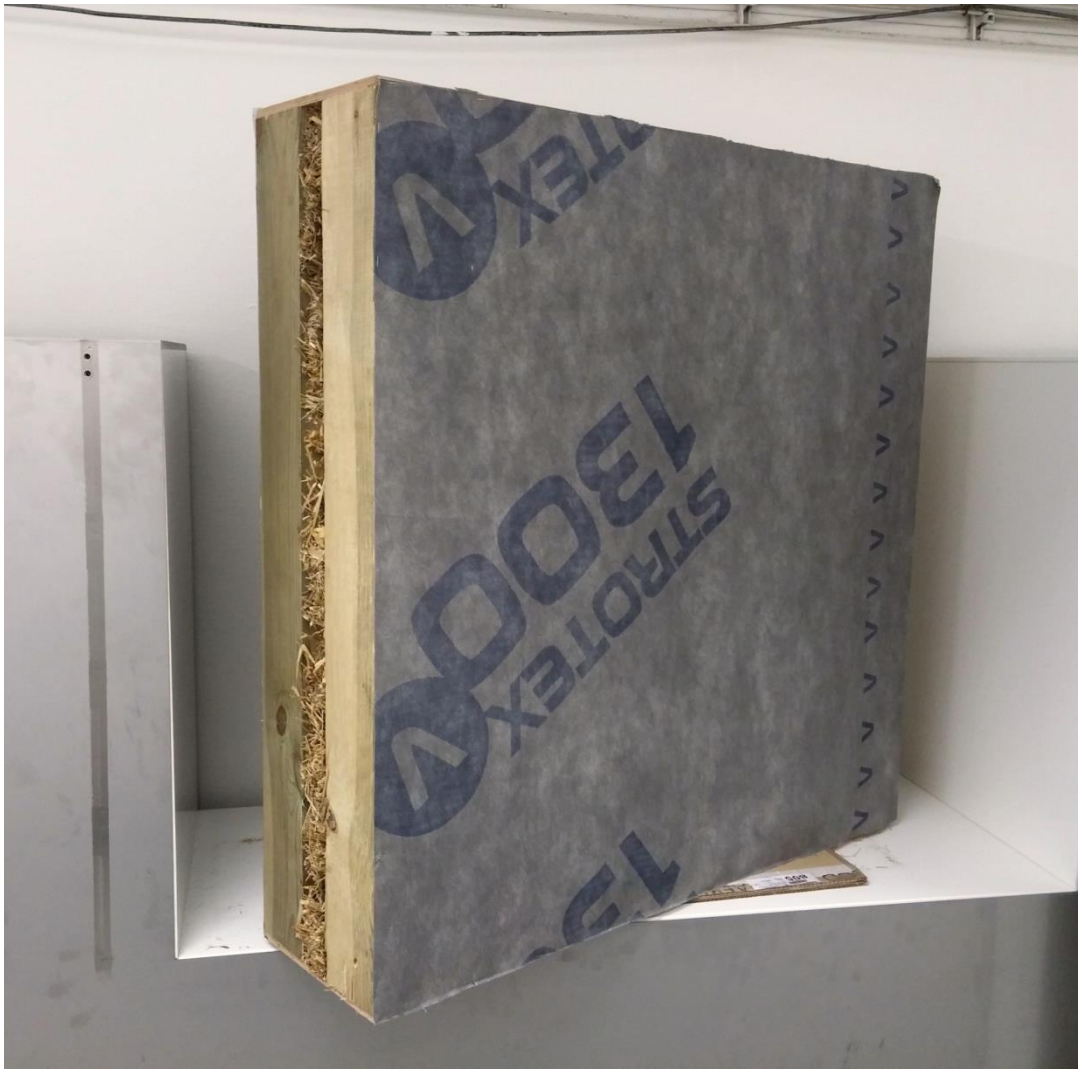

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COEFFICIENT OF THERMAL CONDUCTIBILITY UNDER DIFFERENT THERMAL CONDITIONS STRAW PANEL

Temperature regime, °C	U, W/m2K	Coefficient of thermos-transmission in different temperature regimes, W/mK
-15	0.38	0.095
-5	0.32	0.08
+5	0.27	0.068

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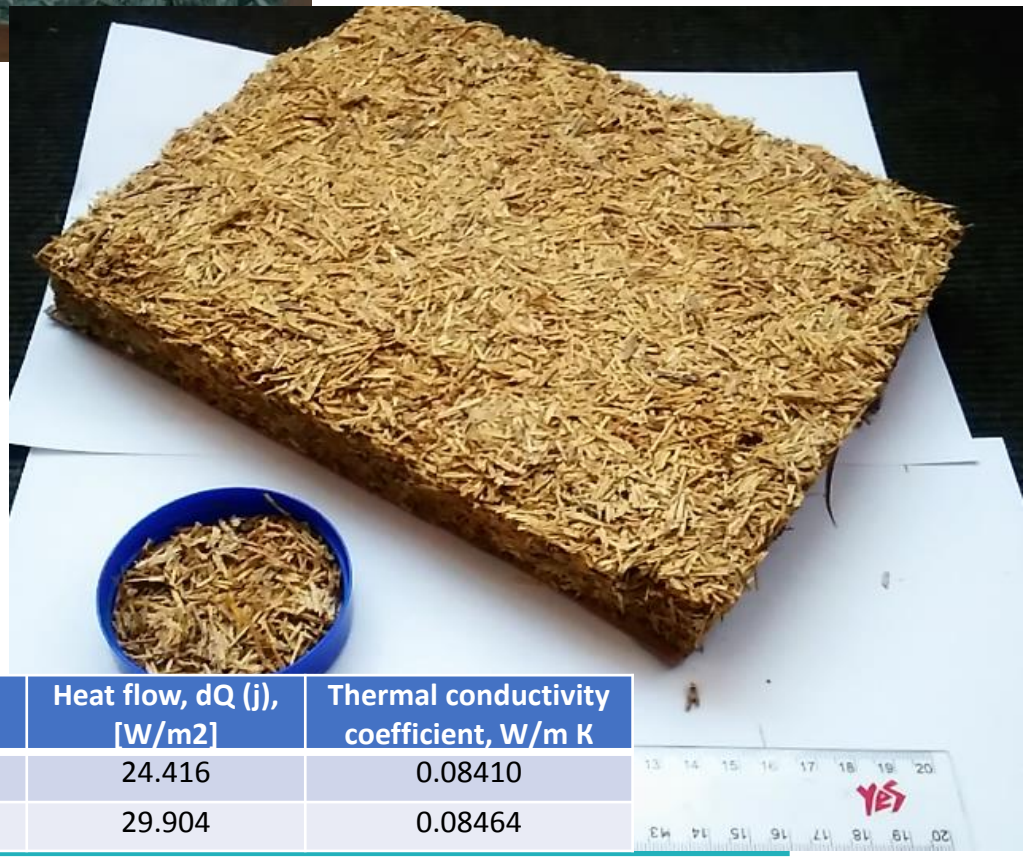

Composition	Density, kg/m^3	Heat flow, dQ (j), [W/m2]	Thermal conductivity coefficient, W/m K
flax straw insulation Л1	311.7	24.416	0.08410
flax straw insulation Л2	336.2	29.904	0.08464

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THANK YOU FOR ATTENTION!

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