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#### **BACKGROUND**

The construction industry and households significantly impact climate change and pollution. This issue is particularly critical in Bosnia and Herzegovina, where air pollution is at a severe stage. The World Green Building Council reports that the buildings and construction sector are responsible for 39% of global energy-related carbon emissions. Traditional construction methods often overlook the environmental impact of high embodied energy in materials, leading to poor thermal performance and high household energy consumption, which contributes to air pollution and greenhouse gas emissions.

In contrast, natural, low-emission materials like straw and clay are widely available and have a minimal ecological footprint, as they generate no waste during construction. The knowledge and materials for building eco-houses, including the 30-year-old passive standard method, are readily available. While thousands of straw houses exist in Western Europe—including apartment buildings and schools —and hundreds of eco-houses have been built in V4 countries (Czechia, Hungary, Poland, and Slovakia) by dedicated enthusiasts, expertise remains limited in Bosnia and Herzegovina.

The project Transformative Approach to Combat Climate Change through Eco-Housing in Bosnia and Herzegovina and Western Balkan region supported by the International Visegrad Fund, directly addresses this gap. It aims to build practical skills among craftsmen and raise public awareness of low-emission natural materials and passive building standards. By facilitating an exchange of experience and strengthening partnerships between V4 countries and the Western Balkans, the project seeks to transfer the established knowledge and skills from V4 nations to Bosnia and Herzegovina for sustainable local impact.

For further information, please visit the project website: <a href="https://sccd-sk.org/projekty/transformative-approach-to-combat-climate-change-through-eco-housing-in-bosnia-and-herzegovina-and-western-balkan-region/">https://sccd-sk.org/projekty/transformative-approach-to-combat-climate-change-through-eco-housing-in-bosnia-and-herzegovina-and-western-balkan-region/</a>

#### INTRODUCTION

The foundation of sustainable architecture lies not in new technology, but in a respectful understanding of the past. For millennia, traditional vernacular architecture across Central and Eastern Europe has embodied a deep ecological wisdom, utilizing local materials like clay, wood, and stone. These methods, which adapted building practices to the climate and terrain, created structures with remarkable durability and minimal environmental impact. This is the heritage of a building culture that prioritized regional self-sufficiency and environmental harmony.

This tradition teaches us that the truest form of sustainable building is non-building. When new construction is necessary, this philosophy manifests as a minimized and optimized architectural approach, which gives rise to the concept of the tiny house. These homes are designed to eliminate unnecessary square meters and redundant materials, thereby minimizing waste and resource consumption. The design is optimized for extreme practicality and functionality, proving that a home can be small, highly functional, and comfortable. This approach, embodying the "small is beautiful" philosophy, demonstrates how intentional, minimal design can lead to beautiful, functional, and environmentally responsible living spaces.

Ecological responsibility extends beyond new construction to the renovation and reuse of existing buildings, which is a crucial aspect of the circular economy. The restoration of historic buildings, for example, demands a specialized knowledge of traditional techniques and careful material handling to preserve their integrity.

The revival of natural building is a testament to this timeless knowledge, bridging the gap between historical wisdom and contemporary needs. By studying, reinterpreting, and adapting historical methods, material usage, and technical solutions, we can meet today's demand for sustainable housing. This handbook presents examples of this essential connection, showing how these time-tested techniques can be successfully applied today to build a healthier, more sustainable future.

# 1. REVIVING THE TRADITION OF NATURAL BUILDING AND THE PATH TO SUSTAINABLE ECO-HOUSING IN BOSNIA AND HERZEGOVINA

Authors: Borislav Đurić and Miodrag Matavulj

#### **Tradition in Service of Development**

Bosnia and Herzegovina possess a rich, yet underutilized, heritage of natural building. The country's folk architecture reflects a deeply rooted ecological wisdom, with a history of traditional mud brick houses, dry stone walls, and log cabins. These buildings were constructed from local materials—stone, clay, and wood—and were adapted to the climate and terrain, resulting in high durability and minimal environmental impact.

A prime example of this is the first primary school in Bosnia and Herzegovina, built in 1857 in the village of Gerzovo. Although it is currently in a state of decay, the building stands as a testament to the local craftsmanship that created a durable structure using stone without modern machinery. Today, these traditional practices—including cob construction, dry stone walling, wood handcrafting, and natural insulation—provide a valuable foundation for developing modern, local natural building standards.

#### **Modern Trends**

Today, several initiatives aim to revive this tradition in the modern context. One of the most notable examples is Professor Dr. Ognjen Šukalo from the Faculty of Architecture, Civil Engineering, and Geodesy at the University of Banja Luka, who is not only a pioneer in educating students about natural building but is also building a house from natural materials without modern energy sources, near the city. His work in promoting sustainable architecture is based on transmitting traditional knowledge while meeting modern comfort and safety standards.

Another striking example comes from the village of Rakova Noga near Kreševo, where two sisters built a hobbit-style eco-village using a combination of local soil, stone, and straw. Their "earth houses" have become a symbol of reconnecting with nature and an inspiration for many enthusiasts of sustainable tourism. In this spirit, it is worth mentioning the work of the Green Council from Sarajevo, led by Sanela Klarić, who, through their work—including a student pavilion built from natural materials—demonstrated how architecture can be ecological, functional, and educational.



The Center for Economic and Rural Development (CERD) has been promoting sustainable development for years, including education on the principles of green transition and natural building. CERD launched an initiative to establish a platform for the promotion of natural building in Bosnia and Herzegovina, through a network of partners, academic institutions, and local communities—building on existing examples and creating an educational framework for promoting this practice. Topics covered include: sustainable architecture, energy efficiency, renewable energy sources, circular economy, organic farming, and many others, along with interesting and practical workshops on these themes. At its own estate in Kmete, CERD has developed the "Domestica" brand with organically certified and biodynamic production, a school in nature, and a permaculture garden, as well as a pilot training project for building eco-houses from natural materials.



#### Practical Example: Potential for Tiny House Pilot in Bosnia and Herzegovina

As part of the Visegrad+ project, a practical pilot was implemented in Laktaši, Bosnia and Herzegovina, to demonstrate natural building techniques using local materials and explore possibilities in natural home constructions. The tiny house model was selected for its simplicity, low cost, and suitability for eco-tourism and training purposes.

Field tests confirmed that local clay was suitable for construction after minor adjustments. While straw is widely available, its density should be carefully checked to meet the required standards. The design of tiny house combines simple foundations, reused timber, natural insulation, and passive energy principles. Beyond demonstration, the tiny house could serve as a training platform for craftsmen and a model easily replicable in other parts of Bosnia and Herzegovina and the Western Balkans.



#### Conclusion

Bosnia and Herzegovina hold great potential to become a regional leader in natural building—not only as a guardian of tradition, but also as an innovator in sustainable housing. However, to fully unlock this potential, further efforts are needed to strengthen the promotion of natural building practices and expand their visibility across society.

Particularly important is the engagement of architects, engineers, and design professionals who can help integrate traditional materials and techniques into modern, functional, and comfortable structures. At the same time, the inclusion of skilled craftsmen — whose knowledge of wood, stone, clay, and traditional construction remains invaluable — will ensure quality and authenticity in these building practices. Finally, stronger collaboration among academic institutions, local communities, professional associations, and policymakers is essential to establish training programs, share expertise, and create a supportive

framework that can turn existing isolated initiatives into a broader movement for sustainable and culturally rooted development.



Photos were taken during the CERD workshops; credit: CERD.

# 2. PRESERVING HERITAGE AND PROMOTING SUSTAINABLE CONSTRUCTION IN CZECHIA

Author: Mária Pružincová, Zdeněk Vejpustek

#### Introduction

The use of local natural materials such as wood, stone, clay, and straw has a long tradition in the Czech Republic. These materials have for long enabled regional self-sufficiency in construction and are known for their energy efficiency and environmental sustainability. While the use of wood in construction has never ceased, other natural materials have been limited, and in the case of clay and straw, there was even a complete break in their use for several decades in the last century. Currently, the interest in the use of natural materials in the Czech Republic significantly increased, with the greatest interest focusing on wood for load-bearing structures and clay for interior plaster and masonry. The combination of natural materials is a proven global trend that is also evident in the Czech Republic, although their use may vary in different areas.

In addition to the repair and renovation of historic buildings, wood and clay are now also used in new buildings such as family homes, eco-centres and public buildings. The renovation of historic buildings requires expert knowledge of traditional techniques and the correct handling of materials to prevent damage. In new buildings, it is essential to apply knowledge of these materials correctly to ensure that their structural and physical potential is exploited while protecting natural building materials from degradation by biotic and abiotic factors throughout the construction process. These requirements place higher demands on the quality and expertise of all those involved in the construction process. In the Czech Republic, both the standard education system (apprenticeships, secondary and higher education) and private and alternative systems (NGOs, ECVET, company workshops) can be used to train these professionals.

#### **Traditional Buildings**

When thinking ecologically, we should not focus solely on new constructions. Renovating or reusing existing buildings is an important part of the circular economy and saving resources. There is a large number of older houses in the Czech Republic, which may be in varying states of repair. A typical historic house built from natural materials is inhabited, well maintained, and shows little or no defects. On the other hand, unmaintained or uninhabited houses age quickly and can thus become a reason for contempt for natural materials.

Historically, there are three basic types of houses in the Czech Republic. The half-timbered house has a wooden load-bearing structure filled with rammed clay or fired and unfired bricks. A log house has a load-bearing structure made of massive horizontal wooden beams with gaps filled with clay or moss. A clay house has load-bearing clay walls with horizontal wooden structures.



Typical historical clay building in Czechia, (Source: I. Žabičková, Z. Vejpustek, Kombinace dřeva a hlíny v moderním stavebnictví - historické stavby, [hlina.info] online])

As part of its support for the use of older houses, the state, through the Ministry of the Environment of the Czech Republic, provides significant subsidies for repairs and compliance with stricter energy requirements under the "New Green for Savings" program, which aims to increase the energy efficiency of family and apartment buildings.

#### **New Constructions from Natural Materials**

New buildings, whether constructed from natural or industrially manufactured building materials, must meet the same legislative requirements in order to obtain a building permit. Among other things, all new buildings must meet the requirements for obtaining an EPBD certificate (Energy Performance of Buildings Directive). Energy efficiency is regulated by legislation and technical standards based on national and European contexts.

In current construction practice, buildings made of wood and clay most often appear as new residential houses and eco-friendly public buildings, primarily using modern technologies [2]. The main disadvantage is that traditional techniques require considerable manual labor, which is currently financially demanding. Traditional construction techniques usually use local materials, which are paradoxically less available than industrially produced materials.



Modern wooden frame structure with clay filling (Source: I. Žabičková, Z. Vejpustek, Kombinace dřeva a hlíny v moderním stavebnictví - novostavby, [hlina.info] online])

Other factors that favor modern technologies over traditional ones include speed of construction, lower worker skill requirements, and availability (logistics, price, speed of delivery).

The construction of eco-friendly houses can be divided into three categories: self-built houses, partially self-built houses, and houses built by construction companies. Houses made from natural materials usually fall into the first or second category. Although there are enough craftsmen and construction companies specializing in natural materials, they remain a niche market.

#### Wood in Modern Sustainable Architecture

New buildings usually follow two basic construction types: light timber frames and heavy timber frames. A light timber frame consists of densely spaced posts, usually reinforced with board material. Between the posts there is usually thermal insulation or clay filling. The wall can be covered from the interior with clay panels or clay plaster. A heavy timber frame has solid posts, the stability of which is ensured by reinforcements. The exterior walls can be independent of the rest of the house and are often filled with clay, straw, or inserted sandwich panels. Clay is used in these houses for plaster, partitions, and horizontal structures, which increases the heat storage capacity of the house.

#### **Straw Houses**

The most common construction method for building straw houses in the Czech Republic is the use of straw bales as infill for wooden frames, which allows for quick and efficient construction. Straw bales are becoming increasingly popular as a building material due to the use of straw bales as infill for wooden frames, which allows for quick and efficient construction. Straw bales are becoming increasingly popular as a building material due to their ecological and insulating properties. This method provides excellent insulation, easy installation, and allows the possibility of self-construction. The bales used must be tightly compressed, homogeneous, and sufficiently dry to withstand moisture and prevent material degradation.

Bales can be laid in two ways: flat or on edge. Flat placement provides greater stability and better mechanical strength, making it more suitable for load-bearing walls. In wooden frame structures, laying bales on edge is more common, as this allows for thinner walls, saving floor space and improving daylight access through windows.

Currently, buildings made of prefabricated straw panels are getting more popular. Compressed straw is inserted into a wooden frame in a factory, and entire walls are then transported to the construction site and assembled. This industrial construction method is offered, for example, by ECOcocon.

#### **Clay Houses**

Unfired clay in buildings regulates the indoor environment (humidity, heat accumulation, microbiome, etc.) and increases comfort. New buildings with load-bearing structures made of clay or straw are still rare, but their numbers are expected to grow. Currently, unplastered structures made of rammed earth are the most popular among architects. Clay for building is relatively easily available on the Czech market, mainly as a plaster mix. Well-known examples are the plaster mixes from Picas, Hlinatura, Hliněný dům, Tierrafino, and others.

Working with clay obtained directly from the construction site requires more expertise about its properties and methods of use. The tradition of building clay houses fell into oblivion for about 100 years [1] due to the widespread use of industrially produced materials. Today, craft skills and theoretical knowledge are mainly available through organizations and institutions that focus on theoretical and practical research in this field.

#### Hemp, Flax and Reed

Hemp fibers are usually used to make insulation boards that are more resistant to moisture. Hemp stalks, water, and lime are mixed to create a material called hempcrete. It is most commonly used in Czechia as a masonry filler, permeable insulating plaster, or insulating layer in floors and roofs, but it can also be used for load-bearing structures. [4]



Exhibition of project Hlína pro lidi / Clay for people – Picas Credit: Sdružení hliněného stavitelství z.s. - SHS

Flax is used in construction to produce affordable thermal insulation. Reed in the form of mats is used as a plaster base and also as a historical roofing material. Reed is usually imported from abroad.

#### **Education and Awareness in the Field of Clay Construction**

Since 2004, the Association of Earth Building in the Czech Republic, (SHS) has been contributing to raising awareness of clay as a building material through its activities. The organization brings together not only experts and craftsmen involved in clay construction, but also theoretical and practical knowledge.

Since 2009, SHS has been organizing the "Learn • Earth" ("Poznej • hlínu") clay building courses with an ECVET certificate [6]. The courses are intended for the general public as well as craftsmen and people seeking retraining. The individual modules gradually cover clay mixtures, clay plasters, rammed and masonry constructions, clay interiors and decorations, and the restoration of clay structures. The main benefit is the expansion of the professional craft base and, thus, the awareness of using clay as building material.



Rowland Keable – Workshop: Rammed earth, project Hlína pro lidi / Clay for people (Author: Dagmar Dvořáková, SHS z.s.)



Workshop: Rammed earth - clay samples, project Hlína pro lidi / Clay for people (Author: Dagmar Dvořáková, SHS z.s.)

Research on clay buildings is also conducted at the Brno University of Technology. As part of the "Clay for People" project, the Faculty of Architecture promotes environmentally friendly and economically advantageous community buildings made of unfired clay. The project resulted in small community buildings, such as a clay columbarium in Mořice [3] and clay decorations of the oven in the courtyard of the Faculty of Architecture. These projects were carried out by students in collaboration with faculty teachers, from the design and preparation of the project to the subsequent community work on the construction of the objects. The current NAKI III project, "One of the most endangered groups of the historical building fund of the Czech Republic: unique technologies of earthen buildings using piece building," focuses on methodologies and methods of preserving earthen cultural heritage. The Faculty of Architecture at the Brno University of Technology offers a course in English entitled Earthen Architecture, which deals with the complex issues of earthen construction.

Columbarium - building process (Author: Mária Pružincová, SHS z.s.)



Academic institutions are a driving force in raising awareness on earth building, as they attract younger generations to the craft and pass on valuable practical experience. The university environment is also much more open to experimentation than practical application, which deepens and complements the missing knowledge about natural materials.



As part of research activities, numerous professional articles are published that present the properties and uses of natural materials. Insufficient knowledge and definition of the properties of natural materials affect the creation of legislation and standards, leading to distrust among builders and construction companies in using these materials. SHS has a long-term effort to fill gaps in clay in construction technical standards.

Clay oven decoration - project Hlína pro lidi / Clay for people (Author: Mária Pružincová, SHS z.s

Columbarium - final project designed by architect Jan Peřina (Author: Dagmar Dvořáková, SHS z.s.)



#### Conclusion

The Czech Republic has strong traditions in the production of natural building materials. This tradition successfully continues, as evidenced by the interest of students and practicing builders. Buildings made from these materials are becoming increasingly popular, especially for self-built projects. The trend in their use will continue, with the only question being how quickly it will develop.

In the Czech Republic, we have a common goal to bring the little-used natural building materials into standard mass production. The result of this long-term effort is the possibility to purchase clay building materials in large stores, the use of natural materials in certified compositions, and the inclusion of sustainable building materials into standard budgeting programs. Ecological and sustainable houses are no longer solely the domain of a small group of environmentally conscious enthusiasts, but are increasingly attracting the attention of the general public. In many cases, high-quality craftsmanship with natural materials is considered a luxury and not just a despised relic of the past. The architectural expression of eco-friendly buildings is not limited to organic shapes; on the contrary, houses made of natural materials often stand out for their modern minimalist design.

#### Resources

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# 3. CHAMPIONING ENVIRONMENTALLY CONSCIOUS BUILDING IN HUNGARY

Author: Ádám Bihari

# **Traditional Vernacular Architecture: A Timeless Foundation for Sustainable Design**

Modern architecture utilizing natural materials greatly benefits from understanding traditional vernacular architecture. This building culture, with its rich heritage in Central and Eastern Europe, including Hungary, offers a wealth of knowledge. By studying, reinterpreting, and adapting historical building methods, material usage, and technical solutions, we can meet contemporary needs in a sustainable way.

This introduction provides insight into some of the techniques used to construct adobe and earth walls. With a history spanning millennia, these methods have evolved into a wide range of variations. From a construction standpoint, they represent completely sustainable solutions with zero carbon emissions and energy-efficient implementation.

Some of these traditional techniques remain viable today, with skilled craftspeople still capable of building houses using them. While many of these methods are now primarily used in restoration projects, they offer valuable inspiration for contemporary technical solutions and sustainable building practices.

For more details on these earth-building techniques, tutorial videos are available here: <a href="https://www.youtube.com/watch?v=E-rOL1ryAeI&list=PLsdxoAv-uWaZdott1JYP-mN5nJnRvSs-r&index=2">https://www.youtube.com/watch?v=E-rOL1ryAeI&list=PLsdxoAv-uWaZdott1JYP-mN5nJnRvSs-r&index=2</a>

#### **Preparation of Mud for Building**

The process of making mud wall material begins with digging out the mixing pit by removing the topsoil. Approximately 10 cm of clay is spread in the pit. Water is gradually added, and the clay blocks are cut with a shovel and stomped with rubber boots to dissolve lumps and achieve a uniform, smooth mixture. Once consistent, plant-based additives like straw are added. Over-wetting the mixture allows for greater shape change as it dries, while the straw helps prevent cracking. Short, broken straw is the best for thinning the mixture. The straw is spread in a 3-5 cm layer and stomped until uniformly distributed and fully worked into the loam, making the material homogenous and ready for use. This process can be repeated for multiple layers. Traditionally, raw material was dug and processed on-site.



Preparation of the mud (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Adding straw (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)

#### **Building the Mud Wall**

The wall can be built directly on two layers of large loam bricks, serving as a separating and moisture drainage layer above the foundation. The raw material is the prepared and at least one-day rested mud mixture, which is laid according to the rules of good bonding. Bunches are laid with a pitchfork, first on one side of the wall, then on the other, with successive pieces laid with continuous offset and overlap. Swooping the bunches onto the ground ensures good adhesion by removing air pockets. A loud snap sound indicates proper swooping. Although the finished loam wall is usually cut vertically, it's also advisable to regularly straighten the edge of the wall during construction using the pitchfork's scraping motion. Scraping aligns the fibers within the loam vertically, which also helps water drain quickly from the drying structure. Efficiency is improved by coordinating tasks, such as one person preparing the cut straw and another swopping the mud on it. The third persons swoop the bunch of mud with straw once again, preparing it for the master laying the wall.

Traditionally, such walls were built freely at 60-65 cm thick. Proper swooping of the bunches involves lifting the material with initial momentum, allowing gravity to do the work. Effective swooping to expel air is crucial for compaction and stability, as a loosely built wall can slip. A maximum height of about 80 cm can be stacked at once, requiring at least two weeks (one week in good weather) for drying before the next layer. Larger openings like windows were traditionally left empty, while smaller ones were cut out or filled with loam bricks. Openings were often cut with a shovel before full drying and reinforced with a brick arch if needed.



Building the wall (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Straightening the edge of the wall (Source: E-Academy of Building Trades, Környezettudatos Építők Szerveze

#### **Traditional Adobe Bricks**

The raw material for adobe bricks is the same mud mixture used for the mud wall, but instead of direct placement, it's put into a forming frame and placed onto the ground. Crashed straw or chaff is scattered on the ground to prevent the bricks get sticked and make them easier to turn during drying. The sides of the mold are coated with diluted mud before use, then rinsed thoroughly, to help the blocks slip out easily. Small mud balls are formed and placed into the mold with wet hands and pressed until evenly distributed and the mold is filled. Excess mud is scraped off by hand. The brick surface is then smoothed with a wet board.

The freshly formed brick is gently turned onto the ground to dry, and the mold is removed and rinsed. This process continues as long as mixture is available. Space must be left for mold removal and for turning the bricks later. Gaps between bricks aid faster drying. New bricks should be protected from direct, strong sunlight to prevent cracking from uneven drying.

After molding, bricks dry for about a week before being rotated onto their sides. Once the other side is sufficiently dry, they are traditionally stacked in piles for further drying. Bricks are typically ready for use in two to four weeks, depending on the weather. During construction, masons apply standard brick-laying rules to build walls with these bricks.



Forming the bricks (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Drying bricks (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete

#### **Rammed Earth Wall**

The loam wall is built by ramming loam in formwork. Loam is spread by a shovel, ensuring even distribution and breaking up lumps. Layers of 15 cm of loam are compressed to 10 cm, using a blunt-ended mallet. Force is applied by lifting the mallet and giving it initial velocity, with gravity doing most of the work. A thin straw layer (loam separation layer) is spread on top of the rammed layer, to prevent drying cracks. The formwork (so called "kaloda") is constructed from 2 long wooden planks of 30 cm height, secured by lower and upper horizontal flat bars and vertical rods. The vertical rods are attached in a way that allows moderate horizontal movement of the upper bars, to enable ramming of loam also under the bars. Formwork is prepared for loam placement by stuffing gaps using bundles made of loam and straw, to prevent earth spillage during ramming and ensure compaction. Straw and loam bundles are prepared in advance and dried a bit. They are firmly pressed at the bottom edges of the formwork; also vertical plank joints are sealed.



Assembling the formwork (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Making straw bundles (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Stuffing gaps (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Ramming (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Thin layer of straw (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Third layer of loam rammed (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)

Corners are strengthened with overlapping bundles from each direction, for extra reinforcement. The formwork is filled with 3 layers of compressed loam and spread straw. Once this upper layer is completed, the formwork can be dismantled by taking off upper connections and pulling out vertical steel rods. The process of assembling the formwork is then repeated on the top of the first lift. Formwork is fixed and gaps are filled with loam and straw bundles on all sides. At each corner, the overlapping bundles are reinforced with a pressed board. Before filling with loam, straw is spread at the bottom and twigs are placed along its full length, 5-10 cm apart, overlapping at corners. The loam is rammed again, in three layers, each separated with a thin layer of straw. Straw and twigs again are applied for the next life.



Assembly of the formwork for second lift (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Straw and twigs on the bottom of the second lift (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Ramming the second lift (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



The result (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)

A precision of about 2-3 cm between rows is sufficient since the wall is planned to be carved on both sides. Although traditional practice involves immediate plastering, a more engineer-oriented approach is to cut 2-3 cm on inner and outer surfaces for a better finish.

This is to correct possible inaccuracies between successive lifts and also to remove the outermost less compacted part of the wall. The cut is made with a straightened shovel, when the wall is still near moist ground state and not as hard as concrete. Further adjustments by sanding are sometimes necessary, until the surface becomes completely vertical and even. The wall that is well cut is easily paintable, and it resists moisture in the air quite well. Only large amounts of direct water could threaten its stability.



Cutting of the surface (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Sanding the wall surface (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



The final result (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)

#### **Traditional loam plastering**

As preparatory work, the surface and joints of the earth brick wall are thoroughly cleaned for better adhesion. Then, the wall is lightly sprayed with muddy water to prevent the too dry surface from pulling water out of the mud plaster. Finally, the adobe mass needed for plastering is prepared near the wall. First, a guide stripe is formed at the edge of the wall, forming a kind of frame. Once completed, the mud plaster is splatted to the center part of the surface with a wetted masonry pan and carefully leveled with a plasterer's trowel, carefully keeping the planarity of the guide strips throughout. Once the mud plaster is smoothed on the surface, the corners are corrected by flipping the adobe material between the sides and forming a slightly rounded edge.



Preparation of the brick wall (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Mud plaster is smoothed on the surface (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



Forming a slightly rounded edge (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)



The final result (Source: E-Academy of Building Trades, Környezettudatos Építők Szervezete)

#### Present and Future: Contemporary Knowledge and Sustainable Architecture Tiny Houses in Hungary

The truest form of sustainable building is non-building. When new construction is necessary, this philosophy takes shape in the form of tiny houses, which are designed with a minimized (or optimized) architectural approach. These homes eliminate unnecessary square footage and redundant building materials. The design is highly practical, with every space optimized for function to the extreme, resulting in a small yet highly functional home.

A notable example in Hungary is the tiny house in Szokolya, designed for client Éva Adorján by architect Ádám Bihari (NaturARCH Studio) with the architectural team: Kinga Gacsályi, Viktória Király, and Vivien Sárkány. The creation of this house was the result of a genuinely thoughtful and realistic collaboration with the client. The owner was fully aware of her resource limitations and was able to align her needs accordingly, which were comfortably met within those limits.

The house was built on an existing concrete foundation, a remnant of a previous shelter-type structure. Aside from this, every component was constructed using natural materials. The load-bearing structure consists of a dimensioned wooden frame, with infill walls made of adobe bricks. The interior and exterior walls were plastered with earth, while the interior surfaces also feature lime and tadelakt finishes.

This building is an excellent example of how traditional vernacular construction techniques can be successfully applied today. Furthermore, it embodies the spirit of the "small is beautiful" philosophy, demonstrating that intentional and minimal design can lead to beautiful and highly functional living spaces.





3D illustration of the planned house (Source: NaturARCH Studio)



The planned house under construction (Source: NaturARCH Studio)



The interior of the tiny house (Source: Éva Adorján)

#### 4. ADVANCING NATURAL BUILDING IN POLAND

#### 1. Straw-insulated timber frame construction in Poland and Germany

Author: Moritz Reichert



Straw panels (Photo: Moritz Reichert)

Since 1998, by our company timber-frame houses have been built, and since 2009, exclusively with straw insulation. For the past 28 years, this construction approach has been developed and implemented in Poland. Five years ago, a large marketing campaign was launched by the company Lorenzsysteme.de to promote modern straw-insulated timber construction.

As a manufacturer of large-format building components, mainly wall and roof elements, it has been observed that the building materials industry has firmly established its thermally produced materials and systems in the market. As a result, working with natural materials must be relearned and, most importantly, actively supported. The significant climate impact in construction primarily arises from the thermal energy required for industrially produced building materials.

Entering this market requires preparation for complex challenges. It is essential to accompany such a construction project from start to finish and, if possible, also handle execution to prevent conflicts between different trades, which could otherwise lead to costly construction defects.

Today, many countries have guidelines for straw construction, such as those from FASBA, the German association for straw construction [1]. By following these simple and logical recommendations and rules, it is possible to build highly durable and well-insulated structures with minimal climate impact.

Since these are generally timber structures, significant regional differences in building culture can be observed. In some regions, particularly in post-communist countries, an interruption in the tradition of timber construction is noticeable. Even today, it is often not included in university or vocational education programs.

Straw isolation (Photo: Moritz Reichert)

In Germany, around 500 straw-insulated buildings exist, mostly single-family homes, often built with a high degree of self-construction. These rely on the following ETA certification [2]. The situation in Poland is similar. However, architects and executing companies are liable for construction defects and damage because straw is not a certified building material, requiring individual approvals.

This construction method has great potential. However, as long as it is not explicitly promoted, it will remain a niche, despite growing interest. The climate impact of straw-insulated buildings is significantly lower than that of conventional massive construction techniques.



A significant impact on the construction industry is expected to take time. The implementation of modern industrial building systems took approximately 100 years. In Germany alone, around 22,000 regulations in the construction sector have been developed, covering everything from planning, logistics, production, and technology to execution and operation. These regulations often serve as a model across Europe. Transforming this framework and creating a new building culture is a long-term process.

The following links showcase two major projects in Germany:

https://querbeet-lueneburg.de/

https://lorenzsysteme.de/referenzen/sanieren-mit-strohdaemmung/

A visit to Banja Luka last year demonstrated that forming local self-build groups and gaining hands-on experience in natural construction is the most effective approach.

#### 2. Natural building materials in Poland

#### Author: Paweł Wołejsza

Earth architecture is unfortunately almost nonexistent in contemporary Polish construction. Historically, many buildings were constructed using earthen and clay bricks.

"With the use of raw earth, (...) one of the notable examples of such architecture is the historic Mostowski Palace in the Tarchomin district of Warsaw, built between the 17th and 18th centuries, whose walls were made using rammed earth technology." [3]. And yet, only few people in Poland are aware that such buildings were constructed with earth. However, there has been a growing academic interest in the topic. At Polish universities, more and more doctoral dissertations, research papers, and studies are emerging, seeking solutions to encourage more natural, local, and forward-thinking construction practices.

Starting in 2030, Poland will require every newly designed building to account for the embodied carbon of the materials used. This shift will bring renewed attention to materials such as rammed earth, straw bales, and hempcrete – natural construction solutions that were displaced during the era of globalization.



Timber structure (Photo: Paweł Wołejsza)

#### The Role of Timber and Other Natural Building Materials

Among natural construction techniques, timber construction remains the most widely used. However, it still accounts for no more than 2% [4] of all newly built single-family homes. Within this category, some buildings incorporate natural plant-based insulation materials, such as straw or hempcrete. These materials are, in fact, more commonly used than light or heavy clay infill, but still not as often as, for example, highly processed rock wool.

Limited adoption of these techniques can be attributed to several factors, including the globalization of the construction industry, the standardization of building solutions, and the demand for reliable supply chains that can meet large-scale investment requirements. Another major barrier is the lack of harmonized standards for natural construction technologies, making them less accessible in conventional building markets.

Among plant-based construction materials, straw bales are the most popular, apart from wood wool.

"In Poland, the first straw bale building was constructed in 2000. Since then, the number of such buildings has steadily increased. A significant acceleration in growth occurred after 2011. Research completed in early 2023 confirmed the existence of 320 straw bale buildings or ongoing projects, with an estimated 50 more suspected to exist." [5].

Construction site – building with timber and hempcrete (Photo: Paweł Wołejsza)

Hempcrete, a material made by combining hemp shiv with lime, is considered particularly fire-resistant due to its composition. As an architect, Paweł Wołejsza has observed a growing interest among clients in building or renovating structures using natural and minimally processed materials. In 2024, one of his projects was recognized with the PLGBC Awards for the best sustainable single-family



house. Hempcrete, when combined with a timber frame structure, offers significant benefits. It has a negative carbon footprint, helps protect wood from insects, and shields lime from fungi and microorganisms.

In recent years, several small-scale factories in Poland have begun producing prefabricated hempcrete blocks, as well as on-site solutions that allow for in-situ application.

#### **Challenges and Opportunities of Hempcrete**

Hempcrete, like any material, has both advantages and disadvantages. One of its limitations is the need to isolate steel elements, as lime accelerates the corrosion of steel components. Additionally, industrial hemp cultivation requires monoculture farming, as hemp stalks are more difficult to harvest than straw. This practice can lead to a decline in biodiversity.

Despite these challenges, hempcrete remains a promising solution, especially in light of the European Union's push for more sustainable and resilient construction practices.

#### 3. Building with Straw - A Natural and Effective Approach

#### Authors: Marta Rudyk and Józef Chromik

The experience gathered from numerous straw house constructions has allowed us to refine techniques and develop best practices that ensure durability, comfort, and energy efficiency. The combination of timber frame technology with hand-applied compressed straw insulation has proven to be a sustainable and high-performance construction method. Despite its deep historical roots, straw construction is undergoing a modern renaissance, offering an ecofriendly alternative to industrial materials. Below, we outline the key construction stages that contribute to the success of this method.



Timber frame filled with strawbales (Photo: Marta Rudyk)

#### **Foundation**

As with any house, a straw-bale home starts with the foundation. There are two well-tested options: traditional strip footings or slab foundations. The choice depends on the specific building design and geological conditions of the site. One crucial consideration is the wall thickness, which is approximately 40 cm due to the size of a standard straw bale. An alternative to traditional foundations is pier or screw foundations, which present an innovative and sustainable solution.

#### **Timber Frame Structure**

Once the foundation is in place, the next step is erecting the timber frame. Straw-bale houses utilize a post-and-beam system, with a dual-branch structural approach. The main posts create a 40 cm deep space within the wall, precisely matching the dimensions of a standard strawbale to provide optimal thermal insulation. Before installing the straw insulation, it is essential to complete the roof to minimize the risk of moisture exposure during construction.

#### **Straw Insulation**



The straw insulation phase requires technical knowledge and careful execution. Selecting the right straw bales is a key challenge due to the declining availability of traditional baling machines in favor of round balers. The bales must be dry, tightly compressed, and free from other plant materials, ideally sourced from wheat, rye, or triticale. Proper storage and handling are crucial — bales that absorb moisture or come into contact with rain can jeopardize the integrity of the structure. Special attention must be given to critical areas, such as the wall tops and gable ends, which must be strategically designed by architects familiar with straw construction techniques to avoid complications.

Heating in the wall (Photo: Marta Rudyk)

#### **Plastering**

Straw walls require robust protection against rain, rodents, and insects. Lime plaster is the preferred solution, as it provides long-lasting durability while maintaining vapor permeability, one of the greatest benefits of straw-bale construction.

For the interior, clay plaster offers exceptional benefits, including sound insulation, non-toxicity, electromagnetic wave shielding, odor absorption, moisture regulation, and mold prevention. Clay plaster creates a naturally comfortable indoor climate, enhancing well-being and fostering a positive energy within the living space.

#### **Conclusion**

Straw-bale construction is not just an environmentally friendly approach – it is a well-thought-out system that, when applied correctly, ensures longevity, excellent insulation, and a comfortable indoor climate. While it requires knowledge and precision, its benefits far outweigh the challenges. With growing interest in natural materials and increasing awareness of climate impact, straw construction has the potential to move beyond a niche practice and become a widely accepted, sustainable building solution.

#### Resources

- [1] https://fasba.de/wp-content/uploads/2022/02/Strohbaurichtlinie 2019 fasba.pdf
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- [3] P.L.Narloch, Ziemia ubijana stabilizowana cementem jako konstrukcyjny materiał budowlany w klimacie umiarkowanym, PhD Thesis, Politechnika Warszawska, Warszawa 2018
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- [5] M. Jagielak, Straw bale, czyli architektura z kostek słomy w Polsce, Phd Thesis, Krakow 2024

# 5. FOSTERING SUSTAINABLE CONSTRUCTION AND RENOVATION IN SLOVAKIA

**Author: Stanislav Prorok** 

#### **Eco-Building in Slovakia: A Journey Towards Sustainable Construction**

The eco-building movement in Slovakia has a rich history of innovation and growth, driven by a commitment to sustainable practices. Beginning in 2006 with the first hands-on projects in the Zaježová ecovillage, the movement has steadily expanded. Over the years, approximately 300 to 400 straw buildings and several hundred wood-frame houses have been constructed, fundamentally shaping the country's sustainable architectural landscape.

#### Milestones in Sustainable Architecture

Slovakia's eco-building journey is marked by several key achievements. One of the earliest significant achievements was the construction of the first certified passive house using natural materials. This family house was built with a wooden post structure, wood-fiber boards, and blown-in cellulose insulation. To enhance thermal mass and regulate humidity, several tons of clay bricks were integrated. In 2010, renowned specialist Gernot Minke designed and led the construction of a groundbreaking load-bearing straw bale dome. This project demonstrated the structural potential of straw and fostered international collaboration through a hands-on workshop, significantly influencing the development of eco-buildings in Slovakia. Just a year later, in 2011, a family house built to passive house standards used prefabricated straw panels from Lithuania. This project was a pioneering example of combining simple, natural materials with advanced energy-efficient technology, setting a new standard for future eco-buildings in the country. Today, a fully automated production of certified twin-stud timber frame panels with straw infill is in place, making these sustainable materials available for public and private buildings alike.

#### **Promoting Sustainable Building**

The civic association ArTUR is a leading voice for ecological building practices in Slovakia. Its work is crucial to the movement's growth. ArTUR provides comprehensive training for craftsmen, self-builders, and other interested individuals. It was the first organization in Slovakia to develop an ECVET (European Credit System) for craftsman training, allowing participants to earn European certificates in ecological building materials. The association works with universities to develop building codes and regulations for using earth as construction material. ArTUR also runs a nationwide campaign to promote the renovation of traditional houses with increased energy efficiency rather than their demolition. The association's training programs have certified over 1,000 people in clay plastering, which has helped develop small businesses and local supply chains for clay materials and straw bales.

#### **Evolution of Materials and Technology**

The eco-building movement has evolved to incorporate modern technologies and a broader range of sustainable materials. The use of clean energy sources like photovoltaic panels and air-to-water heat pumps has become more common, often supported by government subsidies. Eco-building is no longer limited to small projects; several large villas have been constructed using natural materials, proving its applicability to high-end residential architecture.



Load-bearing straw bale dome (Photo: Createrra Architectural Studio

Over time, the movement of self-built straw houses transitioned into professionally constructed homes. These structures often incorporated clay plasters, clay floors, or heavy earthen partitions, enhancing indoor comfort and sustainability. With increasing awareness of climate change, green roofs became more prevalent, particularly extensive green roof systems, which contribute to insulation and biodiversity.

Slovakia is rich in natural building materials, offering abundant resources such as wood, straw, and earth. The revival of hemp cultivation has further expanded the availability of sustainable materials. Other natural materials like sheep wool, imported cork, reed mats from southern Slovakia, and various recycled materials are increasingly used in construction. Among the notable recycled products are foam glass insulation made from recycled glass, cellulose fiber insulation, and Slovakia's own innovation—recycled textile insulation and mattress materials for water retention on roofs.

#### **Tiny House demonstration**

As a showcase of sustainable building practices, ArTUR, in collaboration with the Slovak Centre for Communication and Development, built a demonstration tiny house in Hubý Šúr between 2022 and 2023. The tiny house serves as a living example of how to reduce CO2 emissions in construction by using local, low-carbon materials, implementing passive design principles, and integrating efficient technology and clean energy. The house was partially built during nine practical workshops, providing hands-on training to the public under the guidance of ArTUR members. The tiny house also demonstrates climate change adaptation measures, such as a green roof, rain gardens, and a design that creates an interior resistant to extreme temperatures. These solutions are applicable to both small and large buildings.

This project and others like it continue to push the boundaries of sustainable construction in Slovakia, making ecological and healthy living more accessible and widespread.



Tiny House - building process (Photo: ArTUR)



*Tiny House – clay floor (Photo: ArTUR)* 



*Tiny House - green roof (Photo: ArTUR)* 

#### **Conclusion**

The development of eco-building in Slovakia has been marked by a steady evolution from traditional self-building methods to professionally executed sustainable projects. The integration of natural and recycled materials, combined with modern passive house technology, has led to innovative and high-performance ecological buildings. Through continued international collaboration and knowledge sharing, Slovakia remains at the forefront of sustainable architecture, fostering a greener future for construction practices. Additionally, eco-building has influenced the renovation of old traditional buildings, which were originally constructed using local natural materials. This approach has helped preserve cultural heritage while integrating sustainable and energy-efficient solutions.



*Tiny House - interior* (Photo: *ArTUR*)



*Tiny House in Hrubý Šúr* (Photo: *ArTUR*)

#### 6. CONCLUSIONS AND RECOMMENDATIONS

The "Eco-Build Handbook" demonstrates the immense potential of natural building to address modern challenges such as climate change, air pollution, and high energy consumption. The project, supported by the International Visegrad Fund, has effectively highlighted how traditional, time-tested techniques can be revived and adapted to meet contemporary needs for sustainable housing.

The examples presented throughout this handbook, from the pilot tiny house design in Bosnia and Herzegovina to the various initiatives across the V4 countries, prove that ecohouses are no longer the domain of a niche group of enthusiasts. Instead, they are becoming increasingly attractive to the general public, as a form of modern, minimalist, and even luxurious construction.

To fully unlock the potential of natural building and transform it from isolated initiatives into a broader movement, the following recommendations are crucial:

- Integrate Professionals: Engage architects, engineers, and design professionals to seamlessly integrate traditional materials and techniques into modern, functional, and comfortable structures.
- **Empower Craftsmen**: Train more skilled craftsmen to ensure that the invaluable knowledge of wood, stone, and clay is passed on thus enabling the broad utilization of natural building materials.
- **Strengthen Collaboration:** Establish stronger partnerships among academic institutions, local communities, professional associations, and policymakers to create a supportive framework for training programs and expertise sharing.
- **Educate Public:** Continue to raise public awareness and provide practical education, to ensure the knowledge and skills are passed on and the demand rises.

By taking these steps, the region can move towards a future where sustainable, culturally rooted development is not just an ideal, but a widespread reality.

#### ABOUT THE AUTHORS

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#### **Moritz Reichert**

He is a speaker, an innovator and an entrepreneur with broad and profound knowledge in natural buildings based on wood and straw, with expertise in commercialization of serial production of straw building elements. Founder and owner of Lorenz GmbH. Founder of the Polish construction company "Dobry Dom" specializing in historical renovation and natural construction based in Stankowice.

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For the last 15 years, she has been working with business, educating about sustainable development. In 2022, she founded Organic House (Organicznydm), a company that builds healthy and ecological houses, and the foundation In Connection with Nature, which aims to renew people and the earth, based on their mutual relationships.

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#### **Stanislav Prorok**

He is a craftsman who is primarily engaged in working with clay as a building material in all its forms since 2013. He leads workshops on construction sites primary with local materials for laymen and professionals. Lecturer of courses Clay as a building material (ECVET) at NGO ArTUR (association on sustainable architecture). He works on development, production and sale of materials for natural construction, especially clay.

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#### PARTICIPATING ORGANIZATIONS



### Slovenské centrum pre komunikáciu a rozvoj, n.o. (SCKR) www.sccd-sk.org

Slovak Centre for Communication and Development - SCCD is a non-governmental organization founded in 2005 with the aim of providing public services. Currently, it focuses on providing professional services primarily in the field of global education and development cooperation, by addressing projects and programmes, organising public and professional events, transferring expertise and providing

solutions in the context of societal development in a national and global context. From 2021 to 2023, SCCD successfully implemented the "*Living Smart with Climate Change*" project. This initiative aimed to raise awareness about sustainable housing. A key outcome was the construction of a demonstration tiny house in collaboration with ArTUR. This tiny house, along with other measures, showcased practical adaptations to climate change by thoughtfully considering local climate, available resources, and specific local conditions.



#### Centar za ekonomski i ruralni razvoj - CERD

www.cerd.ba; https://www.facebook.com/card.cerd

The Center for Economic and Rural Development (CERD) is a non-governmental, non-profit organization established in 2012, dedicated to

fostering sustainable rural development, economic growth, and community empowerment across Bosnia and Herzegovina. Building on decades of experience in rural development, CERD specifically supports youth, rural women, and small-scale farmers. The headquarters, the Rural Education and Business Support Centre, is located in the village of Krnete. CERD combines practical training, community and business support, and promotion of sustainable principles in development work. Its activities include project implementation, capacity building, promotion of organic and biodynamic farming through its Domestica® brand, and knowledge dissemination. Through extensive partnerships and networking, CERD is committed to foster inclusive, sustainable development and resilient communities throughout the region.



### Sdružení hliněného stavitelství z.s. - SHS www.hlina.info

The Association of Earth Building (SHS) brings together individuals passionate about using unfired clay and other natural materials in new construction. It also actively supports the protection and preservation of

existing earth buildings, recognizing them as a vital part of cultural heritage. SHS achieves its objectives through a multi-faceted approach. It supports professional training and continuous education, organizing various events like courses and seminars to raise awareness and foster expertise. It promotes the collection and exchange of information, processes, publishes, and sells guidelines and informational materials, and advocates for legislative changes that support earth

building. Furthermore, it actively supports design and research activities, offering valuable consulting services to those working with natural building materials. The Association champions and organizes cultural and artistic initiatives focused on unfired clay, and it fosters and supports international collaboration within the earth building community. A comprehensive suite of training courses for working with clay, clay materials, and decorative elements is offered by SHS. These include the "Learn – Earth" courses, which conclude with an ECVET exam. It also provides the "Clay Building Contractor" requalification course, accredited by the Ministry of Education, Youth, and Sports of the CR, which includes apprenticeship qualification exams. Additionally, SHS hosts various practical workshops to provide hands-on experience.

SHS with ArTUR, Slovak civic organization for sustainable architecture, organize every year the **International Conference Healthy Houses**, on a rotating basis in Slovakia and Czechia, in cooperation with the Faculty of Architecture of STU (Slovak Technical University) and VUT (Vysoké učení technické) in Brno. In 2025, the conference held in Slovakia focused on the renovation of traditional houses.



#### Környezettudatos Építők Szervezete - Körépítők

https://www.korepitok.hu; https://www.facebook.com/korepitok

The Association of Environmentally Conscious Builders – Körépítők was founded in 2019 with a mission to boost public awareness and popularity of ecological building materials. Körépítők actively promotes sustainable construction technologies throughout Hungary, striving to broaden their

adoption and provide essential training in the field. Emphasizing a building culture rooted in natural materials, Körépítők advocates for and educates on sustainable lifestyles (inspired by nature's principles), relevant building systems, and the practical application of natural materials. To ensure ongoing professional excellence, research and development are integral to its educational initiatives. Körépítők maintains a strong commitment to continuous collaboration among related disciplines and experts, recognizing this as crucial for credible advancements. Objectives of the association, all connected to its core mission, include establishing and operating a dedicated educational center, creating and maintaining an online knowledge base, and developing a quality assurance and expert support system. Körépítők also focuses on studying, reinterpreting, and adapting historical building methods, material usage, and traditional technical solutions to meet contemporary needs.

The Hungary based Körépítők, the Romania based TERRApia and the Serbia based Earth and Craft; organize each year in one of these 3 countries the **REGIO EARTH - Central and South-Eastern European Festival of Earth Architecture** © (<a href="https://www.regioearth.com">https://www.regioearth.com</a>). The annual event is about earth based architecture, construction, design and art. It focuses on the Central and Eastern region of Europe to create a strong cross-border network for the local professionals (architects, engineers, craftsmen, professors, researchers, etc.). The main basis is the common earthen heritage of the named region, and the main goal is to find contemporary ways to integrate it in the present's

dynamics. The event aspires to reach out to the mass of general public to popularise natural material-based constructions.

The latest event Regio Earth Serbia – 2024 was organized by Dragana Kojičić, the co-founder from Serbia, along with the KFZ (Klub finih zanata) team. On 18 July 2024 a roundtable discussion took place at the Svilara Cultural Center, in Novo Mesto, supported by the Visegrad Fund. The program involved the introductory presentations of five Visegrad Fund partner organizations, followed by a discussion on eco-housing perspectives in Central and Eastern Europe. The joint participation of Visegrad partners contributed to strengthening the networking and communication of professionals interested in sustainable construction, as well as to building new partnerships.



## Ogólnopolskie Stowarzyszenie Budownictwa Naturalnego – OSBN http://www.osbn.pl

The National Association for Natural Building (OSBN) is dedicated to fostering the construction of better, more durable homes in Poland that benefit both people and the environment. OSBN actively promotes the

use of renewable materials with simple production processes, such as wood, straw, hemp, clay, and lime. OSBN conducts research in collaboration with scientific and research institutions, drawing up solutions implemented worldwide and across Europe. It's an active member of the European network of like-minded organizations, ESBA (European Straw Building Association). Currently, OSBN's activities primarily center on promoting best practices and knowledge exchange, popularizing natural building through education, and organizing numerous workshops. It also funds research conducted in certified laboratories. OSBN regularly organizes training sessions within the European STEP training system for strawbale technology and actively cooperates within the broader European natural building network, including participation in the ESBA, the ESBG biennale, and other initiatives

OSBN organizes every two years the **Natural Building Festival** (<a href="https://festiwal.osbn.pl">https://festiwal.osbn.pl</a>) that gathers enthusiasts, investors, researchers, designers, and contractors involved in natural construction. The main mission of the festival is to promote building with natural materials such as clay, wood, straw, lime, and hemp. The program regularly includes a series of lectures, workshops, and a rich exhibition space, providing a platform for meetings, knowledge exchange, experiences, and discovering the latest innovations in this field. Discussions on the construction industry in the face of the climate crisis include also specialists in sociology, anthropology, and the psychological and social context.