

BATILIBRE: Use of locally sourced loess for renovations to guarantee comfort, well-being and energy efficiency in residential buildings

COMPANY PROFILE



Name: BATILIBRE

Registered office:

Haguenau, Alsace (France)

Industry: Construction and insulation

Founded: 2010 / **Employees:** 4

Contact: Manuel ZAEPFFEL

Email: zaepffel.manu@yahoo.fr

http://www.batilibre.com/



Context and current challenges

BATILIBRE is a company specializing in eco-friendly renovation and building construction headquartered in Haguenau in the northern Alsace region that offers solutions for healthy, efficient, economical and sustainable living.

Batilibre uses bio-based and indigenous construction materials such as raw earth - in particular loess - from Hochfelden as regional, natural construction materials with a low environmental impact as well as materials such as straw, hempcrete and reed panels to efficiently insulate buildings, to lower energy consumption and to improve the comfort of living.

Climate change currently poses serious challenges for the construction industry. The ever more frequent heat waves experienced in the Upper Rhine region impact the comfort of buildings, especially in the summer. To adapt buildings to climate change requires improved insulation systems to keep them cool in summer and warm in winter.



Objective(s)

BATILIBRE endorses eco-friendly construction and renovation with local and sustainable construction materials in order to reduce our carbon footprint, to use grey energy and to increase building efficiency by:

- Identifying soundproofing and insulation solutions for improved humidity management both in summer and in winter.
- Reducing resource consumption and recovering, recycling and reusing existing construction materials and components.
 - Minimizing waste and boosting deconstructability of buildings.
 - Creating jobs locally and "employing people instead of machines."
 - Using existing specialist knowledge and implementing reasonable measures on existing buildings.
 - Contributing to the improvement of local historic building fabric and quality of life.

BATILIBRE also pursues the goal of democratizing approaches to ecological construction and renovation by:

- Disseminating information and participating in trade fairs and conferences to raise awareness of alternative construction methods in the industry.
- Reducing costs to ensure the affordability of proposed solutions to suit all budgets (training and participative construction projects are potential approaches to cost reduction).
- Supporting self-builders and managing participative construction projects.



Innovative measures

Improvement of comfort in indoor spaces by using loess – a local, sustainable, zero-waste construction material from Hochfelden (Alsace). This solution enables the adaptation of residential buildings to climate change.

• What is loess?



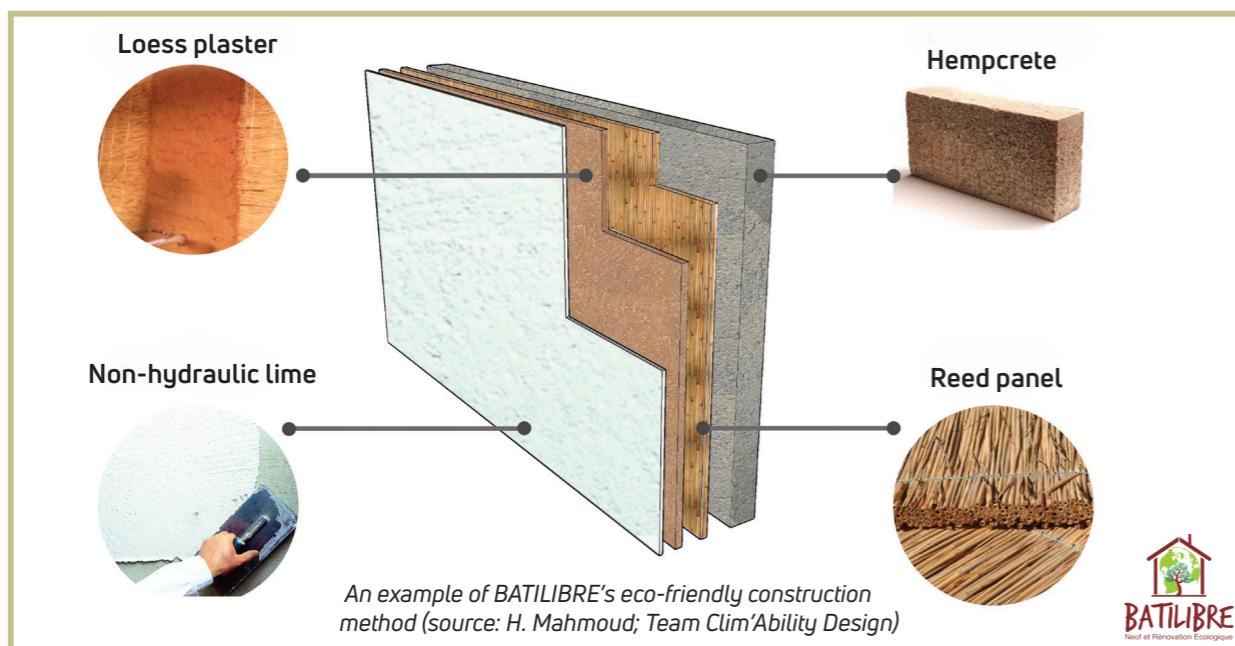
Loess wall in Kaiserstuhl, Germany
(photo by Andreas Schaps)

To the west of Strasbourg lies a hilly landscape rich in **loess**³ – a detrital sediment that forms through the collection of silt from wind erosion. This sediment contains both silicon crystals similar to sand and **granular calcium carbonate**. Typical loess comprises **fine sand** (10%), **silt** (75%) (typically coarse silt) and **clay** (15%)⁴. It is a **homogeneous, non-stratified material**. However, it is also **highly porous** due to traces of roots and calcareous cementing of its granules⁵.

Loess can be found in many locations in the Upper Rhine region and beyond⁶.

• Why loess?

The energy crisis has led to increased pressure to replace chemically manufactured and petroleum-based construction materials with locally sourced, natural materials (*earth, wood and plant fibers*) with the goal of reducing transport costs. In general, earth is a **finite resource, but it is largely abundant** worldwide. Moreover, it can be reused again and again. These two criteria make it an ideal base material for construction in terms of good **ecological balance**.



3. The word «loess» probably derives from the alemannic root «loesch», meaning «loose».

4. Study report: Quantification des performances mécaniques en fatigue d'un Loess d'Alsace traité aux liants hydrauliques (LENOIR et al.) p.7 <https://hal.science/hal-01543532/document>.

5. M. Vriend, M.A. Prins. Calibration of modelled mixing patterns in loess grain-size distributions:

Procedure



Insulation with hemp wool and reed panels.



Loess plaster coating on reed panels.



Final result.

an example from the north-eastern margin of the Tibetan Plateau, China. *Sedimentology*. 2005; 52(6): 1361-1374.

6. On the Upper Rhine, for example around Strasbourg, in Sundgau and the hills of Kaiserstuhl and Tuniberg (Germany), cf. Wuscher (2021) <https://journals.openedition.org/quaternaire/17113>.

7. «Light Earth Building» by Franz Volhard

Results

1. Costs

- **Material costs:**

Straw bales: €2 to €5 per unit – approx. 700 units are required for insulating the walls and roof of a house with 100 m² of living space.

Reed panels with insulating properties: approx. €25/m².

Earth (*loess*): approx. €5/m² for a 1 cm-thick plaster coat.

- **Labor costs: selon version FR ?**

The costs vary depending on the project, but they are relatively high to ensure a high-quality result (approx. €40/m² for labor). "Self-building" with competent support or registering for a participative project would be affordable alternatives.

- **Installation costs:**

*"For the earthen plaster, we have created a compound that is compatible with a locally manufactured gypsum mixer sold by SERVABOEHM, a business run by the BOEHM family from Mutzig – a traditional mortar mixing establishment in Alsace. Its mechanics are relatively simple to use, durable and robust."*⁸

- **Transport costs:**

Certain construction materials are sourced 100% locally, **Ils proviennent de Hongrie, de Turquie et dans une moindre mesure la Camargue (France)**, thus eliminating high-energy and expensive transport. However, this does not apply to the reed panels. Nevertheless, the CO₂ stored by the materials compensates for the transport emissions (assuming each journey transports large volumes).

Manuel Zaepffel

BATILIBRE

"We increasingly turn to earthen materials; they have their place in the construction industry. I don't understand why, historically, we have rejected earth as a construction material – probably for financial reasons. But earth, and here in our region I specifically mean loess, should play a key role. Firing monomur bricks – terracotta, or literally 'baked earth' – has an environmental impact."

8. 10. Manuel Zaepffel, BATILIBRE - 9. "Light Earth Building," by Franz Volhard

2. Positive side effects

- The light mixtures (300 to 800 kg/m³) are efficient thermal insulators that provide sufficient inertia and soundproofing (for walls, roofs etc.). The heavy mixtures (800 to 1200 kg/m³) have sufficient thermal inertia and soundproofing properties as well as increased resistance (nails and pegs can be driven in starting at 900 kg/m³).⁹
- Improved air quality in indoor spaces.
- Zero-waste, zero-kilometer construction site.
- Environmentally friendly packaging in paper bags (instead of "big bags").
- Dissemination of knowledge via instructions for self-building and GABION (organization offering training in eco-friendly construction).
- Development of widely forgotten construction practices.
- Social involvement and ethical commitment of BATILIBRE.

3. Difficulties

- Approval from oversight offices (fire resistance).
- Drying time of plasters which can be long (1 month) in the cold season

Temps de séchage des enduits (enduit de corps + finition = environ 80€/m²)

4. Comparison with conventional buildings

Comparison of CO₂ emissions and other ecological aspects:

"The energy efficiency of each project is different. If the context is suitable, a passive house standard is achievable. In the case of renovation projects, the standard is lower if thermal bridges or other airtightness aspects cannot be correctly addressed for technical or financial reasons. This is no different to conventional constructions."

Global approach / Corporate social responsibility

BATILIBRE undertakes various other operations:

Dissemination of knowledge about various networks and partnerships:

TWIZA, ENVIROBAT,
Parc régional des Vosges du Nord.

Further information:

- BATILIBRE : zaepffel.manu@yahoo.fr
- Contact Clim'Ability Design : info@clim-ability.eu



Partenaires cofinanceurs / Kofinanzierende Partner



Partenaires associés / Assoziierte Partner



«Dépasser les frontières, projet après projet» // „Der Oberrhein wächst zusammen, mit jedem Projekt“