Wuppertal Institute
for Climate, Environment
and Energy

ECOINNOVATION

Topics Online „Eco-Innovation" presents cutting-edge and fascinating best practices for increased resource productivity. In the tradition of „Factor Four" they show what is possible, present obstacles and how green lead markets can emerge.

Best Practice

››› Unburned Clay Building Materials

Clay is the world's oldest mineral building material. Modern clay architecture uses clay tiles, bricks and plaster, beaten clay, ready-to-use clay mortar and other clay products tailored to various functions.

Clay can be mixed with cellulose fibre or other materials to create a durable building material: Jute, reed, straw, wood chips or expanded clay optimise the product for different uses. Clay building materials work just as well for repairs on protected old buildings as in modern passive houses. They can be used on both interiors and exteriors.

Clay in building is experiencing a renaissance as energy-saving, resource-conscious and healthy building has become increasingly important. An ever increasing series of exemplary built projects, clay-producers and clay specialists bear testimony to the many and varied uses of clay in building.

Sustainability-effects

ECOLOGY

Clay conserves resources and land, as loam obtained in excavation work can generally be used for clay building materials. Clay is available almost anywhere in the world, production-related transport is reduced to a minimum. It achieves nearly endless reusability; waste disposal is no problem in clay building. Any waste obtained in clay building is biodegradable.

Clay architecture does without environmentally harmful substances. No chemical processes are involved in producing clay building materials, thus needing very little energy. Furthermore, substituting cement-based building materials considerably reduces emission of the greenhouse gas CO_2.

Clay is extremely durable. It absorbs humidity and so helps conserve wood, e.g. in timber-frame constructions, extending a building's lifespan.

- ✓ Resource consumption
- ✓ Waste
- ✓ Land use
- ✓ Energy consumption
- ✓ Transport
- ✓ Emissions
- ✓ Lifespan

ECONOMY

Manufacturers of clay building products work with an inexpensive raw material. Repairs with clay building materials can often obviate expensive all-round modernisation of old buildings.

Clay building involves a higher number of workers than conventional building techniques. Increased clay building promises positive effects on the job situation.

- ✓ Costs
- ✓ Jobs

SOCIAL

Clay building materials contain no chemical preservatives and generally pose no health risks. They can bind indoor pollutants. Clay regulates indoor humidity levels, provides heat and sound insulation and has pleasant surface temperatures. On the whole, clay improves the indoor climate.

An unconventional building material like clay with its interesting surface structure increases a building's attractiveness. Consumers seeking an innovative image will be happy to use this inventive and attractive building material.

- ✓ Health
- ✓ Quality of life
- ✓ Positive image

Obstacles and drawbacks

The decline in the use of natural earthen materials in buildings from the end of the 19th century onwards has led to a corresponding loss of clay building expertise. Practical skills and general knowledge about the material and its handling have been forgotten over the years.

Clay characteristically shrinks or expands with varying moisture levels, a process that can leave cracks. Without appropriate surface treatment, clay is not water-resistant and must be protected from direct contact with water. Faulty workmanship can result in mould. Since clay takes quite a long time to dry, building activities are restricted to certain seasons. Damp clay is sensitive to frost. All these features require experience and skill in handling, involving a high number of qualified workers. Hence, clay building is accordingly expensive. The insulating qualities of clay are limited, so walls have to be thicker.

The exact consistency of clay is different in different locations, so it is fairly difficult to standardise clay. Not all loam obtained in excavation work is suitable for clay building materials. In many cases, clay of the required quality must be obtained in targeted excavation.

Potential

The market for construction and modernisation is a large one. Clay so far is not a common building material in Germany and elsewhere, so its share in the market can be increased. That requires a viable network of supply and handling partners (know-how). Meanwhile, clay products are standardised and certifying is possible, thus increasing consumers' trust in clay product quality.

Clay building is labour-intensive and can create jobs. Well-trained, qualified specialists are needed. In many emerging and developing countries, clay building would be advantageous – this can be a market for plant manufacturers (e.g. plastering machines).

Policy recommendations

Research, education and training need to integrate clay building in their curricula for engineers, architects, designers, energy consultants, craftsmen and the trade. The German vocational training programme „Specialist for Building with Earth" has been a big step in improving acceptance of clay building in the professional building sector. The development of new products, techniques and designs can open up bigger markets worldwide.

Specific information campaigns are important to sensitise the various user groups, public authorities, funding authorities and educational institutions for the application of alternative building materials and increase the degree of awareness, especially for new buildings.

Links and contacts

Further information:

Dachverband Lehm e.V.

Lehmbau Süd

Scheeres Lehmbau

Manufacturers and suppliers (examples):

CLAYTEC e.K.	www.claytec.com
Hock GmbH & Co. KG	www.thermo-hanf.de
Casadobe – Bausteine aus Lehm	www.casadobe.de
Ziegelwerk Grün GmbH & Co.KG	www.gruen-ziegelwerk.de
Eiwa Lehm GmbH	www.eiwa-lehmbau.de

Wuppertal Institute

Döppersberg 19
D-42103 Wuppertal
Tel. +49 (0)202 / 24 92 - 0
www.wupperinst.org

Photos: CLAYTEC e.K.
Date of publication: 10/2009

For questions on eco-innovation please contact

Prof. Raimund Bleischwitz
raimund.bleischwitz@wupperinst.org