



**BUILDING  
OUR  
FUTURE**  
with  
expanded  
clay

**EXCA**

EUROPEAN EXPANDED CLAY ASSOCIATION

# a sustainable industry

Lightweight aggregate has been used in construction since Roman times, valued for its combination of low weight and high strength. The variability of natural lightweight aggregate remained a challenge for almost 2,000 years until the advent of industrial production processes. Expanded clay lightweight aggregate has been produced since the start of the 20th century in the United States and in Europe production started in the early 1950s.

Today, expanded clay is a well-established lightweight aggregate suitable for a wide range of applications. It has proven to be a durable and safe material able to withstand different climates all over Europe: from the Mediterranean to Scandinavia.

The European expanded clay industry is a sustainable industry. It is resource efficient and contributes to a competitive low carbon economy. The industry is committed to continuously reducing the impact of production and developing the properties and applications of the material to improve its sustainability.

Expanded clay is produced with the maximum care for employees, environment, climate, neighbours and local communities. Over the last few decades, the industry has considerably reduced both its energy consumption and CO<sub>2</sub>

***If expanded clay isn't a sustainable and resource efficient construction material, then what is?***

emissions and there is a commitment to delivering further CO<sub>2</sub> emissions under the EU Emission Trading Scheme. Using waste that cannot be recycled or reused as substitutes for fossil fuels not only reduces fossil fuel consumption and contributes to a true circular economy, it also reduces CO<sub>2</sub> emissions.

For every cubic metre of natural and abundant clay, up to five cubic metres of expanded clay is produced. Using expanded clay saves energy and reduces CO<sub>2</sub> emissions in the construction and transport sectors. Its low weight means fewer trucks and fewer journeys, thus reducing the carbon impact of transportation. The thermal insulation properties of expanded clay materials used in construction, improve the energy performance of the buildings, significantly contributing towards reducing energy consumption and related CO<sub>2</sub> emissions.





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European Expanded Clay Association (EXCA), representing more than 90% of the European expanded clay industry, has today 13 member companies operating some 20 plants throughout Europe. The annual production of the member companies is approximately 4,500,000m<sup>3</sup> of expanded clay and they offer direct employment to around 2,000 people. The expanded clay aggregate industry has an estimated turnover of close to 200 million €. Together with industries using expanded clay aggregates, the total expanded clay industry has a turnover of about 600 million €. In Europe, expanded clay is traded under brands like **Arlita**, **Argex**, **Fibo**, **Laterlite**, **Leca**<sup>®</sup>, **Liapor** and **TechniClay**.

***“Expanded clay is a well-proven, high quality, efficient and competitive construction material that can be used anywhere.*”**

***It is sustainable and packed with properties that improve the economic, social and environmental performance of a building or infrastructure over its whole lifetime”***



# all in one

Expanded clay is a high quality, durable lightweight aggregate, that has been used for over half a century.

The main characteristic of expanded clay is low density combined with high strength. In addition, the aggregate holds many other important characteristics, and it can be described as an **“all-in-one”** product, providing a huge range of properties vital for sustainable construction.

### DURABILITY

Expanded clay is durable has long lifetime and requires no maintenance

### ADDS STRENGTH

Expanded clay can reduce the weight of concrete by almost 50% without compromising strength

### LIGHTWEIGHT

It is 4-5 times lighter than loose gravel or loose fill crushed stone

### STRONG

It can be used as loose fill and insulation in road and rail embankments and can sustain dynamic loads from heavy high-speed trains

### RECYCLABLE

Expanded clay is 100% recyclable or reusable. There are no problems with disposing of demolition waste and no use of new materials, new resources or new energy

### RESISTANT TO FIRE

It is classified as a fully non-combustible material. It has no reaction to fire, does not emit gases or smoke and retains its mechanical resistance and all other thermal and physical characteristics. It is an excellent protection against fire



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### **A THERMAL INSULATING MATERIAL**

Insulating performance of loose fill expanded clay is in the same range as the best values of wood. Concrete made with expanded clay can be up to 12 times more insulating than normal concrete: winter and summer comfort is guaranteed

### **REDUCES THE NOISE**

It works well for both acoustic insulation and sound absorption. It is suitable in the home as a wall between dwellings and good outside as a barrier between houses and noisy infrastructures

### **HAS A NEVER-ENDING LIFE**

Expanded clay is chemically inert, contains no harmful substances or gases and is completely neutral. Its resistance to chemical attack is comparable to that of a glazed tile, glass or other ceramic materials

### **PROTECTS THE ENVIRONMENT**

There is no dangerous leaching from expanded clay, even when in contact with soil, water or rain. It does not emit VOCs or any other dangerous substances. It is good for the environment and good for health

### **MANAGES HEAVY RAINFALL**

Quick water drainage and run-off is guaranteed thanks to the 40% of hollow space between the grains. This enables the "run off" of water in urban areas to be controlled, protecting the natural environment and preventing flooding

### **USED FROM THE NORTH POLE TO THE EQUATOR**

Unlike other materials it is not harmed by freezing temperatures. It will not warp, break or burst. It is widely used in Northern European countries exposed to extreme weather conditions



buildings



# everywhere



Expanded clay has a huge variety of uses. From flower pots where it is used to improve and control growth of plants and trees to production of lightweight structural concrete bridge elements for structures in harsh northern waters. Most applications for expanded clay go unseen whether it is used in the foundations and construction of buildings or underground in infrastructure and landscaping projects.

Expanded clay aggregate is used extensively in new buildings, the restoration of historical buildings and renovation projects. Expanded clay can be used in all elements of construction from foundations to rooftop. It is primarily used in internal and external masonry walls, both in blocks and mortar as well as providing insulating layers in floors, roofs and basements. When used in house building, the material offers high levels of thermal and acoustic comfort and contributes to improved energy performance and home environment quality. The unique material properties provide solutions for stabilising and restoring foundations of historical buildings while preserving the original structures.

# everywhere

Expanded clay is used in civil engineering projects including road and railway embankments. The material's lightweight characteristics and durability provides engineers with proven solutions for challenging ground conditions. Other uses include bridge abutments, retaining walls, tunnel and pipe-line coverings. Expanded clay is used in building foundations including where there are unstable ground conditions. This is particularly important in the reclamation of urban "brown-field" sites. It is also used in noise barriers and in engineering works built to mitigate the environmental impact of infrastructure projects.

Expanded clay aggregate is used in landscape restoration around our parks and the green areas surrounding urban developments. Green roof gardens act as a buffer for rainwater, which seeps slowly through the layers reducing the surge water caused by heavy rainfall. This also allows time for water evaporation, hence further reducing pressure on urban drainage systems and

providing green urban areas for the development of flora and fauna. Expanded clay has a number of environmental benefits. Its ability to absorb gases and dust particles helps the recovery of air humidity levels in the atmosphere and improves air quality. Extensive use is made of expanded clay in drainage and water management projects and the unique structure of the aggregate is ideally suited to water and air filtration systems. Leisure uses include foundations for sport surfaces and run off safety areas for motor sports. It is used in agriculture and horticulture as a growing medium for plants and even processing waste farm slurries.

Expanded clay aggregate is everywhere, significantly contributing to improving our environment, even if we cannot always see it.

green



# infrastructures



# sustainable production

Expanded clay is produced from naturally and abundantly available clay. The clay is extracted, pre-treated and introduced to rotary kilns. These kilns are heated to temperatures up to 1,150 °C and this process transforms the clay into various sized lightweight aggregates with a hard ceramic shell and a porous core.

To produce expanded clay high temperatures are necessary and the production is therefore energy intensive. However, it is also resource efficient at the same time with a yield of five cubic metres expanded clay from just one cubic metre of clay.

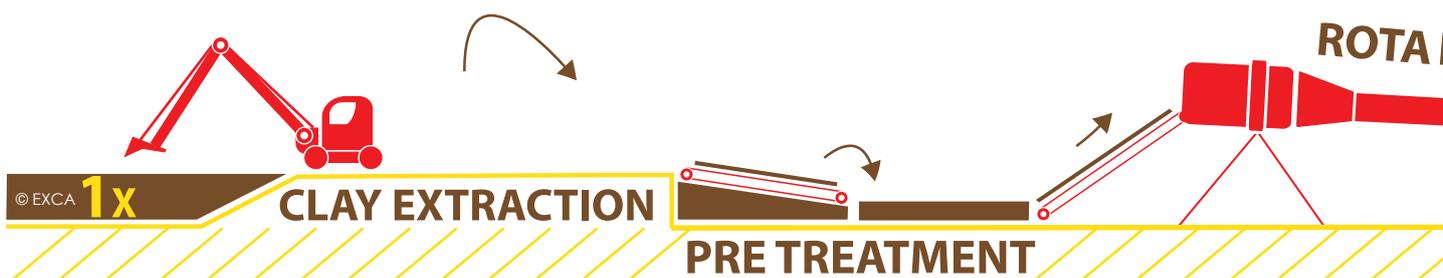
The clay is extracted from clay pits normally located close to the plants, thus keeping haulage costs and carbon emissions to a minimum. By

considering biodiversity issues at the planning stage as well as during and after extraction we can ensure protection of habitats. The clay pits are restored and rehabilitated to both preserve biodiversity and create new natural habitats.

Once transported to the plant the clay is pre-treated and processed in rotary kilns. After passing through the kiln the now expanded clay is cooled. A correct cooling process is essential to ensure a high-quality product. It also significantly improves the energy performance. As the hot clay cools, cold air is warmed and this heated air is used to dry, heat and expand the clay in the kiln.

Energy represents a significant part of the production cost of expanded clay. Over the

## FROM 1m<sup>3</sup> CLAY TO 5m<sup>3</sup> EXPANDED CLAY

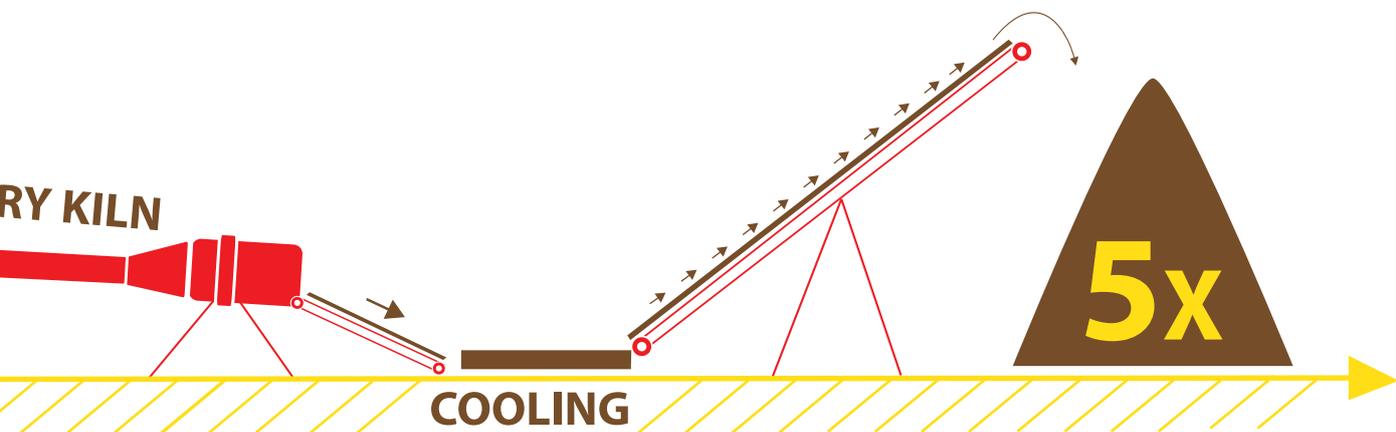


last few decades the industry has considerably reduced energy consumption and today all European plants use state of the art technology.

All European expanded clay plants are operated in compliance with the European Industrial Emissions Directive. The industry is focussing on continuous improvements and aims to use the best available technology.



***“Just 1m<sup>3</sup> of natural and abundant clay can produce 5m<sup>3</sup> of high quality, efficient and competitive construction material ”***



# reducing CO<sub>2</sub>

Even though producing expanded clay consumes energy and emits CO<sub>2</sub>, the expanded clay industry is a resource efficient industry contributing to a competitive low carbon economy. The energy is used to produce up to 5 m<sup>3</sup> high quality, efficient and competitive construction material from 1m<sup>3</sup> locally available raw material. In addition, using expanded clay saves energy and reduces CO<sub>2</sub> emissions in the construction and transport sectors. Its low weight means fewer trucks and fewer journeys, thus reducing the carbon impact of transportation. The thermal insulation properties of expanded clay materials used in construction, improve the energy performance of the buildings, significantly contributing towards reducing energy consumption and related CO<sub>2</sub> emissions.

The expanded clay industry is covered by the EU Emission Trading System (ETS). This has a significant impact on the industry as the combustion of fuel to expand the clay emits CO<sub>2</sub> while the raw materials and the expansion process itself emits CO<sub>2</sub>.

However, the industry supports the ETS and its objectives and is working to deliver CO<sub>2</sub> reduction under the terms of the system. Expanded clay is exposed to significant risk of carbon leakage and, as such, will receive free allowances from the European Commission. However, the free allocation is set at ambitious benchmark. Only the most efficient plants may receive an amount of free allowances that cover their emissions. Thus, the industry will deliver its fair share of Europe's 20% CO<sub>2</sub> reduction target for 2020.

What is carbon leakage?

Carbon leakage is the situation when for reasons of costs related to climate policies production



is transferred to countries which have laxer constraints on greenhouse gas emissions.

To reduce CO<sub>2</sub> emissions, the industry is continuously improving a reduction of thermal and electrical power consumption in order to improve energy efficiency. To further reduce CO<sub>2</sub> emissions, the industry is replacing fossil fuel with waste and biomass.

Using waste as a substitute for fossil fuel not only reduces the use of and dependence on fossil fuel but also reduces CO<sub>2</sub> emissions. If the waste had not been used instead of fossil fuel it would have either been incinerated or sent to landfill – both processes which would have emitted CO<sub>2</sub> or other greenhouse gases.

Fossil fuels such as coal, petroleum coke and oil are mainly used today while some natural gas is used in certain countries. Typical waste includes waste oils and solvents. A limited number of plants use bio waste when locally available in suitable quality and sufficient amounts. Only waste that is not suitable to be reused or recycled is used. Naturally, only waste that does not affect product quality is suitable.

The use of waste in all expanded clay plants in Europe is done under strictly controlled conditions and in compliance with stringent European waste legislation and emission limits. Expanded clay kilns are well-suited for using waste as a substitute for fossil fuel and using waste is a well-proven and established technology.

Replacing fossil fuel with waste is a well proven highly regulated technology benefitting the environment, society and economy

## **Our contribution to a competitive low carbon economy**

- Produce 5m<sup>3</sup> high quality, efficient and competitive construction material from 1m<sup>3</sup> locally and abundantly available raw material
- Continuous improvements to the production process lowers the amount of fuel and electricity used
- Replacing fossil fuel with waste and biomass reduces the dependence on and use of fossil fuel, reduces the CO<sub>2</sub> emission and contributes to a true circular economy
- The low weight of expanded clay means fewer trucks and journeys which reduces the carbon impact of transportation
- Using expanded clay improves the energy performance of buildings and significantly contributes towards reducing energy consumption and related CO<sub>2</sub> emissions



**“By replacing fossil fuel with waste, that would otherwise have been incinerated or landfilled, emissions from fossil fuel are avoided and overall CO<sub>2</sub> emission reduced”**

# sustainability assessment

Sustainable development is commonly defined as: "development that meets the needs of the present generation without jeopardising the ability of future generations to meet their own needs". The sustainability debate in the construction industry is often limited to environmental issues. However, the social and economic role of the sector is vital and must be taken into account. Only a built environment which is high performing in social, economic and environmental terms can be considered sustainable.

It is important that the sustainability assessment of a building or infrastructure should consider its entire lifecycle.

Lifecycle Assessment (LCA) is a method of calculating the total environmental impact of products over their whole lifetime. Using LCA reduces the risk of shifting the impact from one lifecycle stage to another. Although the production of construction products uses resources and impacts on the environment, when looking at the whole lifecycle of a building or infrastructure it is widely recognised that the biggest impact comes from the very long life-time.

When making an LCA in the construction sector the assessment must take the technical and functional performance of the building or infrastructure into account. Different construction

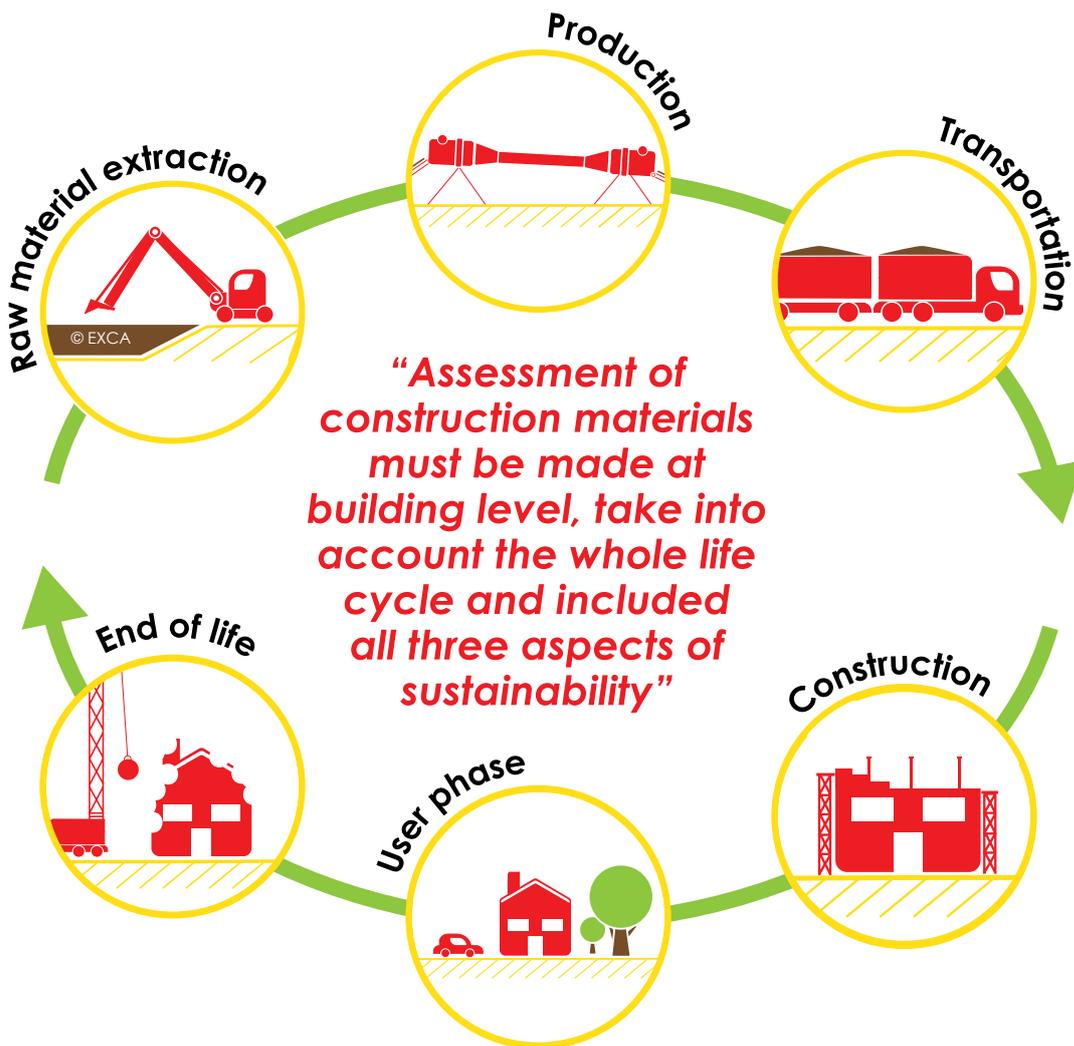
products have their strengths and weaknesses in different phases of their lifecycle and it is important to find a system that allows them to be fairly assessed for each structure.

A system that is based on whole lifecycle function and performance and which includes all three dimensions of sustainable development is essential. Such a system exists and has been developed by the European Committee for Standardisation (CEN) under a mandate from the European Commission.

***"The expanded clay industry supports the standardised methods developed by CEN"***

Environmental Product Declarations (EPD) for construction products are necessary for assessment of individual buildings or structures. An EPD provides environmental data for a construction product based on LCA. An EPD is developed based on common product specific rules and requirements known as Product Category Rules (PCR).

A European Standard (EN 15804) provides core product category rules for any construction product. The EPD is used when assessing the performance of the building according to a European Standard (EN 15978) The EPD shall not be used for comparing different construction products.



### Raw material extraction

- Naturally and abundantly available clay extracted close to the plants
- Restore and rehabilitate clay pits to preserve biodiversity and to create new natural habitats

### Production

- Up to 5 m<sup>3</sup> expanded clay is produced from every 1 m<sup>3</sup> clay
- Efficient production using state of the art technology
- Replace fossil fuel with waste and biomass in compliance with European waste legalisation
- No waste is generated

### Transportation

- Efficient and well developed infrastructure for delivery to the construction site
- The low weight means fewer trucks and fewer journeys, thus reducing the carbon impact of transportation

### Construction

- Expanded clay is flexible in use, is durable, has lifetime and requires no maintenance
- The low weight provide safe and good working conditions during handling and installation

### User phase

- In buildings, expanded clay offers healthy indoor climate with good acoustic comfort and fire resistance and improves the energy efficiency
- In infrastructures and in green applications, it guaranties drainage and avoids extensive load to the construction

### End of life

- At end of life when a building or infrastructure is demolished, expanded clay can be recycled or reused

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