



FACTSHEET #05

How do you measure “Green”?

So many products and companies these days play the “green card”. Unfortunately, the words “green” or “environmentally friendly”, like the words “natural” and “organic” have no definitions, making them available to shrewd salesmen everywhere. So what exactly we mean when we say clay brick is a “green” construction material.





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“The Clay Brick Association of South Africa has the responsibility to assist members to be aware of and conform to legislation regarding air pollution and environmental protection,” says Jonathan Prior, executive director of The Clay Brick Association of South Africa (ClayBrick.org).

“We expect more than just lip-service to environmentally sound practices, because South Africa is OUR country. When you manage a business that has a 60-100 year average lifespan, sustainability takes on a whole new importance. Clay Brick products and manufacturing technologies are not imported - our managers, staff and their families live within a few kilometres of where they work.

WHAT DO WE MEAN BY “GREEN”

When a term has no formal definition we need to describe exactly what we mean when we say clay brick is a “green” construction material.

Made of clay and shale, the final composition of clay brick includes the four natural elements, i.e., earth, wind, fire and water. Clay bricks contain no pollutants or allergens and are resistant to ants, borer and termites. They are also recyclable or reusable, and can be returned to the earth at their end of their useful life.

SELECTING A BUILDING MATERIAL IS A LIFELONG DECISION

Over the life of a clay brick, as little as 20% of energy usage is taken up in its manufacture. The other 80% of energy is in the subsequent cost of providing heating and cooling of enclosed habitable spaces.

Apart from protecting the environment with low levels of carbon emissions during manufacture and distribution, the natural insulation and low thermal diffusivity properties of clay brick also contribute significantly to the low CO₂ emissions life cycle of a building.

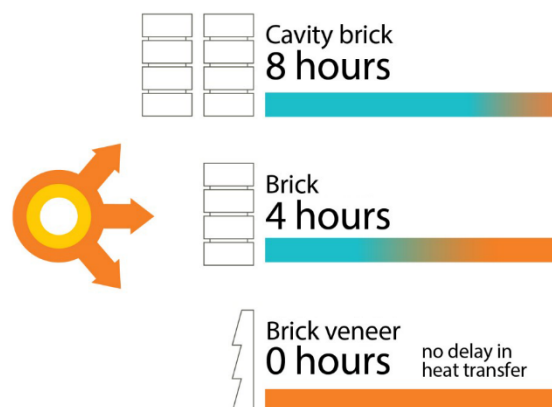


Figure 1 Cavity clay brick is proven to keep homes cooler throughout the heat of the day



50% LESS ARTIFICIAL HEATING AND COOLING

Clay brick has the ability to absorb heat during the day and release it at night, thus reducing the need for artificial heating in winter and cooling in summer. In South Africa's warmer climate zones, energy is more often put towards air-conditioning and cooling rather than heating. Most insulated prefabricated panels are designed for use in Europe, so only heating is considered important.

Consistent across both South African and Australian thermal modelling studies is that clay brick and the thermal mass it provides enhance the time spent in the comfort zone.

The two clay brick skins for the external walls were found to offer most benefit over lightweight during the hotter days, while the internal skin of clay brick of the Insulated Clay Brick wall contributed to the walling systems superior performance over lightweight during the colder periods.

In comparison, insulated lightweight walls from pre-fabricated panels cannot self-regulate, resulting in "hotbox" conditions.

In a comparative electrical usage study by Structatherm Projects, carried out on a standard CSIR designed house of 132m² with an insulated clay brick walls, electrical energy usage was 40-60% of the steel frame light weight walling system with insulation. Using an alternative building system might just double your energy bills every year, with the consequent impact on the environment in terms of carbon emissions.

For example, in the Bloemfontein test house with cavity walls comprising clay brick and insulation to SANS 204, the total electrical usage for heating and cooling over a calendar year was 10975 kWh. This can be compared to steel frame house (insulation to SANS 204) of 29950 kWh. This is a reduction of 18975kgs [63% less] of CO₂ emissions per annum. That is more than significant!

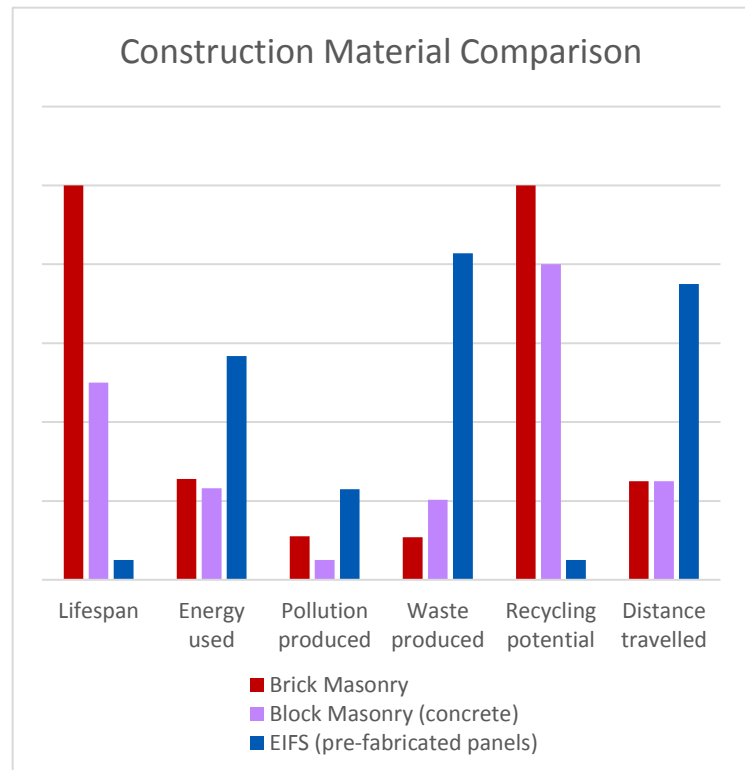
Lightweight walling including aerated cement bricks, cement blocks and pre-fabricated fibre-cement panels simply do not have the requisite thermal mass in the walling envelope to attenuate heat flows and moderate internal temperatures. This poor thermal performance results in the need for extended cooling and heating, higher energy costs, greater CO₂ emissions and greater impact on the environment.



INTERNATIONAL RESEARCH SUPPORTS LOCAL FINDINGS

Research by the CTL Group in the US, has confirmed local outcomes.

Comparing different “cladding” on a standard US house located in 10 different cities across the US, they found that houses with an exterior brick cladding used less heating energy in warmer climates than lightweight alternates associated with Innovative Building Technologies, and less cooling energy in all locations.



	Brick Masonry	Block Masonry (concrete)	Pre-fabricated fibre-cement panels
Lifespan	100 years	50 years	Estimated 15 Years*
Energy	0.256	0.232	5.669
Pollution	0.011	0.005	0.023
Waste & Depletion	0.108	0.203	0.828
Recycling potential	100%	80%	2%
Distance Travelled#	Within 100km of manufacture	Within 100km of manufacture	Within 300km of manufacture
Noise Attenuation	44dB	Unknown	30-38dB
Fire rating	120-240 minutes	Unknown	60-120 min

* Innovative Building Technologies such wall cladding and panels comprising a layer of plastic (CFC) insulation, fibre cement reinforced layer and a final top coat or finish. As many of these building system are new and untested, and their lifespan must still be proven.



Distance travelled. Clay bricks are usually used within 100km of manufacture due to the local suppliers conveniently located in each area. Pre-fabricated panels are manufactured in a single location which requires transportation to the point of use. The environmental impact of transport is significant and road transport is considered the largest single contributor to global warming.

The European Environment Agency proposes that a single diesel truck carrying just 1 tonne of freight for 300km produces:

- 360kg of CO₂
- 75 grams of carbon monoxide
- 96 grams of hydrocarbons
- 900 grams of nitrogen oxide, and
- 54 grams of sulphur oxides
- 51 grams of particulates

MINIMAL MAINTENANCE

Once laid, face-brick stays beautiful indefinitely without maintenance –no initial painting, no subsequent repainting and no replastering. The maintenance free benefits of clay face brick translate into an approximate reduction of 6.0Kg CO₂ emissions for every square meter of wall that is repainted every 5 to 7 years over a buildings life.

Buildings like schools are subjected to excessive wear and tear, and the annual maintenance of a prefabricated building is an unacceptably high cost for both the school and our environment.

A LIFETIME OF SAVINGS

Of course, a building that needs replacing after just a few years is a complete waste of all resources invested in both manufacture and daily use!

Clay bricks are designed and manufactured to handle the rigours of prolonged exposure to the African sun, wind and rain. Clay bricks have an impressively high load-bearing capacity and the highest dimensional stability and compressive strength of all building materials. These properties also minimise the risk of cracking, ensuring that the structural integrity of buildings are maintained even when the bricks are plastered. Some face brick, engineering and paving products have a compression strength exceeding 50MPa.



Mountain Mill Shopping Centre. Photograph courtesy of Worcester Brick



BUILDING END OF LIFE DEMOLITION

No pollutants or toxins are released due to decay, and clay brick are so durable that when the building is demolished, recycling is encouraged. Clay brick is a product of 'mother earth' – 100% natural. At the end of the life of the building, it can be crushed and returned to the earth, reused or recycled.

GREEN PRODUCTION

"We continually investigate best practices and technologies internationally, that reduce pollution and environmental impact for manufacturers," says Jonathan Prior, executive director of The Clay Brick Association of South Africa (ClayBrick.org)

Clay brick manufacture and building methods are considered "old fashioned" as brickmaking has been in existence since the first human settlements. However modern brick production has come a long way in the past 15 years, in an effort

The Clay Brick Association of South Africa supports the use of the latest technology to maximise the productivity and energy efficiency of its members.

CLAY BRICK – THE GREENER BUILDING MATERIAL

At every stage in its long life, clay bricks are proven to be in a class of their own when it comes to reducing carbon emissions, cutting energy costs and ensuring a sustainable work and home environment for all South Africans.

Local and international comparative research continues to demonstrate why clay brick, as THE 'green' building material - one that is not just sustainable, but beautiful and highly desirable as well.

As the environmental consciousness of society grows, there will be increasing pressure on building professionals, municipalities and government to incorporate green principles into sustainable construction and living. We are proud to be at the forefront of sustainable construction materials and methods.

For further information:

The Clay Brick Association of South Africa

Website: www.claybrick.org