

## **Sustainable Building**

As the need for more sustainable housing grows, clay brick in construction's superior composite offering, none more so than in the critical areas of energy efficiency, indoor air quality, affordability and investment value, defines its continued relevance and superior worth.

According to Corobrik's Peter Kidger, "when it comes to sustainability, clay brick walling envelopes for houses tick all the boxes. In pursuit of reducing environmental impacts and greater energy efficiency, the world, and now South Africa, has seen a multitude of different fabricated house construction types striving for the share of the market, lightweight prefabricated systems such as LSFB being just one. In most cases these alternate technologies are presented as some sort of panacea to masonry construction for achieving sustainable housing across South Africa. The reality however is quite different, as evident in real life experience of many South Africans living in clay brick homes and wide ranging research into the comparative performance of different wall construction types.

What the research shows is that while the different lightweight alternate building systems do a job in providing shelter, they present a compromise when compared to the composite offering clay brick and mortar brings to house construction here in South Africa.

Fundamentally the shell of a house is the essence of the house and sustainability in the South African context requires a robustness to endure, an innate propensity to endure beyond 100 years, that the built cost should be competitive and ideally last cost and where that might not be, that the material selection helps provide a lowest lifecycle cost opportunity. In addressing such requirements, clay brick construction stands out for all the right reasons - proving not only competitive as built but equally importantly mitigating maintenance costs down the line associated with replacement, refurbishment and maintenance of less durable lightweight fabricated walling systems.

Building on this fundamental value, clay brick houses can be designed to take best advantage of their inherent thermal mass, to enhance thermal comfort in South Africa's major climatic zones even further and achieve lower heating and cooling energy usage outcomes most cost effectively. Through the simple application of insulation in the cavity between the brick skins superior thermal outcomes with best payback for the insulation applied are found when comparing walling systems in compliance with SANS 204 energy efficiency standards. Notably clay brick walls providing a CR product in compliance SANS 204 standards consistently outperform SANS 204 compliant lightweight walls in spite of the latter's higher wall R-values.

According to the University of South Africa's Bureau of Market Research, Statistics South Africa and the Department of Housing, households spend 14% of their total monthly household incomes on energy needs. Poor to middle class households spend four times more percentage wise than their wealthier counterparts. After cooking and hot water provision, the biggest energy consumed is through domestic space heating. "It is in this area", says Kidger "that clay bricks inherent thermal mass provides the X-factor to the energy efficiency equation, supporting low cost solutions appropriate in South African different climates characterised by well-defined diurnal temperature swings." While the wall R-value is of course an important thermal property for achieving energy efficiency, it is a mass enhanced R-value that clay brick construction provides that presents a common sense way for achieving energy efficiency economically. And it just so happens to be a material that South Africans relate to and consider most 'proper' for defining best quality in house construction.

That clay bricks in construction do the job better is not a myth. Eight years of empirical research at the University of Newcastle in Australia, where thermal comfort and energy

efficiency of building modules constructed of four typical Australian wall types were exposed to real world conditions and internal environments measured in both free floating and controlled conditions, endorse clay bricks superior worth. The findings of this research were unambiguous:

- The insulated lightweight building performed the worst.
- The brick veneer building outperformed the lightweight.
- The cavity brick building with insulation in the cavity was the best performer.

The research went further to find that clay bricks applied as internal partition walls enhanced energy efficiency further for all external wall types. In the case of the insulated lightweight exterior wall building module, the application of clay partition brick walls improved energy efficiency by a significant 20%. For information on this substantive Australian research, go [www.thinkbrick.com.au](http://www.thinkbrick.com.au) <<http://www.thinkbrick.com.au/>> - downloadable document "Energy Efficiency and the Environment – The Case for Clay Brick, Edition 4

<<http://www.thinkbrick.com.au/energyefficiencyandtheenvironmentthecaseforclaybrickedition4/>>".

The superior energy efficiency of conventional cavity brick walls, both un-insulated and insulated relative to comparable and higher R-value lightweight alternatives is further presented in the full Life Cycle Assessment by Energetics. This assessment of two house designs built in three climatic zones and over four different orientations with five different wall construction types found that the cavity brick walled houses outperformed the insulated lightweight in most situations and the insulated cavity brick walled houses outperformed the lightweight in all situations. The full Life Cycle Assessment established that insulated clay brick construction's superior thermal performance translated into lower "total" greenhouse gas emissions [embodied plus operational energy] over a 50 year lifecycle when compared with lower embodied energy higher R-value alternate lightweight walled house assessed.

When it comes to all round performance, it is clear that clay brick houses designed and specified with nature in mind, stand in a unique space when it comes to addressing the sustainable objective in all three dimensions – economic, social and environmental.  
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