COROBRIK'S ENVIRONMENTAL SUSTAINABILITY PROFILE

COROBRIK®

Clay brick intrinsically sustainable and in harmony with natural environments

1. PREFACE

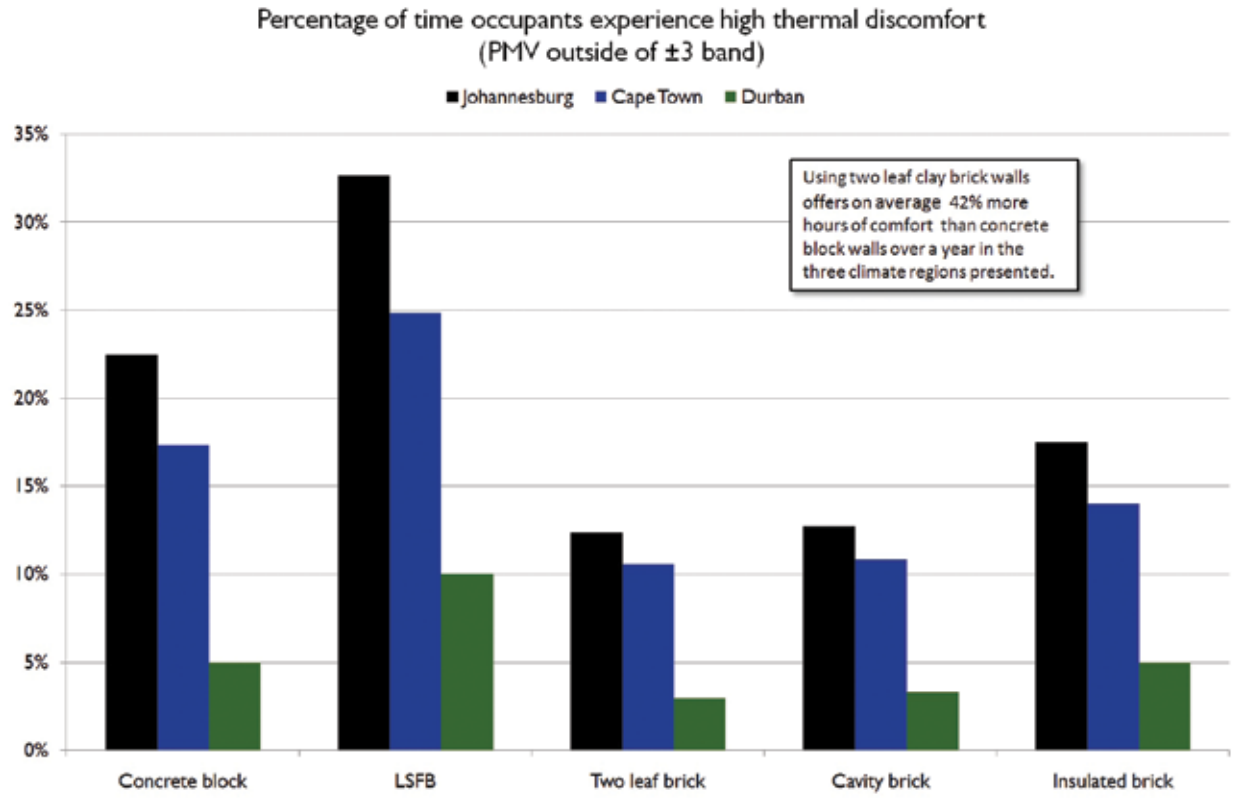
With sustainability established as a global imperative, Corobrik continues to take active steps to enhance the sustainability of Corobrik's business in all three dimensions - economic, social and environmental, and through the process of reducing environmental impacts, compound the value that the generic intrinsic properties of clay brick contribute to sustainable built-in environments.

2. CLAY BRICK – INTRINSICALLY SUSTAINABLE

Fired clay brick is one of only a few man-made walling materials that is proven reusable and / or recyclable. Robustness and extreme durability mitigates future carbon debt associated with refurbishment and replacement of less durable building materials while longevity provides the time opportunity for embodied energy to dissipate. The mineral properties and inert non-toxic qualities of fired clay brick well recognised for meeting all necessary requirements for healthy living, further defines clay brick as a sustainable building material.

It is such qualities, coupled with the colourfast maintenance free attributes of face brick that help mitigate future carbon debt associated with painting, that adds further substance to clay bricks sustainability proposition.

And then one cannot overlook the natural thermal performance properties of clay brick, proven through extensive empirical and modelling research to support greater thermal comfort conditions within South African climates and lower the operational energy usage of buildings.



Clay brick walling supports thermal comfort conditions

In this graph from the study by WSP Green by Design of a 40m² low cost house, the three double skin Corobrik clay brick walled alternates [with the requisite thermal capacity and low R-values] accounted for the generally superior thermal performance, greater thermal comfort and lower energy usage for heating and cooling than the insulated lightweight walled alternates [with higher resistance but low thermal capacity].

THERMAL MODELLING OF VERDANT AND SIROCCO HOUSE PLANS AVERAGE HVAC GREEN HOUSE GAS (kg CO_2-e) EMISSIONS OVER 50 YEARS Extracted from Energetics Full Life Cycle Assessment						
Location	**Orientations**	**Uninsulated Double Brick**	**Insulated Double Brick (R1.3)**	**Insulated Timber Frame**	**Insulated Timber more/(less) GHG than Double Brick**	**Insulated Timber more/(less) GHG than Double Brick Insulated R1.3**
Newcastle Climatic Zone	N,S,E&W	54137	51236	60457	11.67%	18.00%
Melbourne Climatic Zone	N,S,E&W	73050	63641	72570	(-0.66%)	14.03%
Brisbane Climatic Zone	N,S,E&W	64924	65010	72554	11.75%	11.60%
Average GHG	N,S,E&W	64037	59962	68527	7.01%	14.28%

These performance attributes of clay brick, along with South Africa's strong masonry tradition and society's broad preference to live in brick houses, combine to underpin clay bricks pre-eminent status for sustainable house construction.

Corobrik's Kliprug quarry – now a residential estate with vineyards

3. MAKING COROBRIK'S BUSINESS GREENER

Corobrik's approach to reducing environmental impacts in the business has concentrated on quarrying clay materials within a sustainable development framework, achieving greater resource efficiencies and lowering the consumption of non-renewable resources.

Progress made has elevated the environmental integrity of Corobrik's products beyond the sustainable qualities generic in fired clay. The interventions include:

3.1. Dematerialisation

Through investment in advanced extrusion technologies dematerialization with enhanced product quality, and performance attributes have been achieved. Resultant energy usage reductions through dematerialization include:

- Reductions in drying and firing energy usage in the order of 20% when compared to a 'standard' 3 core-hole brick with 20% perforations.
- Reduced diesel usage per thousand bricks delivered.
- An 8% reduced mortar usage on site reducing the carbon footprint associated with the cement component of mortar.

3.2. Lowering the carbon footprint through the use of cleaner burning fuels

For each giga joule of energy, natural gas releases just 48kgs of CO_2 compared to 97kgs of CO_2 emitted from coal. In 1996 Corobrik committed to a process of converting to natural gas for the firing of its kilns. Today, Corobrik has six major factories using natural gas as a primary fuel for the firing of its kilns, bringing to the South African market clay bricks with embodied energy values in line with best international practice for the clay types and the manufacturing technologies employed. Further conversions are being pursued but remain dependent on the availability of natural gas at the factory gate.

Corobrik has the distinction of being the first company in South Africa to be issued Certificates of Emissions Reductions by the United Nations Clean Development Mechanism for its fuel switch programme – Lawley Factory conversion. Corobrik presently has two CDM projects registered with UNFCCC.

Efficiency through advanced technologies

3.3. Lowering electrical energy consumption

Teams are in place at all operations with a mandate to reduce electrical energy usage. Through power correction interventions and modifying shift activities thereby circumventing high electrical energy usage at peak periods, electrical energy usage has dropped significantly throughout with further savings being explored.

3.4. Use of recycled materials in the production process

Most 'green' brick waste is recycled back into the clay production processes. Burnt brick waste is either crushed as aggregate for use in road building applications, or the manufacture of concrete products. Surplus aggregate is returned to the quarry from where it came. In addition suitable waste materials from other waste streams are regularly evaluated for their suitability as a recycled component in our the brick manufacturing processes. At this stage we have not been able to source suitable waste materials that meet the environmental requirements of a ISO 14001 certified factory.

3.5. ISO 9001:2008 Quality Management Certification at factories

Corobrik has 10 factories with ISO 9001 Certification with others busy with the accreditation process

3.6. ISO 14001:2004 Environmental Management Systems Certification at factories

Corobrik has 5 factories with ISO 14001 Certification with others busy with the accreditation process. It is the two processes of achieving Quality and Environmental certification, coupled with Corobrik's commitment to employing international best practices at its operations that has helped drive down Corobrik's carbon footprint and enhance eco systems around operations.

Dematerialised multicore bricks fired with natural gas

4. THE CARBON FOOTPRINT OF COROBRIK BRICKS

Corobrik Factory	Avoca 1 Transverse Arch Kiln	Lawley 2 Transverse Arch Kiln	Midrand Tunnel Kiln
Product Type in Imperial Format	Clay Plaster Bricks	Clay Face Bricks	Clay Face Bricks
Kg CO_2/m^2 Single Skin Brickwork	29.3	33.8	23.2

As calculated by CSIR Built Environment, the embodied energy of clay bricks from 3 typical technologies Corobrik employs, ranges between 23.2 and 33.8 Kg CO_2/m^2 single skin of brickwork. This equates to between 215 and 250 tCO_2 per tonne of bricks against the international average of approximately 300 tCO_2 per tonne of bricks. Ideas and interventions with the potential to effect incremental reductions in emissions are continually being assessed and implemented where appropriate.

5. CONTINUOUS IMPROVEMENT

Building on progress made, sustainability at Corobrik is set to take a step further during 2014 through the services of "The Good Business Framework". The programme is designed to broaden the depth of understanding, knowledge and commitment in the business for addressing the sustainability imperative.

In addition to the above, Corobrik will continue to invest in research to understand how brick may be better specified in buildings to lower environmental impacts and to help develop specifications for masonry walling able to facilitate optimal thermal performance outcomes – greatest energy efficiency and payback for the built cost. This is presently being advanced through our membership of the Clay Brick Association of South Africa, where Corobrik is involved in the commissioning of the ground breaking full Life Cycle Assessment of clay brick in South Africa being undertaken by the University of Pretoria. This assessment is to consider the contribution of clay brick to sustainability in the three dimensions - environmental, economic and social.

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