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## SUSTAINABILITY FACTSHEET #03

### Dematerialisation as a resource and energy efficiency measure

“Dematerialization is the reduction of the total material and energy throughput of any product and service, and thus the limitation of its environmental impact.

This includes the reduction of raw materials at the production stage, of energy and material inputs at the use stage, and of waste at the disposal stage”.

*UNEP (2001) – Consumption Opportunities*

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## THE CHALLENGE

The majority (more than 70%), of the clay bricks produced in South Africa are unperforated. On the one hand, the low production of perforated bricks can be attributed to the predominant use of the clamp kiln as a firing technology in the country, which does not lend itself to the firing of perforated products. On the other hand, the traditional solid clay “plaster” brick is still deeply entrenched in the South African building sector and is therefore still widely manufactured and preferred over perforated products.

In the midst of rising raw material costs, energy costs and the carbon tax, the shift to perforated bricks is an untapped opportunity for many clay brick makers to benefit from reduced material and energy costs, while maintaining the same levels of production.

### PERFORATED VS SOLID BRICKS

Perforating a clay brick is the act of extruding the clay body such that there are voided areas or holes within the resulting brick. Perforating bricks results in a reduction of the material required to produce a clay brick and a reduction of the energy required to fire the brick. This sustainability practice is known as dematerialization.

Broadly, dematerialization includes the reduction of raw materials at the production stage, of energy and material inputs at the use stage, and of waste at the disposal stage.



### CASE STUDY - DEMATERIALIZATION AT PIKA BRICK

The drying time required for green bricks is one of the biggest challenges faced by brick makers. The introduction of perforations, which means lower mass, less water and an increase in surface area, leads to a direct reduction in time and energy required for the drying of product. The lower mass of product being fired requires a proportionate reduction in firing energy, and also usually has the added benefit of a more “even” burn due to each unit having a higher surface area and improved oxygen availability. Firing times are usually reduced as an added benefit. A reduction in fired brick mass also allows for larger loads to be transported adding to the competitiveness of a cored product versus a solid product.

As part of the Energy Efficient Clay Brick (EECB) Project by the Swisscontact, a dematerialization study was conducted at Pika Brick, a privately-owned brick manufacturer in the Free State producing clay plaster brick products. The company traditionally fired their bricks utilizing clamp kilns, but recently converted to a zig-zag kiln firing technology.



No changes were made at Pika Brick in terms of clay raw materials mining or preparation, nor in the green brick handling methodology, which is based on a pallet / forklift system.

Changes to the green brick or extrusion process were limited to adding a bridge piece, core rods, core bridge tips and die oil lubrication plates. A die lubrication system was already installed, and no additional costs were incurred.

The results from the study, when comparing their annual production of solid bricks to a change to perforated brick production showed significant gains favouring the introduction of perforations. These gains included:

- Reduced clay requirements
- Increased green brick production
- Lower wet and fired brick weights
- Reduced fuel costs
- Lower body fuel requirements
- Decreased drying time requirements
- Less coal required per 1000 brick units produced

## REFERENCES

**CBA. (2017).** *Energy Efficient Technologies - Dematerialization* [Online].

- <http://www.claybrick.org.za/technical-note-32-energy-efficient-technologies-dematerialisation.pdf> [Accessed 06 September 2018].

**UNEP. (2001).** *Consumption Opportunities: Strategies for Change* [Online].

- <http://www.unep.fr/shared/publications/pdf/3000-ConsumOpportunities.pdf> [Accessed 06 September 2018].

### **For further information:**

The Clay Brick Association of South Africa

Website: [www.claybrick.org](http://www.claybrick.org)