

'Green', clean cement?

A more carbon-efficient product

Mike McDonald

AfriSam's cement
product manager

Cement suppliers are vying for a share of the "green" building market. PPC is the latest producer to clean up its act. AfriSam recently launched its Eco cement, which it claims has a significantly lower carbon footprint than the worldwide average for cement – half the carbon footprint of the world average at 453 g/kg. This is primarily attributed to the substitution of clinker with mineral components which significantly reduces clinker content of the cement. This has been achieved without compromising the strength of the cement product.

The Gauteng consumer would pay the same price of R68 for a 50 kg bag of Eco Cement as it would for a bag of conventional multi-purpose cement of the same 32,5 MPa strength; a 20 kg bag comes at a cost of around R35.

Comparing Eco cement with conventional cement products, Mike McDonald, cement product manager for AfriSam, says it can be applied with the same ease but consumers may achieve better finishes and brighter colours using Eco cement. The 32,5 N-strength product could be used to produce concrete of any desired strength which renders it suitable for residential and other structures. McDonald points out that the longer the cement takes to strengthen, the better the interlink between particles. According to him, Eco cement continues to gain in excess of 16% strength up to 56 days. It is also suitable for soil stabilisation in road-construction projects.

Clinker content reduced

"Since 2000, we have been looking at ways to reduce the carbon foot-



David Poggolini

print of our product range by using mineral components," says McDonald

AfriSam started quantifying the CO₂ emissions of all its cement products in 2009 and has put carbon footprint measurements emissions number on all its cement bags, as disclosed in the September 2009 edition of *Quarry SA*.

While developing Eco cement, the group considered ways to reduce the clinker content of its cements to reduce its carbon footprint. Clinker is the most carbon-intensive ingredient of cements as 60% of the emitted CO₂ of cement emanates from the decarbonisation of limestone.

The balance of CO₂ emissions are attributed to factors such as coal consumption, electricity used in the manufacture of clinker, finishing and dispatch, and hydrocarbons.

In order to reduce the amount of CO₂ emissions and, therefore, effectively reduce the carbon footprint that originates from the clinker in the product, AfriSam replaces an amount of the clinker ingredient with an activated mineral component, a by-product of ArcelorMittal's steel-manufacturing process which

carries a much lower inherent carbon load than clinker.

McDonald says the by-product carries only a small CO₂ penalty as the main product of steel already carries the carbon penalty.

Measuring the carbon footprint

The measurement includes the carbon footprint emanating from the amount of clinker used in the manufacturing process as well as the energy used in functions such as transporting materials between manufacturing sites, McDonald elaborates. The energy used in operations comprises electricity and diesel for transport and drilling machines, as well as on-site power generation which is diesel-based. He says the annual use of electricity was obtained from meter readings and checked against the figures per kWh obtained from Eskom.

AfriSam's carbon-footprint assessment also includes emissions from explosives used in quarries. These are converted to CO₂ equivalents.

During the assessment, additional calculations are done for the energy embedded in the treatment and



supply of municipal water, including the impact of pumping.

The producer used the default figures from the World Business Council for energies embedded in sewage removal.

Also taken into consideration is the disturbed area around the plants and quarries where vegetation, which serves as a carbon sink to a lesser or greater degree, had been disturbed. In certain cases, the vegetation loss is compensated by rehabilitation and this is taken into account for complete accuracy. Although the CO₂ values in these three areas – water, sewage and vegetation loss – are of such low significance that they could be left out of the calculations, they are taken into account to arrive at complete sets of figures.

AfriSam employs a specialist energy management and carbon footprinting consulting firm which ensures that AfriSam calculates auditable carbon-footprint numbers.

The measured carbon footprint of its cement products is printed on the cement bags. A CO₂ barometer indicating the carbon footprint of the particular cement relative to the world average, 890 g/kg in the case of Eco Cement, is included.

A noticeable aspect of AfriSam's approach to "greening" its production is the use of slag, as opposed to fly ash. Other cement producers have used fly ash in order to reduce the clinker content, as is the case with Lafarge.

AfriSam, PPC and the up-and-coming Sephaku have also experimented significantly with Loesche mills which are claimed to be significantly less energy intensive than ball mills. ■