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LCA confirms lower environmental impact of ceramic tile production using zircon

ZIRCON INDUSTRY ASSOCIATION

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LCA confirms lower environmental impact of ceramic tile production using zircon

The environmental impacts of the cradle-to-gate life cycle assessment (LCA) of zircon sand have been assessed for the first time, in a study commissioned by the Zircon Industry Association (ZIA). The ISO-standard LCA report entitled 'Life Cycle Assessment of Zircon Sand Production Applied to Ceramic Tiles' also demonstrates a lower environmental impact than the main alternative product, alumina, when used as an opacifier in the production of ceramic tiles.

Commenting on the study, Dr Keven Harlow, Executive Director, ZIA, said: "The ability to quantify environmental impact is increasingly important in our industry. We now have a reliable benchmark for zircon sand production, which confirms that the majority of its, albeit low, environmental impact is related to upstream electricity consumption."

Zircon has been used by tile manufacturers as a raw material in the production of ceramic tiles for many decades, principally as an opacifier, to obtain lasting brilliant whiteness. Its high hardness helps to produce a resilient tile capable of resisting mechanical damage, as well as increasing resistance to water, heat and chemicals, and making tile surfaces more suitable for the latest digital printing techniques.

The LCA study examined the environmental impacts associated with the production of 1kg of zircon sand. Because of the comparatively low environmental impact of the downstream manufacturing process, the impact relates overwhelmingly to local electricity consumption associated with upstream mining processes, much like the mining of other natural minerals.

The study went on to compare the environmental impacts when using zircon as a whitener in ceramic tile production with the main alternative product. It found that tile production using zircon generates significantly lower overall environmental impacts over a range of environmental indicators selected for the LCA study, according to international standards.

The Global Warming Potential, used to quantify climate change, was found to be 16% lower with zircon, while the Acidification Potential (linked to acid rain) was 21% lower and the Eutrophication Potential, associated with airborne emissions, was 23% lower. Scenario analysis demonstrated that these conclusions would remain valid even when making the worst-case assumptions for zircon and best-case assumptions for the alternative product.

The Abiotic Depletion Potential (elements) was approximately 50% less when using zircon-containing tile mixes.

The Abiotic Depletion Potential (fossil), Photochemical Ozone Creation Potential, and Primary Energy Demand were all found to be about 20% lower when using zircon-containing tile mixes. The impact for Ozone Layer Depletion Potential was similar for both products.

"This LCA demonstrates our commitment to environmental transparency and will allow our members to develop meaningful targets as they continually strive to reduce environmental impact," said Dr Harlow. "The study also demonstrates that tile manufacturers and users can lower their environmental footprint by using zircon as the opacifier instead of other whiteners," he added.

Notes for editors

The LCA and comparison was conducted by thinkstep in collaboration with Centro Ceramico di Bologna using the GaBi 8 software system for lifecycle engineering and the CML2001 (January 2016) impact assessment methodology framework. The LCA was critically reviewed by an independent panel of three experts to ensure conformity to the ISO 14040/44 standards.

Global Warming Potential is used as a measure of the impact of greenhouse gases on climate change. Acidification Potential is used to quantify atmospheric acidification, which leads to acid rain. Eutrophication Potential is linked to airborne emissions and is used to quantify the impact of algal bloom. Abiotic Depletion Potential (elements) relates to the impact upon non-biological resources. Ozone Layer Depletion Potential quantifies the relative impact of a chemical compound upon the degradation of the ozone layer. Abiotic Depletion Potential (fossil) relates to the impact upon biological resources, Petrochemical Ozone Creation Potential relates to the potential for ozone to be created, and Primary Energy Demand is a measure of the total amount of primary energy required by the process.

About ZIA: The Zircon Industry Association (ZIA) is an independent industry association for the entire zirconium value chain, from zircon sand production, to a wide range of downstream products, including zircon flour, opacifiers, refractory materials, friction materials, fused zirconias and zirconium chemicals, metal and alloys. ZIA members currently represent some 80% of the globally-produced zircon tonnage. ZIA's mission is to represent and support the interests of the zircon, zirconia and zirconium value chains.

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