Quantification of potential environmental impacts of cement production using a life cycle approach: a case of Dangote Cement Tanzania

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The cement is one of the most important industries worldwide and the world cement production is projected to grow by 0.8-1.2 per year, reaching between3700 and 4400 megatonnes in 2050. The cement sector is facing a number of challenges regarding the reduction of raw materials, high energy demand and associated environmental burden. Despite Tanzania being a signatory to a number of Multilateral Environmental Agreements, which advocates for the protection of human health and the environment, there are no local documented emissions data from the production of cement that demonstrate Tanzania's commitment to meet the objective of these MEA. This result quantified the potential environmental impact of cement manufacturing process, using a Life Cycle Assessment approach. The environmental profile of the cement manufacturing was presented through a gate to gate life cycle assessment approach based on primary data collection from the plant located in Mtwara Region, Tanzania. The functional unit was I tone of cement produced at Dangote Cement Tanzania and the impact assessment was based on indicators that comply with the ISO 14040. The impact categories studied were particulate matter, acidification, Ozone layer depletion,. The study found out that a production of I tonne of cement, accounted for: 677.64kg CO_2 eq land use change and global warming for GWP, $6.56E^{-05}$ kg CFC- 11 for Ozone Layer depletion, 3.55 kg SO_2 eq accounted for acidification potential, 1707.41 kg C deficit accounted for Land use change and Particulate matter accounted for 0.326 kg PM2.5 eq. The key findings from the assessment reveal that transportation of raw materials and electricity production (from diesel power plant) and consumption is responsible for the majority of environmental impacts that stem from the respective process, based on these results, it is recommended that mitigation measure should shift towards energy minimization techniques and the use of alternatively energy sources in order to advance the environmental performance of cement production