World Academy of Science, Engineering and Technology
International Journal of Geotechnical and Geological Engineering
Vol:10, No:06, 2016

Comparative Life Cycle Assessment of Roofing System for Abu Dhabi

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Abstract : The construction industry is one of the major factors responsible for causing a negative impact on the environment. It has the largest share in the use of natural resources including land use, material extraction, and greenhouse gases emissions. For this reason, it is imperative to reduce its environmental impact through the construction of sustainable buildings with less impact. These days, it is possible to measure the environmental impact by using different tools such as the life cycle assessment (LCA) approach. Given this premise, this study explored the environmental impact of two types of roofing systems through comparative life cycle assessment approach. The tiles were analyzed to select the most environmentally friendly roofing system for the villa at Khalifa City A, Abu Dhabi, United Arab Emirates. These products are available in various forms; however, in this study concrete roof tiles and clay roof tiles were considered. The results showed that concrete roof tiles have lower environmental impact. In all scenarios considered, manufacturing the roof tiles locally, using recovered fuels for firing clay tiles, and using renewable energy (electricity from PV plant) showed that the concrete roof tiles were found to be excellent in terms of its embodied carbon, embodied the energy and various other environmental performance indicators.

Keywords : clay roof tile, concrete roof tile, life cycle assessment, sensitivity analysis
Conference Title : ICGCME 2016 : International Conference on Geotechnique, Construction Materials and Environment
Conference Location : San Francisco, United States
Conference Dates : June 09-10, 2016