ASSESMENT OF EMBEDDED ENERGY IN MANUFACTURING WALL TILES USING TWO DIFFERENT FIRING TECHNOLOGIES IN SRI LANKA.

BY

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and behalf, it contains no material previously published or written by another person nor material, which to substantial extent, has been accepted for the award of any other academic qualification of a university or other institute of higher learning except where acknowledgment is made in the text.

UOM Verified Signature

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ABSTRACT

Energy productivity is a critical factor for the Sri Lankan manufacturing industries which is a critical issue that affects the cost of production. Efficiency in consumption of energy and its conservation would be one of the most important means of energy cost reduction and also for meeting future energy demand. The ceramic industry is one of energy intensive industry in Sri Lanka which uses massive quantity of thermal energy as well as electrical energy for the manufacturing processes. An analysis was carried out to asses the energy consumption of two industrial processes in manufacturing ceramic wall tiles using technologies of conventional and fast firing. Conventional firing technology is the oldest technology and fast firing technology is the latest technology that are being used to fire ceramic products.

The main objective of the study was to analyze the energy efficiency of technologies in a broad view and as secondary to study the energy conservation techniques used and can be used in order to reduce the energy consumption. The method of embedded energy analysis was used to analyze the energy of two processes under certain boundary conditions. Analysis of embedded energy was calculated in three levels such as level 1 direct energy supplied by the fuels and electricity, level 2 all ancillary energy inputs and level 3, energy in raw materials. The calculated embedded energy of wall tiles manufactured with the technology of conventional firing is 16 GJ/ MT and similarly the embedded energy of wall tiles manufactured with the technology of fast firing is 9 GJ / MT. The energy consumption in each levels, level 1, level 2 and level 3 of conventional firing technology is 96.7%, 2.4 %, and 0.9% respectively and in fast firing technology is 96.5%, 2.4%, 1.1% respectively.

The latest technology of fast firing technology has been developed highly considering of energy efficiency productivity and product quality. The fast firing technology consist of many kinds energy saving technologies such as waste heat recovery, high thermal efficient kiln furniture and refractory, high efficient burners, efficient tile transportation methods. Out of two technologies of fast firing and conventional firing the most energy efficient technology is the fast firing technology which is 12% more efficient than the conventional firing with compared to the result of the study. Further the implementation of energy conservation techniques to the existing plants will be incorporated to reduce energy consumption by 5 to 10 percent on electrical and 2 to 5 percent on thermal.

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