National University of Science and Technology

Think in Other Terms

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF CIVIL AND WATER ENGINEERING

PROJECT TITLE:

METHODS OF REDUCING THE CARBON FOOTPRINT OF THE BUILT STRUCURES

FINAL YEAR PROJECT

FOR

FARAI MUDEDE (N005 1022M)

Civil & Water Engineering Department

Faculty of Industrial Technology

Supervisor: Eng Desai / Ms E Mangore

2 JULY 2010

Abstract

There is no legislation in Zimbabwe that makes it mandatory for the construction industry to be accountable for GHG emissions neither associated with its products nor is the construction industry directly affected by the climate change even though it is the largest contributor of total GHG emissions in developing countries. Excessive GHG emissions result in climate change which exacerbates occurrence of droughts, floods, gender disparities, agricultural production decline and the incidence of water borne diseases.

With limited funding in developing countries such as Zimbabwe available for adaptation activities and for combating climate change, the most suitable measure to fight climate change is reducing GHG emissions.

A study of the effect of construction materials, construction systems and plant on the final carbon footprint was undertaken with the aim of identifying areas where reductions of the final Carbon footprint could be made. Four structures were taken as case studies, which are the F14, D30, E21 as classified by the Ministry of housing and rural amenities and the Ceremonial hall at NUST. Residential dwellings were chosen as case studies because of their standard form and their repeatability.

It emerged from the study that using labour intensive construction method results in an average reduction of 8% in the total embodied energy of the structure due to construction while the use of a traditional construction method resulted in an average reduction of 30% in the total embodied energy of the structure due to construction. The traditional construction method is applicable as it results in a reduction in the general cost per m^2 of construction and may be a viable material for low cost housing construction. It was observed that the use of fly ash as a supplementary cementitious material results in an average reduction of 8,9% in the total embodied energy of the structures analysed. Fly ash as a supplementary cementitious material is financially viable as it results in a general reduction in the cost per m^2 of wet concrete. A combination of the above methods, results in the embodied energy due to construction activities of the structures analysed being reduced by 40.2%.