Ezema I. C., **Opoko A. P.** and Oluwatayo A. A. (2016)

Bridging The Housing Deficit In Nigeria: Energy And Co_2 Emissions Implications.

International Conference for Infrastructure Development in Africa ICIDA, 2016,

Pretoria, South Africa.

ABSTRACT

Affordable and decent housing constitute an important component of the urban infrastructure of any nation. In Nigeria, the housing deficit was estimated in the year 2012 to be about 17 million. Understandably, the huge financial and complex logistical implications of bridging the deficit appear to have dominated academic discussions on the subject matter. This paper attempts to address the energy and CO_2 emissions implications of mitigating the huge housing deficit. Using a predominant urban social housing typology in the highly urbanized city of Lagos as a basis, the paper estimated the embodied energy and CO_2 emissions associated with providing the additional housing units needed to bridge the deficit. The life cycle energy analysis framework was adopted for the study with the Inventory of Carbon and Energy (ICE) as the main source of embodied energy and CO_2 coefficients. It was found that given a housing unit footprint of $120m^2$ and a building life span of 50 years, the embodied energy and CO_2 emissions intensities for the prototype were $7378MJ/m^2$ and $589kg/m^2$ respectively. For the additional housing units, the above intensities translated to about $15.x\ 10^{12}$ MJ of embodied energy and 1.2×10^{12}kg of CO_2. With respect to the building components, the largest contributors to the embodied energy and carbon profile were the substructure, frame and upper floors as well as internal and external walls and the key materials for the components were cement and steel reinforcement. In order to reduce the estimated embodied energy and carbon impact of providing the additional housing needs, the targets for mitigation should be the concrete, steel reinforcement and envelope/partition materials of the buildings.

Keywords: Embodied carbon, Embodied energy, Life cycle assessment, Mass housing, Nigeria

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