

# **Application of comparative life cycle assessment to a proposed build-ing for reduced environmental impacts: Assiut University Hospital Clinic as a case study**

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## **Abstract**

Although buildings have many benefits, the construction industry represents a big barrier to implement the strategic environmental plans. Specifically, in Egypt as one of the developing countries, the building construction sector consumes around 40% of the global raw material extraction, according to (World Resources Institute, 2015). Furthermore, the manufacturing industries and construction processes have 23% of all fuel combustion activities and have 22% of all GHG emissions according to the BIENNIAL update report (Ministry of Environment, 2018). This paper is one of a set of scientific papers that will be introduced to apply the integration methodology of Life Cycle Assessment (LCA) and Building Information Modeling (BIM) on a health clinic as a proposed building in Assiut University Hospital. The results have revealed that that the main harmful environmental impacts are the respiratory inorganics, global warming potential, and non-renewable energy as the midpoint method, additionally the human health and resource depletion as endpoint method. In particular, the GWP results of the steel, concrete, brick, and tiles are (3.4E5), (2.55E5), (9.67E4), and (4.31E4) kg CO<sub>2</sub> equivalent respectively as a midpoint result. For the endpoint method, the weighting results conducted that the human health and resources depletion have recorded the largest figures, as well as the steel, concrete, brick, and tiles industries have massive environmental burdens. Additionally, the paper has summarized that there is an urgent need to introduce sustainable alternatives of building materials particularly since these industries emit many of emissions such as CO<sub>2</sub>, P. M2.5, SO<sub>2</sub> and C<sub>2</sub>H<sub>4</sub>. Ultimately, the paper has introduced future recommendations for both proposed and existing buildings.

## **Keywords**

Life Cycle Assessment (LCA), Environmental Impact Assessment (EIA), Building information modelling (BIM), Energy efficiency