



# Comparing Two Innovative Light Weight Structural Systems in Terms of Sustainability

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## Abstract

The major purpose of this article is to compare two prevalent light weight structural systems: Light Gauge Steel structural systems and 3D Wall Panels to find out which system is more compatible with sustainable construction aspects. To achieve this desire, the research procedure begins by defining the concepts of sustainability in residential construction, following by a brief explanation about each system. Then a sample residential plan is applied for each light weight systems with similar conditions. Afterwards two plans are compared considering sustainability aspects. The structural analysis and design of Light Gauge Steel systems has been carried out using STRAP software, while 3D Wall Panels has been designed in ETABS. Statistical data of the projects is estimated according to previously performed project schedules. As a result, although both Light Gauge Steel and 3D Wall Panels Systems do not completely fulfill sustainability aspects, each of the two systems precedes in some.

**Keywords:** sustainability, light weight structure, residential, 3D Wall Panels, Light Gauge Steel.

## 1. INTRODUCTION

The environmental impacts of human activities- such as global warming, climate change, ozone depletion...- have been increasing since the beginning of the industrial revolution. On the other hand, the reduction of energy recourses is also being a matter of concern during recent years. In this regard, considerable attention towards energy saving and sustainability has been growing as a critical issue in all aspects of human life recently. In this regard, buildings as a place which individuals spend most of their time in, also needs to be investigated in terms of sustainability. A very large proportion of the energy used in the world, and the greenhouse gases that are released from this energy use, is connected to the building sector. It is clear that no move towards sustainable development can go ahead without radical changes in architecture, construction and special planning. We are now seeing a huge drive to conserve energy, increase efficiency and create zero-carbon buildings, all of which are vital in reducing the environmental impacts of buildings. But building sustainability must also take a broader approach, including the whole impact of a building- on the environment, people's health and social wellbeing- throughout its whole life time. In order to build a truly sustainable buildings and cities, architects and planners need to think holistically in all aspects of sustainable building.

In this project it is targeted to evaluate the environmental performance of bearing structures used in low rise residential buildings. Among homebuilding structural systems, light weight structures, have been generating rapidly throughout world lately and also were considered as more sustainable structures. Seismic resistance and easy construction of these systems have considered them as appropriate alternatives to conventional building structures. In this respect, the major purpose of this research is to compare two prevalent light weight structural systems namely: Light Gauge Steel framing systems, and 3D structural Panels from the aspect of environmental performance.

To achieve this desire, the research procedure begins by defining the concepts of sustainability in residential construction, following by explaining the method of design and construction of both structural systems. Then a sample residential plan is applied for each light weight systems with similar conditions. Afterwards plans are compared considering mentioned aspects.