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Author: K. Hassouneh A. Al-Salaymeh J. Qoussous

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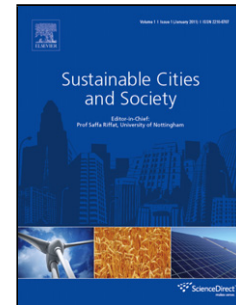
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# Energy Audit, An approach to apply the Concept of Green Building for a Building in Jordan

K. Hassouneh<sup>1</sup>, A. Al-Salaymeh<sup>2</sup> and J. Qoussous<sup>1</sup>

*1Architecture Engineering Department, Faculty of Engineering and Technology, The University of Jordan, Amman, 11942, Jordan, E-mail: [k.hassouneh@ju.edu.jo](mailto:k.hassouneh@ju.edu.jo); [jawdatqoussous@hotmail.com](mailto:jawdatqoussous@hotmail.com); Fax: +96265355588*

*2Mechanical Engineering Department, Faculty of Engineering and Technology, The University of Jordan, Amman 11942 Jordan, E-mail: [salaymeh@ju.edu.jo](mailto:salaymeh@ju.edu.jo), Tel.: +962 65355000 Ext. 22788, Fax: +96265300851*

## ABSTRACT

An energy audit for one department at the faculty of Engineering and Technology at the University of Jordan has been conducted as a way to apply the concept of green building to an existing structure. According to the Jordanian green building code, a classification for the green building has been carried out according to its saving in energy and water in addition to the other factors such as indoor quality and material.

The heating and cooling loads were calculated and the results were compared with the values for the same building after amendments to the windows and walls. The insulation for external walls of the building has been introduced in addition the double glazing instead of the current single glass windows for the building. The electricity for the lighting consumption of this building was obtained and analyzed and the potential of utilizing a lighting sensor for different halls and rooms was studied and analyzed. The boiler performance has been studied and an estimation of efficiency enhancement was proposed. It has been found that choosing a larger window area facing south, east and west can save more energy in winter and decreasing the heating costs using a certain types of double glazing, while decreasing the glazing area facing north can save money and energy. Also, it has been found that the payback period for the annual saving in fuel and electricity bills is less than 3 years. The needed investment for obtaining the energy saving is shown in the paper.

## 1. INTRODUCTION AND METHODOLOGY

Energy took an important place through the Human being history, starting from the prehistoric age. Before 1970, the supply and consumption of energy were relatively obscure matter to most people. Within less than a decade, however, "energy" has emerged as one of the most provocative words of the times.

Energy demand in Jordan is increasing largely during the last 20 years and it will continue increasing by the same rate. Energy consumption might be doubled between 2015-2020 referring to low production of energy and high growth of energy, [1].

The shortages and high prices that occurred with the oil embargo of 1973 and the rapid economical development, combined with the growing prices of energy, lead to an increasing recognition and understanding for the need of energy audit.

The running cost of green building is considered to be less than conventional buildings because the benefits of typical green buildings exceed the additional costs. Within the first two or three years and over a 15 year period provide financial benefits about ten times larger than the extra cost of building green.

Now homeowners and business owners are interested in upgrading their homes and facilities to be more energy efficient and to reduce the cost of their monthly energy bills, [2].

In the last few years, energy and electricity price in Jordan increased many times. The energy bill for Jordan represents 20% of the Jordanian GDP and it affects the most aspects of the Jordanian life. Therefore, the motivation in the country is moving quickly towards the energy saving buildings in order to reduce the operating cost of the building.

The main goal of this study is to use energy audit to reduce energy consumption rate of an existing building at the University of Jordan, by understanding how energy is being presently used and possibly being wasted and to recommend proper condition that ensure human comfort of users of the department. The novelty of this study is that it suggests some important points that should be taken into consideration to reduce energy bill in an important building in Jordan.

The methodology which was adopted for this audit was visual inspection and data collection, observations on the existing condition of the facility, equipments and quantification, identification/verification of energy consumption and other parameters by measurements and potential energy saving opportunities.

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