بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ARCHITECTURAL DEPARTMENT

Use of vertical greenery systems to conserve energy in administrative buildings in Egypt

A Thesis submitted in partial fulfillment of the requirements of the degree of

Master of Science in Architectural Engineering

Supervised By

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by

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Bachelor of Science in Architectural Engineering
Faculty of Engineering, Architecture Department. Misr International University ,2017

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Ain Shams University
Faculty of Engineering
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Statement

This thesis is submitted as a partial fulfilment of Master of Science in Architectural Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Abstract

Expansion and urban development in Egypt have led to the main problem which is increased energy consumption and it sometime comes at the expense of green areas. For example, it is possible to dispense with large green areas and trees in order to develop the road network.

Administrative buildings are one of the main energy consuming entities in Egypt. so the aim of thesis is to rationalize energy consumption in administrative buildings, and also to increase green spaces in Egypt.

Therefore, the thesis examines the types of Vertical greenery systems (VGS) in detail, their use, structure and technological systems for it. The main goal is to demonstrate the effectiveness of vertical green systems in Egypt through a simulation of an administrative building using the Design Builder program.

The thesis will discuss the issue through two main parts.

Firstly, theoretical and analytical study, based on a comprehensive literature review of vertical green systems and explain their importance, their construction systems, how they work, drainage and irrigation, etc.

As well as analyzing energy consumption data within the administrative buildings in Egypt. And explain to what extent those buildings consume energy. And how it can be extensively reduced through vertical green systems.

Secondly practical study, based on DesignBuilder simulation. A three-story administrative building is simulated with different scenarios. A Base scenario with zero greenery which will be compared to two different scenarios that applied a vertical green system.

The first scenario will use VGS on 100 percent of the southern façade of the building while the second scenario, will use 70 percent of the southern façade to be covered with VGS.

Finally, a comparison was made between the three scenarios, and the results show that the first scenario had the lowest energy consumption and saved about 9 percent annually of the annual administrative building’s energy consumption compared to the base scenario.

While the second scenario saved almost 7 percent of the energy consumption annually. So, it was clear that vertical green systems have a significant and effective role in rationalizing energy consumption in administrative buildings.

Keywords:

Vertical Green systems, Greenwall, Administrative building, Energy consumption, living wall

Abbreviations

VGS	Vertical green system
LWS	Living wall system
GF	Green facade
GW	Green wall
DSF	Double skin façade
Ktoe	Kilotonne of Oil Equivalent

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Introduction

Chapter 1: Administrative Buildings & Energy Consumption

Chapter 2: Vertical green system technology (VGS)

Chapter 3: Analysis of previous vertical green system case studies