

# Readings in Contemporary Construction Technology and Management

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Muhammad Abu Eusuf



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

# READINGS IN CONTEMPORARY CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Edited by:

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Building Technology and Engineering Kulliyyah of Architecture  
and Environmental Design International Islamic University  
Malaysia



IIUM Press

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Muhammad Abu Eusuf: Readings in Contemporary Construction Technology and Management

ISBN: 978-967-418-051-5

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :  
**IIUM PRINTING SDN.BHD.**  
No. 1, Jalan Industri Batu Caves 1/3  
Taman Perindustrian Batu Caves  
Batu Caves Centre Point  
68100 Batu Caves  
Selangor Darul Ehsan  
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543  
EMAIL: iiumprinting@yahoo.com

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# TOWARDS THE ZERO ENERGY HOUSE - A COMPARISON OF BIOCLIMATIC STRATEGIES AND THERMAL COMFORT ISSUES IN TWO DIFFERING CLIMATES

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## ABSTRACT

The aim of the paper is to present a comparison between the application of energy efficient design strategies in designing a zero-energy house in two differing climates, the tropical and the temperate. Current technology and development regarding passive and low-energy strategies such as daylighting and passive cooling which have been originated in more developed countries situated in the temperate climate have been used as a background for low-energy strategies in developing countries many of which are in tropical climate. The paper highlights the issues and conflicts involved in implementing these strategies i.e. concerning energy conversion, thermal and visual comfort and building integrated photovoltaic from the „temperate“ climate into the context of the tropical climate. Some of these strategies have been implemented in the design of a zero-energy house in the tropics. Issues concerning the use of daylighting with its consequences in terms of heat gain and glare, thermal comfort level, cooling strategies in two different climates are compared and highlighted. The paper emphasizes that there is a need for a prioritization of issues and strategies in implementing energy-conscious design in different climates and when transferring one form of technology or strategy from one climate to another.

*Keywords:* Zero Energy House, Day Lighting, Thermal Comfort, Tropical Regions

## INTRODUCTION

Modern urban residential areas are considered as the main energy consuming sectors in many countries, at temperate climate regions, most of the energy consumption is for heating while in tropical regions the main energy consumer is the cooling load.

A zero energy building (ZEB) produces as much energy on-site as it uses annually, with a grid-tied, net metered photovoltaic (PV) system and active solar water heating. The zero-energy house concept was originated in the developed countries, which are mostly located on temperate climates. Previously fully autonomous zero