# ENERGY EFFICIENCY STUDY IN FTMSK BUILDING OF UNIVERSITI TEKNOLOGI MARA SHAH ALAM

Thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA



MOHD NIZAR BIN MOHD NASIR FACULTY OF ELECTRICAL ENGINEERING UNIVERSITI TEKNOLOGI MARA 40450 SHAH ALAM SELANGOR DARUL EHSAN

#### **ACKNOWLEDGEMENT**

In the name of Allah, I take special pleasure in this opportunity to thank the many people who have helped me to complete this thesis.

First, I would like to express my gratitude to my supervisor Encik Mohd Zaki bin Abdullah lecture for Universiti Teknologi MARA for her idea and suggestion and also to for the time and effort in proofing this thesis.

I would also like to express my thanks to all ECO Energy and Pejabat Pembangunan dan Penyelengaraan UiTM Shah Alam staffs who helping me seeing clearly what should be done.

#### **ABSTRACT**

People nowadays are more concerned about energy efficiency and conservation. One of the focal point is on the energy consumption in buildings. Energy audit is considered as one of the comprehensive methods in the checking the energy usage and wastage in building [1].

This paper describes the actual implementation and the process of energy audit program at the Faculty of Information Technology and Quantitative Science (FTMSK), Universiti Teknologi MARA building.

The study focuses on energy efficiency of the existing Ventilation Air Conditioning (VAC) and Lighting system of the Faculty. Opportunities for improving the energy consumption were identified and evaluated and economic analysis was carried out to determine the pay back period energy audit program.

### TABLE OF CONTENTS

DECLARAT	TION		i		
ACKNOWL	EDGEI	MENT	ii		
ABSTRACT	•		iii		
TABLE OF	CONTE	ENTS	iv		
LIST OF FIGURES					
LIST OF TA	BLES		xi		
LIST OF ABBREVIATIONS					
CHAPTER			PAGE		
1.	INTR	LODUCTION			
	1.1	Introduction	1		
	1.2	Energy Management	2		
	1.3	Facility Background	2		
	Ÿ.	1.3.1 Existing Building Energy Management	3		
		1.3.2 General Equipment	4		
		1.3.3 Lighting	4		
		1.3.4 Ventilation Air Conditioning System (VAC	4		

## 2 VNTILATION AND AIR CONDITIONING (VAC)

2.1	Backg	round on the importance of VAC	7
2.2	Types	of Ventilation	8
	2.2.1	Fan Coil	8
	2.2.2	Package Unit	8
	2.2.3	Induction Unit	9
2.3	Major	Equipment of VAC System	9
	2.3.1	Air Handler Unit	9
	2.3.2	Fans	10
	2.3.3	Cooling Towers	10
	2.3.4	Pumps	11
	2.3.5	Ductwork	11
	2.3.6	Split Units	11
LIGH'	TING S	SYSTEM	
3.1 Introduction		uction	13
3.2 Lighting Principles			14
	3.2.1	Luminous Flux	14
	3.2.2	I luminance	14
	3.2.3	Luminance	14
	3.2.4	Correlated Color Temperature	15

3