**FINAL PROJECT REPORT**

DIPLOMA IN MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

MARA INSTITUTE OF TECHNOLOGY

41450 SHAH ALAM

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# DAYLIGHT FROM SOLAR RADIATION

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**MAY 1997**

## CONTENTS :-


| | | Page |
|---|---|---|
| | **ACKNOWLEDGEMENT** | i |
| | **ABSTRACT** | ii |
| **1.0** | **INTRODUCTION** | 1 |
| 1.1 | Introduction Of Sunlight | 1 |
| 1.2 | Solar Radiation | 6 |
| 1.3 | Illumination | 11 |
| **2.0** | **OBJECTIVES** | 19 |
| **3.0** | **METHODOLOGY** | 21 |
| **4.0** | **RESULTS** | 38 |
| **5.0** | **DISCUSSION** | 42 |
| 5.1 | Discussion About The Project | 42 |
| 5.2 | Problem Faced | 52 |
| 5.3 | Suggestion | 54 |
| | **APPENDIX** | I |

# ABSTRACT

The relationship between solar radiation and illumination fully in a horizontal surface at Shah Alam is studies. Since this is the first time illumination is measured in this country, a photometer ( luxmeter ) is installed on the roof top of a building at the School of Applied Science, Institut Teknologi MARA, Shah Alam.

The photometer and a standard pyranometer are connected to a data logger and the measured data are downloaded with a computer. The data are plotted onto chart and a regression analysis was done to determine the relationship between solar radiation and illumination. The relationship is found be a linear and produce an equation $y = 0.99x + 32.4$.

# 1.0 INTRODUCTION

In Spite of what you read in the papers, the much-heralded energy shortage of the future need never reach crisis proportions. The sum-the ultimate source of nearly all energy on earth-shines every day, providing solar power to the earth's surface at the stupendous rate of $1.7 \times 10^{14}$ kilowatts (kW). In more familiar terms, this flow of power is equivalent to that which sould be obtained from burning 6 million tons of coal every second, around the clock, every day in the year-roughly 100 tons of coal perday for every person on earth.

Energy from the sun-solar energy-is a renewable resource. It will not be depleted for millions of years, it does not have to be imported from abroad, it does not habe to be hauled or piped to the point of use, and it is readily available at any location where the sun shines. It is nonpolluting, has little if any adverse environmental impact, and leaves no residue or industrial waste. Taking into account night and day, the seasons of the year, cloudy and sunny days, and the latitude on the earth's surface, the average solar power at ground level is about 17 watts per square foot ($W/ft^2$)-enough, if it could be collected, stored, and used at 100 percent efficiency, to supply the total world demand for energy many times over.

### 1.1.1 Some Limitations On Sun Power

Plentiful and inexhaustible though it is, solar power has some limitations that must be recognized at the outset. Some of these are listed here, and others will be examined as we develop the principles of solar eneregy systems design in subsequent chapters.

1. The sun's energy is not concentrated on the earth's surface to provide large amounts of energy at high temperature in a small area. Large collection areas are required.
2. Solar energy is intermittent, because night and day, cloudy days, and the seasons of the year affect its reception on earth. Consequently, it must be collected when availabel, stored in large quantities, and used later as energy demands dictate.
3. As with all heat energy processes, the conversion of solar energy to usable heat or mechanical energy is accompanied by significant losses. Depending on the type and design of the solar ebergy system, efficiencies range from about 12 percent to a high of about 60 percent.
4. Capital investment for equipment is large. Although the sun's energy itself is free, the equipment and systems necessary to capture it and put it to work are expensive. This factor may well become less inhibiting, however, as mass production of solar energy components becomes commonplace.
5. Generally speaking, at locations and times of greatest energy need, solar energy is least avaible-for example, in winter in extreme northern (and southern) latitudes, in urban