



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**THE CASE STUDY ON HOUSEHOLD ELECTRICITY
CONSUMPTION ASSESSMENT IN MALACCA**

This report is submitted in accordance with the required of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Power) With Honours.

by
اونيورسي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AZZAM MURLINDA BIN MOHTADA

B071710099

950105-13-5323

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

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Ts. SULAIMAN BIN SABIKAN

Alamat tetap pelajar:

Cop rasmi penyelia Projek Sarjana Muda

NO 275, KAMPUNG NO.2,

JALAN DATUK AJIBAH ABOL,

94300, KUCHING,

SARAWAK.



Ts. SULAIMAN BIN SABIKAN
Pensyarah
Fakulti Teknologi Kejuruteraan Elektrik & Elektronik
Universiti Teknikal Malaysia Melaka

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Author:

AZZAM MURLINDA bin MOHTADA

Date:

8/2/2021



اونيورسيتي تيكنيكل مليسيا ملاك

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power) With Honours. The member of the supervisory is as follow:


Ts. SULAIMAN BIN SABIKAN
Pensyarah
Fakulti Teknologi Kejuruteraan Elektrik & Elektronik
Universiti Teknikal Malaysia Melaka

Signature: _____
Supervisor: Ts. SULAIMAN BIN SABIKAN


اونيورسيتي تيكنيكل مليسيا ملاك
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ABSTRAK

Penggunaan elektrik di sektor kediaman merupakan sebahagian yang terbesar dari jumlah permintaan elektrik di dunia. Di Malaysia, kebanyakan sumber elektrik dijana daripada gas asli, hidroelektrik dan arang, dimana ia dua sumber ini akan mengerakkan penjana atau lebih dikenali sebagai “generator” untuk menghasilkan tenaga elektrik. Jadi kajian ini adalah untuk mengkaji penggunaan dan menyediakan cara yang efektif agar pengguna dapat menilai sendiri sebelum membuat melaporkn kepada pihak berkenaan tentang kenaikan bil mereka. Kajian ini akan menumpukan pada bagaimana melakukan penilaian penggunaan elektrik rumah penduduk untuk beberapa jangka masa. Beberapa rumah sukarelawan akan dipilih untuk kajian ini. Semua maklumat berkaitan mengenai elektrik akan dikumpulkan untuk setiap rumah, seperti penggunaan alat elektrik, bil elektrik bulanan, profil permintaan elektrik isi rumah dan aktiviti pengguna. Dengan adanya kajian ini, hasil tersebut dapat dinilai sendiri oleh penduduk dan mereka turut dapat memberikan tindakan yang dapat dilakukan untuk meningkatkan kecekapan elektrik.

اوتیور سیتی تیکنیکل ملیسیا ملاک

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ABSTRACT

Electricity consumption in the residential sector is the largest part of total electricity demands in the world. In Malaysia, most electricity sources are generated from natural gas, hydroelectric and coal, where these two sources will move the generator to generate electricity. So this study is to review the use and provide an effective way so that users can evaluate themselves before making a report to the relevant parties about their bill increase. This study will focus on how to evaluate the electricity consumption of residents' homes for some time. Several volunteer homes will be selected for this study. All relevant information on electricity will be collected for each household, such as the use of electrical appliances, monthly electricity bills, and household electricity demand profile and consumer activities. With this study, the results can be evaluated by the residents themselves and they can also provide actions that can be done to improve electrical efficiency.

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DEDICATION

This report was wholeheartedly to my beloved parents and my siblings. Who have been gave me strength and inspiration when I am about to giving up, who keep provide their financial support, spiritual and moral support. Praise is to Allah S.W.T that I am part of this family. Thankful for your supporting advice and the best wishes.



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LIST OF ABBREVIATIONS

TNB	Tenaga Nasional Berhad
SEB	Sarawak Energy Berhad
SESB	Sabah Electricity Sendirian Berhad
EXCO	Executive Council
LED	Light-emitting diode
UV	Ultraviolet
CFL	Compact fluorescent lights
PSM	Projek Sarjana Muda
UTeM	Universiti Teknikal Malaysia Melaka



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CHAPTER 1

INTRODUCTION

1.1 Background

In this world there are principle like supply and demand for example the demand is household need the power supply to lighting their houses so the provider is Tenaga Nasional Berhad (TNB). In Peninsular Malaysia, the provider power supply is TNB, meanwhile Borneo Peninsular the power provider is Sarawak Energy Berhad (SEB) for Sarawak and Sabah Electricity Sendirian Berhad (SESB) for Sabah, this provider responsible to supplying the electrical power to the end user.

Electricity in Malaysia, electricity is generated by converting various forms of energies into electrical energy. One of the most common methods is using kinetic energy to rotate a magnet surrounded by coils of wires to generate electrical current. In order to create the kinetic energy needed to rotate the magnet various energy resources can be used.

Natural gas and coal is one of the resources used commonly in Malaysia. The combustion process creates high pressure gas that rotates the turbine which turns the magnet in a combined cycle power plant. The exhaust gas will also be used to heat up water to create steam to rotate another turbine. There many types of energy come from like coal, solar, and hydro.

The end user or consumer divided to domestic and industrial used. This case study focusing on domestic like household. This case study is focusing on Household Electricity Consumption Assessment in Malacca and assessment can be done by themselves and can get the roughly for their electricity bills, this also can use as evident as your study once you make a complaint.

1.2 Problem Statement

In 2019, it is reported that over 250,000 household in Malacca have been installed smart meters and became the first group used that meter in Malaysia and categories as smart user. Tenaga Nasional Berhad (TNB) said, the advantages of use this smart meter is efficiently and there is no misreading information on the actual monthly power usage and can be access by user for manage their expenses on power in houses.

Based on the amount of user of smart meter, only one percent of the household made report to TNB. The complaints from consumers that their monthly bills had soared drastically since converting to the smart meters. Almost all of them have already been take action and including by checking the smart meter at their houses. TNB also said that a refund would be provided if the meter readings indicated an improper bill surplus.

Since allegations of smart meters allegedly caused unreasonably higher electricity bills on Facebook last month, TNB did not sit idly by and take complaints including handling complaints and meeting and briefing Melaka Chief Minister Adly Zahari and state Executive Council (EXCO) members and the Energy Commission.

Therefore, this “Case Study on Household Electricity Consumption Assessment” in Malacca is made. Because the user can use this assessment by themselves and can get the roughly for their electricity bills, this also can use as evident as your study once you make a complaint. Besides that, this case study also propose an improvement to increase electrical efficiency for each cases.

1.3 Objectives

The purposes for this case study are:

1. To design and develop an effective methodology to do Household Electricity Consumption Assessment.
2. To collect and analysis data of household electricity consumption.
3. To propose an improvement to increase electrical efficiency for each cases.

1.4 Scope of Project

The purpose of this case study was designed to achieve the objectives of the project. This case study focuses on design an effective methodology household electricity consumption assessment. This assessment made because of the issues that happened in Malacca. By this assessment, the user can compare their electricity consumption. Besides that, this study case able to get the data from household then analyse the data given. In the meantime get the data, need to know the type of household. Once get the data, it can be conclude the probability reason of the consumption. The probability it might be because of the old appliances, wiring problem, equipment problem, meter TNB and inaccurate info or data from user. Finally, from the comparison, we can giving some advised and recommend to household how improve the efficiency for each cases such as ask them to change the light from tube fluorescent to light emitting diode (LED).

1.5 Thesis Outline

This report consists of five chapters. All these chapters are discussed about the implementation of this case study, which about “The case study on household electricity consumption assessment in Malacca”. Chapter 1 introduces about the overview of this project system that include background, problem statement, objectives, scope of projects and thesis outline of this project.

Chapter 2 consists of literature review. In this section, it is about the discussion of related previous journal or article that have been conducted by other researchers for the improvement of the project. The information about several part of components, equipment that been used and technology will be discussed in detail at this chapter.

Chapter 3 consists of the methodology used to implement this case study. The method and procedure as the guide and apparatus is stated with clear flow of this research. A block diagram will illustrate the whole function of this project system. The flow chart is used as well as the operation of this project will be discussed in this chapter.

Chapter 4 consists of result obtained regarding to the performance of this project will be discussed. Moreover, the discussion on the analysis based on the project result and findings is being concluded clearly in this chapter.

Finally, in Chapter 5, with understanding for whole research, the conclusions and recommendation are discussed in this chapter view.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will explain more about what is power consumption, smart meter, lighting, cable and self-monitoring electricity consumption. Those subtopics have been cited as the key source of this research from related articles, posts, papers and websites. Each of the topics discussed in this chapter were focused on the case study framework that focuses to achieve the objectives.

2.2 Power Consumption

Power consumption in electrical engineering refers to the electrical energy per unit time, supplied to run anything like a home appliance. The power consumption is usually expressed in units of watts (W). The electricity consumed by the equipment is always greater than the electricity it actually needs. This is because there is no equipment that is 100 percent effective. ('Power Consumption', 2008)

Power as heat, vibration and electromagnetic radiation is wasted. A light bulb, for example, not only converts electrical power into light, it also causes some heat. Power and energy are closely related but push the design into various components or parts.

In some cases, such as vehicles that run from a generator, we may have limits on the total power consumption of the platform in some situations, such as vehicles that run from a generator, but the most common limitation on power consumption comes from heat generation more power burned means more heat. In general, we will use the term power as a shorthand for the consumption of energy and energy.

2.3 Smart Meter

Smart meter frameworks are being sent to improve network dependability and advance vitality proficiency while giving improved administrations to their clients. Smart metering which is introduced in a large number of families overall gives utility organizations with constant important and convenient information about power utilization and permit clients to make educated decisions about vitality use. Smart meter information examination has become a functioning region in exploration and industry. It intends to help utilities and purchasers comprehend power utilization designs. Some of the benefits related to data obtained from smart meters are:

- Better access and data to manage energy use
- More accurate and timely billing
- Improved outage restoration
- Power quality data
- Early detection of meter tampering and theft
- Data for improved efficiency
- Reliability of service, losses, and loading,
- Improved data for efficient grid system design, power quality
- Data for the service areas, and improved customer premise
- Safety and risk profile

This enormous information challenge requires progressed strategies and foundation to manage tremendous measures of information. (Dudek and Gawlak, 2018)



Figure 2.1: Smart Meter



Electric Meters









Figure 2.2: Analog and Digital Meter

2.4 Lighting

The wattage measures the amount of electrical power consumed by a light bulb. The total power or energy is measured by watts. A lumen is a measure of the brightness or the light output. Else is, measure the visible light from any source of light. Remember both when buying a light. A higher wattage does not mean higher lumens, however higher the lumens per watt, the more splendid is the bulb.

Fluorescent tube, these are basically the white tube lights we all know well. The tube is gas filled, which produce short-wave bright (UV) light. Besides that, Compact fluorescent lights (CFL) use gas, mercury particles and phosphor to produce the light. Most CFLs have a charge-up time, and also need more watts to light up. This makes them unacceptable for regions where quick exchanging is required and where lights are much of the time turned on and off. Light emitting diode (LED) use diodes instead of gas to create light making them the most energy efficient lighting option available. The type need to consider for lighting is watts, price, life span and energy efficiency.

Table 2.1: Comparison of Lights

ECONOMICS OF LIGHTS				
	Incandescent	Fluorescent (T8)	CFL	LED
While light emitting diodes (LEDs) cost much more, in the long run, they are the most cost efficient.				
	60 Watts/hour	36 Watts/hour	15 Watts/hour	10 Watts/hour
Lumen/watt/hour	11.67	73.61	48.00	80.60
Units (kWh) consumed in a year (6 hours a day)	131.40	78.80	32.80	21.90
Life span (hours)	1,200	15,000	10,000	50,000
Cost per bulb (₹)	12	85	200	950
Number of bulbs needed for 50,000 hours	 42	 3	 5	 1
Cost of electricity consumed a year (₹5.50/unit)	722.70	433.62	180.40	120.45
Total cost of electricity and bulbs for 50,000 hours (₹)	28,000	10,155	7,325	5,900
<small>CFL: Compact fluorescent lights Watt measures the amount of electricity a bulb consumes; lumen shows the amount of light the bulb will provide. Source: Havells India, Philips India, Mint research</small>				