



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**PERFORMANCE ANALYSIS ON DOMESTIC APPLIANCES
EFFICIENCY FOR ENERGY SAVING PURPOSE**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Industrial Power) with honour

by

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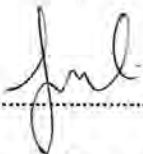
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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours. The member of the supervisory is as follow:



(Project Supervisor)

ABSTRACT

One of the critical problems facing the society today is the challenge caused by the increasing energy consumption and the increasing of greenhouse gas emissions. Beside, a lot of consumer having economic difficulties due to the high living cost. People might want to find a solution to reduce their expenses. Electrical bills is one the expenses which have the potential to save by reducing the energy consumption. So, it is important to let everybody concerned about the correct methods to use the energy more efficiently in order to reduce energy consumption. But the fact is people do not act on without a real data presented upon them. So this project will present the consumer a real data which will give them be conscious the important of reducing the energy consumption. Since household are one of the major consumers of electricity in Malaysia, so this project will be focusing on how to reduce the energy consumption in domestic appliance by practicing correct energy efficiency in daily consumption. At the end of this project, a data will be presented to give the consumer about the knowledge in terms of usage and costing of each appliance used. The data will presented based on the study on the energy consumption of the most common household appliances in Malaysia and prescribes the various steps that can lead to reduced energy consumption.

ABSTRAK

Salah satu masalah kritikal yang dihadapi masyarakat hari ini adalah cabaran yang disebabkan oleh penggunaan tenaga yang semakin meningkat dan peningkatan pelepasan gas rumah hijau. Selain itu, kebanyakan pengguna yang mempunyai masalah ekonomi disebabkan kos hidup yang tinggi. Kebanyakan pengguna hendaklah mencari penyelesaian masalah yang sesuai untuk mengurangkan kos perbelanjaan mereka. Salah satu cara untuk cara mengurangkan kos perbelanjaan adalah berdasarkan mengurangkan penggunaan tenaga elektrik. Jadi, ia adalah penting untuk membiarkan semua orang mengambil berat tentang kaedah yang betul untuk menggunakan tenaga yang lebih efisien. Tetapi hakikatnya ialah kebanyakan pengguna tidak bertindak tanpa data sebenar yang dibentangkan kepada mereka. Jadi projek ini akan membentangkan pengguna data sebenar yang akan memberi mereka sedar kepentingan dalam mengurangkan penggunaan tenaga. Memandangkan perumahan adalah salah satu sektor utama tenaga elektrik di Malaysia, jadi projek ini akan memberi tumpuan kepada cara untuk mengurangkan penggunaan tenaga dalam peralatan rumah dengan mengamalkan kecekapan tenaga yang betul dalam pengambilan harian. Pada akhir projek ini, penjimatan rancangan perkakas domestik akan direka untuk memberikan pelanggan tentang pengetahuan dari segi penggunaan dan pengekoson setiap perkakas yang digunakan. Pelan penjimatan ini akan membentangkan kajian mengenai penggunaan tenaga peralatan rumah tangga yang lazim di Malaysia dan menetapkan langkah-langkah untuk mengurangkan tenaga elektrik.

DEDICATION

To my beloved parents

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**LIST OF ABBREVIATIONS, SYMBOLS AND
NOMENCLATURE**

PF	-	Power factor
Kwh	-	Kilowatt per hour
W	-	Watt
V	-	Voltage
Ω	-	Resistance

CHAPTER 1

INTRODUCTION

1.0 Introduction

This session explain about the conservation and energy efficiency for a domestic appliances follow by objective and scope that need achieved. This project will focus on the method of reduction of daily consumption by determine the energy efficiency of domestic appliances.

1.1 Project Background

Energy efficiency can be defined as a measure of energy used for delivering a given service. Energy efficiency is the main important factor to reducing the use of fossil fuels and emissions of greenhouse gases which can cause global warming. Improving energy efficiency means getting more energy from the energy that we used in our daily life. Since household are one of the main sector that consume electricity in Malaysia, the issues in improving the energy efficiency on domestic appliance for saving purpose are becoming increasingly important. In this project energy measurement for several household appliances has been designed to find a ways of reducing the power consumption by controlling the energy efficiency of domestic appliance. This analysis consists of providing some good idea based on measurements to allow domestic users to reduce their power consumption on domestic appliance, save on utility bills and eventually increasing access to the majority lot who are not connected to the grid.

1.2 Problem statement

One of the critical problems facing the society today is the challenge caused by increased energy consumption and the increase of greenhouse gas emissions. The increasing of the population in the world caused the increasing energy consumption and the released gas emission and eventually it will cause global warming. Beside high energy bills are main factor causing considerable financial hardship in the world, one of the reason cause fuel poverty crisis is the poor energy efficient in domestic appliances. A lot low income earners have to find an alternatives solution to reduce their monthly expenses on electrical bill. As the energy costs are increasing, more and more consumers are becoming actively interested in reducing their energy consumption. This project includes the overall analysis on the usage and the cost for each appliance. Once the data is know, we can predict how much in ringgit Malaysia we have waste our money at the end this project will came out with a saving plan which called it domestic appliance saving plan. Finally this project will observe the energy consumption more closely and to have the option to change the user consumption habits to improve on their savings.

1.3 Objective

The main objective of this project is to determine the saving in RM when practicing correct energy efficiency in daily electricity consumption. In order to achieve the main objective there are several sub objectives that have to be done in this study:

- To determine the in electrical usage in domestic appliance.
- To analyse the data of domestic appliance electrical energy efficiency.
- To design a more sustainable and secure energy consumption system to reduce the energy consumption.

1.4 Scope

The scope of this project is to focus on analyse on domestic appliances efficiency for energy and cost saving purpose. This is very important since the energy consumption problem has become the most critical problem in the world. In order to reach the goal of optimizing electricity usage and electrical bills some of important elements must be considered. They are:

- Type of domestic appliance that consumed the most electrical usage and cost in household.
- The consumer living habit on each domestic appliance.
- The study analyzes the wasted of energy consumption that can be avoided
- The analyzing of study will be done by using excel.
- A comparison of usage would be done in a table form to see the different before and after.
- All the data will be recorded in KWh and calculated it in Ringgit Malaysia.
- The output data will be analyze and came out with a saving plans.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Chapter 2 provides the literature review based on the previous researches as well as theoretical readings based on the methods to reduce the consumption energy on domestic appliance. The literature review done based on the previous researches will help improving the methodology of this project and the result will be recorded successfully. This section also will do the comparison between the methods that selected to reduce the energy consumption for saving energy purpose.

2.1 Energy Efficiency

According to Stephanie J. Battles from U.S Energy Information Administration, energy efficiency can be defined as energy intensity which is the ratio of energy consumption to demand for energy services [1]. In other word Energy efficiency, means using less energy to provide the same level of energy service. The phrase 'Energy Efficiency' is often used to describe any kind of Energy-Saving Measurement. For example if a household which is insulated, less energy will be needed in cooling and heating to achieve a same temperature. Another example is using a fluorescent lights which consume smaller energy instead of incandescent lights which consume more energy to achieve the same level of illumination and certainly incandescent lights will be more energy efficiency. Improving the energy efficiency will helped to reduce the energy consumption needed to get the same amount of services and reach the goal of saving costs by paying less on energy bills. Improving the energy efficiency will also cut the emissions effect. According to Energy Efficiency Market Report 2015, consumers in countries belonging to the International Energy Agency (IEA) have saved up to USD 5.7 trillion in the last 25 years as a result of energy efficiency investments [2]. The Energy Efficiency Market Report 2015 also says that International Energy Agency IEA countries have reduced an additional 10.2 Giga ton of carbon dioxide by 2014 with the helped of energy efficiency investments [2].

2.2 Energy Conservation

Energy conservation can be defined as reduction of the amount of energy consumption through using less of an energy service. Being good at energy conservation could save your a lot of money over time and good at improving the environment problems. For example turning off a light when not needed is energy conservation. According to the Energy Survey conducted by Ministry of Power in 1992 energy conservation emerges out to be the first and least option to reduce the energy consumption. The energy conservation might be cost effective with a short payback period but also might make things a bit less convenient by cut down on your comfort level, but still it can help reduce monthly energy bills and saved money by reducing the amount you use them [4]. In other word, Energy conservation is the practice of reduced the quantity of energy used while achieving a likely outcome of an energy service [4].

2.3 Smart meters

Smart meters are digital devices that measure the whole electricity usage in household and tell the consumer how much energy their using through a display in the house. Smart meter provide a communication channel between consumer and utility. Smart meter also provide consumers of electricity with new means to observe their energy consumption more closely. With this device the consumer will have the option to change their consumption habits to improve on their energy savings. Figure 2.1 show the image of Smart meter.



Figure 2.1: Smart meter

Source from internet: www.google.smartmeter

2.4 Electricity-saving box

Electricity saving box is a device used in residential homes to save energy and reduce electricity bills up to 20%-30% by simply plug it into any power point in your home. Figure 2.2 show the example of the power saving box.



Figure 2.2 Electricity-saving box

The working principle of power saving box they do the power factor correction and improve power quality. Basically this device consists of capacitor which act likes a capacitor bank which can helped to increase the power factor of an electrical load. Figure 2.3 show the circuit diagram of the electricity saving-box.

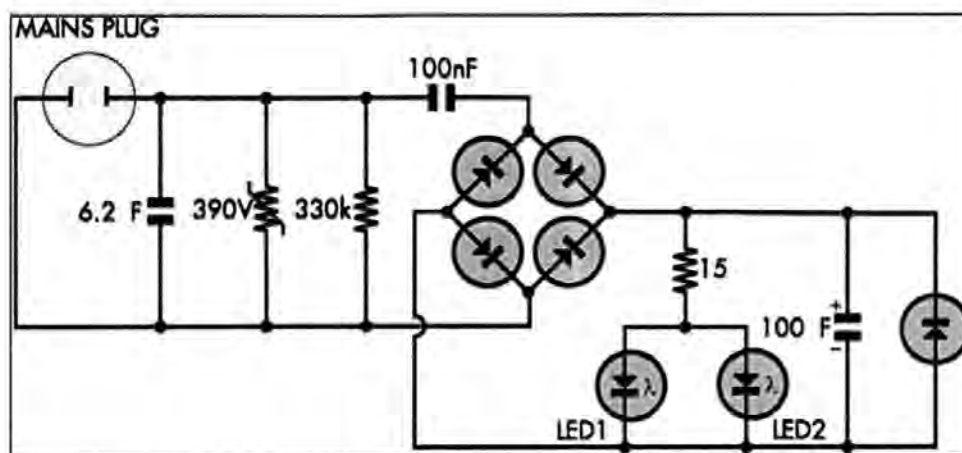


Figure 2.3: circuit diagram electricity saving-box

Meanwhile as far as a domestic user there is no additional charge when having a low power factor [5]. Basically there were 3 terms need to understand for a domestic consumer.

- 1) Real power
- 2) Reactive power
- 3) Apparent power

Real power measured in kilowatt (KW) which is the real power needed by our appliance. Utility meter for household measure real power and charge on utility bills usually depends on real power [5]. Meanwhile reactive power measured in kilo volt-ampere reactive (KVAR). Utility meter on household does not record this quantity and a residential consumer does not pay for reactive power [5]. The last one is the apparent power which referred kilo volt-ampere (KVA) which is the multiple from the voltage and currents. Figure 2.4 show the relation between this is power.

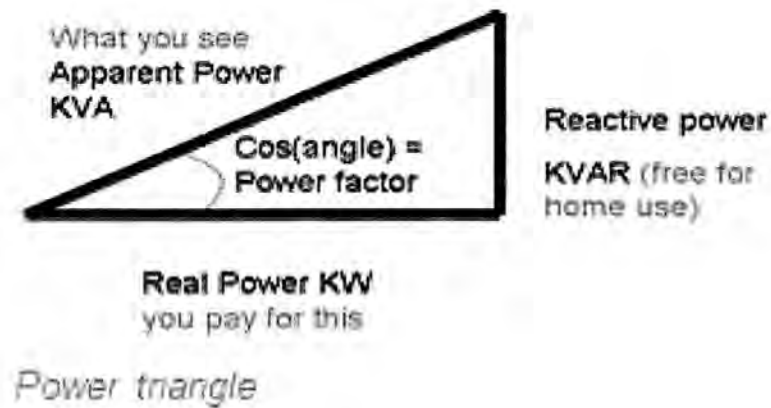


Figure 2.4: Relation power triangle

Source from internet: <http://electrical-engineering-portal.com/the-real-truth-behind-household-power-savers>

Power saving box claim that the utility bills can be reduced by installing a capacitor and bring the level of power factor very close to unity. Based on the improved apparent power would mean less current consumption is needed for all the domestic appliances. But the fact is, as a domestic customer the utility bill is depends on how much kilowatt used on the household appliances not the apparent power [5]. These devices won't save electricity in your home.