

AN EFFECTIVE TIME OF USE TARIFFS SCHEME FOR RESIDENTIAL AREA IN
MALAYSIA

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AN EFFECTIVE TIME OF USE TARIFFS SCHEME FOR RESIDENTIAL AREA
IN MALAYSIA

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*Specially dedicated to
My beloved family and those who have guided and inspired me
Throughout my journey of learning*

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ABSTRACT

Time of Use (TOU) is a tariffs scheme that provides variable rate structure for electricity depending on time of day used. In Malaysia, currently, the TOU scheme is only available for industrial and commercial customers. However, the government has wanted to implement TOU scheme in residential area so that a better load profiling can be obtained in the power system. The changes from block tariff to TOU scheme might be increase the customers' electricity bill. Besides that, the unsuitable TOU structure and pricing might also cause the utility to lose their profit. Therefore, the main objective of this research is to identify the suitable time structure and pricing that will give beneficial to the utility and customers. The recommendation on appropriate incentives along with the TOU pricing signals to encourage customers to have better management on their consumption will also being considered. Thus, the analysis is beginning with residential customers' behavior modeling. Next, the information of total electricity bill paid by customers will be determined. Last but not least, the statistical analysis will be used to identify suitable TOU structure and pricing. Therefore, the outcome of this research is an effective TOU scheme that will give beneficial to residential customers (in term of reduce electricity bill) and utility (in term of profit).

ABSTRAK

Masa Penggunaan (TOU) adalah skim tarif yang menyediakan struktur kadar berubah untuk tenaga elektrik bergantung pada masa penggunaan setiap hari. Di Malaysia, pada masa ini, skim TOU hanya tersedia untuk pelanggan industri dan komersil. Walau bagaimanapun, kerajaan ingin melaksanakan skim TOU di kawasan perumahan supaya profil beban yang lebih baik dapat diperolehi dalam sistem kuasa kami. Perubahan dari tarif blok ke skema TOU mungkin meningkatkan bil elektrik pelanggan. Selain itu, struktur dan harga TOU yang tidak sesuai juga boleh menyebabkan utiliti kehilangan keuntungan mereka. Oleh itu, objektif utama penyelidikan ini adalah untuk mengenal pasti struktur masa dan harga yang sesuai yang akan memberi manfaat kepada utiliti dan pelanggan. Cadangan mengenai insentif yang sesuai bersama dengan isyarat harga TOU untuk menggalakkan pelanggan untuk memiliki pengurusan yang lebih baik mengenai penggunaannya juga akan dipertimbangkan. Oleh itu, analisis bermula dengan pemodelan tingkah laku pelanggan kediaman. Seterusnya, maklumat jumlah bil elektrik yang dibayar oleh pelanggan akan ditentukan. Terakhir sekali, analisis statistik akan digunakan untuk mengenal pasti struktur TOU dan harga yang sesuai. Oleh itu, hasil kajian ini adalah skema TOU yang berkesan yang memberi manfaat kepada pelanggan kediaman (dari segi mengurangkan bil elektrik) dan utiliti (dari segi keuntungan).

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LIST OF ABBREVIATIONS

TOU	Time Of Use
DSM	Demand Side Management
EDF	Electrite De France
AEEG	Italian Authority For Electricity And Gas
DR	Demand Response

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CHAPTER 1

INTRODUCTION

1.1 Overview

Time of Use (TOU) tariffs scheme is a variable rate structure that charge for electricity depending on time of day use. TOU is divided to three conditions; peak, mid peak and off peak hours. During peak hours, the rate is higher than mid peak and off peak since the demand for electricity is high. In Malaysia, TOU has already been implemented for industrial and commercial customers while residential customers still use block tariffs. However, the government has a plan to implement TOU in residential areas to achieve better load profiling in the power system.

Some initiative programs have been implemented by Malaysia's utility from May to October 2017, known as the SmartSaver TOU Pilot Programme. The objective is to study the behavior of low-voltage ordinary power consumers on the pilot TOU service offering. Customers can benefit if they are able to control their electricity usage and enjoy rebates when they manage to shift their consumption from peak to mid-peak or off-peak hours.

1.2 Statement of the Problem

Time of use (TOU) tariffs scheme of industrial and commercial is not suitable to be applied to residential customers. The changes from the block tariff to TOU scheme might increase the customers' electricity bill. Besides that, the unsuitable TOU structure and pricing might also cause the utility to lose their profit.

Therefore, an analysis will be done in order to find the valuable time and pricing of TOU which help in reducing maximum demand during peak hours and customers manage to shift their electrical consumption from peak hours to mid peak or off peak hours. While, utility can reduce the cost of generation since the demand during peak hours can be shifted. Furthermore, the price can help resident in reducing monthly electricity bill when compared to existed block tariff for domestic.

1.3 Objectives of the Study

Followings are the objectives proposed for this study:

- (i) To propose an effective Time of Use (TOU) tariff scheme for residential area in Malaysia.
- (ii) To evaluate the effectiveness of TOU to power utilities and users.
- (iii) To analyze the pricing different without change the electricity consumptions.

1.4 Scope of the Study

Scopes of this project are limited to a residential area in Malaysia. In this project, the location selected is in Ampang Tambahan, Selangor which is low cost residential where mostly small family or bachelor are stay here. By selected some cases with same energy consumption averagely use about 150 kWh per month.

By using the monthly electricity bill, which cost RM 32.70 for November 2017, daily load profile can be used in determining the peak, mid peak and off peak hour's demand. Then, suitable time of use (TOU) tariffs scheme for a residential area in Malaysia will be design.

1.5 Significance of the Study

This project focuses on development of time of use (TOU) tariff structure for residential area in Malaysia. The problem on how to set the effective TOU tariffs, which can give beneficial to power utilities as well as user, will be evaluated. Furthermore, the recommendation on appropriate incentives along with the TOU pricing signals to encourage customers to better manage their consumptions will be investigated.

1.6 Report Organization

This project report is divided into five chapters. Chapter 1 discuss on the overview of introduction, problem statements, objective, scope and significance of studies. Chapter 2 will focusing on TOU electricity pricing, TOU tariff scheme for residential area in Malaysia, differentiate between flat tariff, block tariff and TOU tariff scheme. Furthermore, some reviews on advantages of TOU tariff scheme and summary is included in this chapter. While, Chapter 3 will be more focused on flow diagram of research methodology, formulation techniques of TOU, which is included study on residential demand, selection the hour demand, formulation of price setting and comparison of price before applied TOU and after applied TOU. Then, results and discussions will be presented in Chapter 4 where discussed more on Malaysia load profile, selected price, compare and analyzed between domestic block tariff, SmartSaver Pilot Programme and TOU. Finally, the Chapter 5 is about conclusions and recommendations.

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