" I hereby declare that I have read through this report entitle *"Study Of The Impact Routine Adjustment And Static Factor For Commercial Buildings"* and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)

Signature :……

Supervisor's Name : MR. MOHAMAD FANI BIN SULAIMA

Date :……

# STUDY OF THE IMPACT ROUTINE ADJUSTMENT AND STATIC FACTOR FOR COMMERCIAL BUILDINGS

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**A thesis submitted in fulfillment of the requiremens for the degree of Bachelor of Electrical Engineering (Industrial Power)**



**Faculty of Electrical Engineering**
**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2016**

I declare that this report entitle *"Study Of The Impact Routine Adjustment And Static Factor For Commercial Buildings"* is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : ……..

Name : MOHD REDZWAN BIN MAHAT

Date : ……

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# ABSTRACT

This final year project report 2 will illustrate the impact of routine adjustment for energy avoided in commercial buildings by using Option C of International Performance Measurement and Verification Protocol (IPMVP) that is whole facility measurement. This method is implemented in order to verify the accurate energy saving declaration whether for commercial and industrial buildings respectively. In this project, the Faculty of Manufacturing buildings in Universiti Teknikal Malaysia Melaka (UTeM) has been identified to execute the buildings auditing process and recommendation of energy conservation measures analysis concurrently. There are a few constraints has been notified during Measurement and Verification planning while the real auditing process will be conducted after verifying the initial of routine adjustment correlation. All routine data has been collected and their impact to the result of the energy avoided based on standard errors and confidently level has been presented accordingly. It is hope that the proposed method will be implemented by the entire Energy Manager in order to determine the real percentage of energy avoided for the future sustainable energy management reports.

# ABSTRAK

Laporan akhir projek tahun 2 ini menggambarkan kesan pelarasan rutin untuk mengurangkan pengguanan tenaga dalam bangunan komersial dengan menggunakan pilihan C dari Prestasi Pengukuran Antarabangsa dan Protokol Pengesahan (IPMVP) iaitu ukuran kemudahan keseluruhan. Kaedah ini dilaksanakan bagi mengesahkan pengisytiharan penjimatan tenaga yang tepat sama ada untuk bangunan komersial dan industri. Dalam projek ini, bangunan fakulti pembuatan di Universiti Teknikal Malaysia Melaka (UTeM) telah dikenal pasti untuk melaksanakan proses pengauditan bangunan dan cadangan tenaga analisis langkah-langkah pemuliharaan serentak. Terdapat beberapa kekangan telah dimaklumkan semasa pengukuran dan pengesahan merancang manakala proses pengauditan sebenar akan dijalankan selepas mengesahkan korelasi awal pelarasan rutin. Semua data rutin telah dikumpulkan dan kesannya terhadap hasil penguranagn tenaga yang dapat dielakkan adalah berdasarkan kesilapan standard dan tahap keyakinan telah dibentangkan dengan sewajarnya. Adalah diharapkan kaedah yang dicadangkan ini akan dilaksanakan oleh seluruh pengurus tenaga untuk menentukan peratusan sebenar tenaga dielakkan untuk laporan pengurusan tenaga lestari masa depan.

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# Chapter 1

# INTRODUCTION

## 1.1 MOTIVATION

Based on Suruhanjaya Tenaga (ST) final electricity consumption for commercial buildings in Malaysia has been increased 14% from year 2010 to 2013 [1]. This statistic has showed that people still less aware toward sustainable energy management in their daily life routine. Energy Conservation is the most common issue and everyday people try to invent new technology that can save energy and increase their efficiency. Currently, people still not alert about the efficiency of the appliance and they just bought it because they are cheap.

On 29th July 2009, Malaysia's Prime Minister YAB Dato' Sri Mohd Najib Tun Abdul Razak has launched The National Green Technology Policy [2]. Energy, environment, economy and social was the four pillars in The National Green Policy [3] . The purpose of this policy is to search for the independence energy and promote the efficient of energy simultaneously. In order to implement this green policy projects and activities that related with the four pillars, there are a few goals that have been set in Malaysia Plan. The 10th Malaysia Plan in 2011 for short term goal has stated that there are four of the most significant and the main improvement toward the National Green Technology Policy that is energy sector, buildings sector, water and waste sector and transportation sector [4]. In energy sector there are two parts which are energy supply sector and energy utilization sector. The energy utilization sector is the application of Green Technology by the industrial and commercial buildings while the energy supply sector is the management aspect including co-generation.. For the mid-term goal of this policy has been stated in the 11th Malaysia Plan in 2015 that is Green Technology become the preferred choice in selecting a products or services [5]. Besides that, it also spread the increased of Green

Technology products production and enhancement application of Green Technology in economy sector.

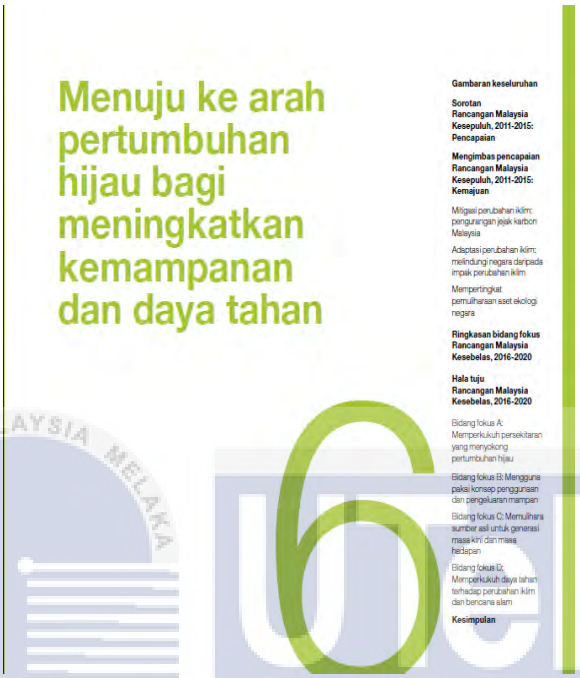



Figure 1.1: 11th Malaysia Plan (Chapter 6)

One of the government initiatives for the commercial and industrial energy management system is the introduction of Energy Performance Contract (EPC) and the concept of Energy Service Companies (ESCO). ESCO also is companies that provide service such as manpower, energy audit system and retrofit project and energy project management. In Malaysia, design, build and fund project of energy saving, energy avoidance cost and operation and maintenance cost reduction for owner facility are being develop by ESCO [6]. Other than that, ESCO

provided the guarantee the amount of energy avoidance at some defined pricing level to the owner of the facility. However, the equipment that is capable of operating at a stated level of efficiency may be a simple guarantee to the owner. Thus, the performance of any equipment or system that being installed is under responsibility of the ESCO.

MAESCO
(Pertubuhan Syarikat Syarikat Perkhidmatan Tenaga Malaysia)
Malaysia Association of Energy Service Companies

**(Pertubuhan Syarikat-Syarikat Perkhidmatan Tenaga Malaysia)**
**Malaysia Association of Energy Service Companies**

Figure 1.2: Example of Energy Service Companies

In order to implement the energy avoidance in every buildings, ESCO will provide a contract for the facility owner that is known as Energy Performance Contract (EPC) and contract between these two parties are made. The implementation of energy conservation measurement will be done based on EPC. EPC is an innovative financing technique that repay the cost of installing in Energy Conservation Measure (ECM) by the cost saving from the avoidance of energy consumption [7]. Due to these reasons and motivation; the measurement and verification process has been introduced in order to verify the accuracy of the saving based on the EPC that has been signed between owner of the buildings and ESCO. In Malaysia, it is still less knowledge regarding to this issue and not many auditors could respond for the measurement and verification process. Thus, the next sub-topic will explain in details the problem that has been faced by the country in order to implement the EPC and the concept of ESCO accordingly.



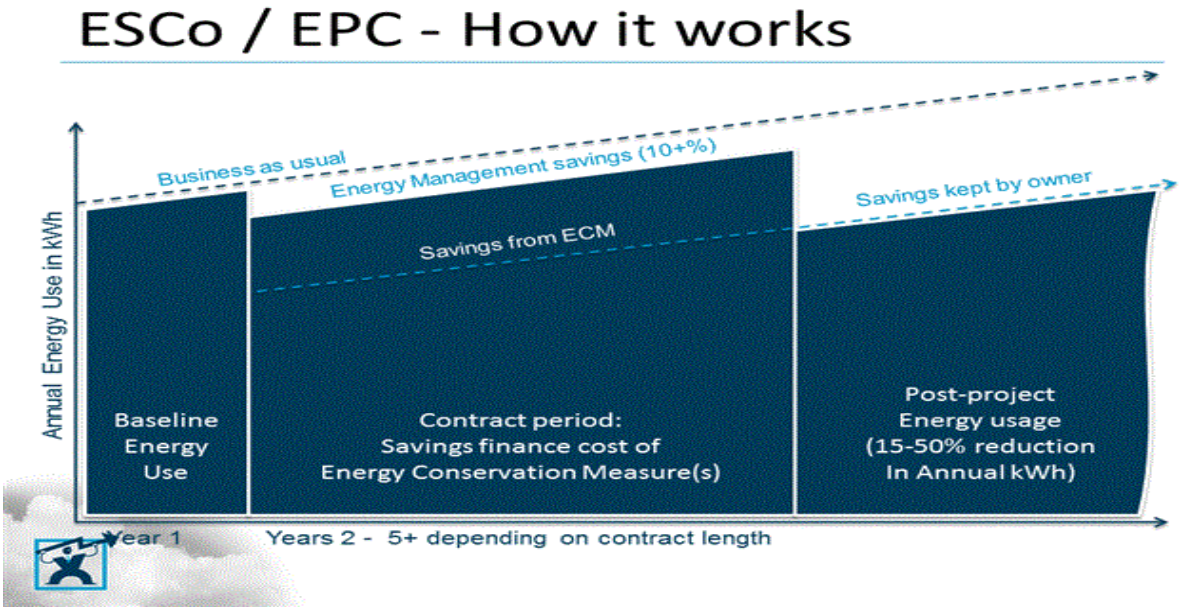


Figure 1.3: Energy Performance Contract (EPC) concept

## 1.2 PROBLEM STATEMENT

Generally, ESCO will provide EPC to owner facility in order to conduct energy saving project and this contract are made between these two parties. In fact, ESCO will promise a guarantee to the owner the amount of energy avoidance at some defined pricing level but at the end of the contract, the energy saving that being achieved is less than promises or not sustain. Other than that, ESCO also request to the owner to renegotiate the contract to extend the length of time needed to achieve the saving. Delayed to resolve technical problems and bad project management are the factor that make ESCO may needed more time to complete the project. Furthermore, building owner did not have independent verifier to verify the M&V plan that being execute by ESCO. ESCO did not follow the international guideline, International Performance and Verification Protocol (IPMVP) such as the M&V plan that being perform is not clearly state in which option IPMVP and method to be used to determine the energy saving. In spite of that, weak in M&V plan may result low level of confident level of the saving reporting the end of the project. In order to resolve this problem, a few objectives have been stated to execute this Final Year Project. These three objectives have been presented in next sub-topic accordingly.



## 1.3 OBJECTIVE

The objectives of this project are to;

a) Model the best regression method for Correlation Identifying

b) To analyze the impact of independent variables by using Self-Organizing Map (SOM) toward energy saving.

c) Quantify energy avoided based on IPMVP for commercial building

## 1.4 SCOPE

This project involve whole facility that relate to energy use in the Faculty of Manufacturing, UTeM .The Option C in M&V planning has been identified to be implemented for this study. There are three major aspects have been considered to be audited which are; cooling system, room data and lighting system respectively. Other than that, the Cooling Degree Day (CDD) and number of working day have been considered as independence variables in the M&V planning process. All CDD and number of working days data have been collected monthly for one year that is from August 2014 until July 2015 while the base line for this study will be started from June 2013- July 2014. Static factor such as change in building size, design and operation of installed equipment will be taken as the factors that contribute to the results of the energy saving.

# Chapter 2

# LITERATURE REVIEW

## 2.1 Introduction

Nowadays, the population growth in Malaysia has been increased every year and statistic showed that there are 30.4 million people in 2014 [8]. This will affect the energy utilization in Malaysia that will increase the generation of the energy supply. Statistic from Suruhanjaya Tenaga also shows that people are still in less awareness toward energy management in their daily life. From this statistic, the government should take an action to create more awareness program for the Malaysian' in order to achieve the National Green Technology Policy. Due to rapid development in Malaysia, there are many buildings, industrial factory and residential has been constructed. In spite of that, the hypothesis for this situation is the more buildings, factory and etc. being constructed; the number of energy supply will be increased. Therefore, to identify the reduction of the energy consumption and energy wasted, M&V plan and audit are the solutions to find real energy saving potential in commercial buildings. In this chapter, the basic theory of the study and previous work done will be discussed accordingly.



## 2.2 Related Theory

### 2.2.1 Concept of Energy

A property of matter that can be converted into work, heat or radiation is known as energy. There are various type of energy present in this world that is kinetic energy for motion, thermal energy for high temperature, chemical energy for molecules that can react and produce heat, electrical energy for voltage and current and many more [9]. Different type of energy are

expressed in different units. Other than that, energy cannot be created or being destroyed but it can be converted from one form to another form that known as energy conversion such as radiation to electrical energy in solar [10]. In fact, energy conversion is important for energy utilization by the society for agriculture, industrial and residential usage. It show that energy is important in daily of society in order to undergo all their routine activities as usual.

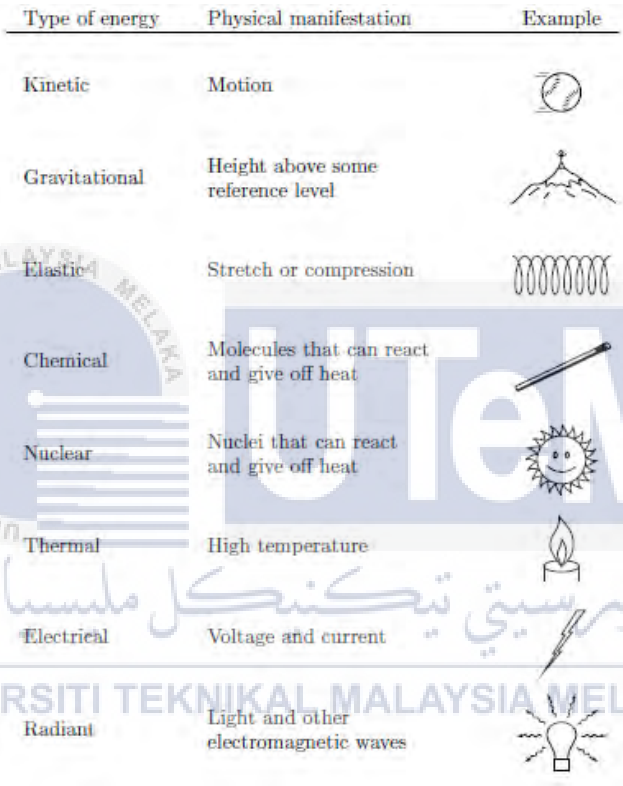



Figure 2.1 : list of energy

Besides that, generation of energy also is important to keep constantly producing the energy for the demand supply. Currently, there are alternative way to generate energy from the natural source such as sunlight, wind, geothermal, biomass and etc. [11]. This natural source are known as renewable energy and example of renewable energy is wind energy from wind turbine, biomass from waste material, solar energy from sun radiation, hydro resources from water reservoirs and streams and many more.


Figure 2.2 : example of renewable energy

### 2.2.2 Electrical Energy

Electrical energy is the most important energy sources and has contributed much in producing heating, lighting, refrigerating, communication and many more. It can be a 'crisis' in the mind of society if it's unavailable for a few minute cause it can affect some of routine activity in their life. It is so easily can be transmitted from one place to another and also can be converted into other form of energy [12]. Positive and negative are the two type of electrical charge, as example to complete a simple circuit using battery and a bulb, in order to light up the bulb, the positive charge must be connected to the negative charge. If not connected the bulb will not be light up. There are a few variable and units that present in electricity such as electric current (A), Voltage (V), Power (P) and Charge (C) [13].

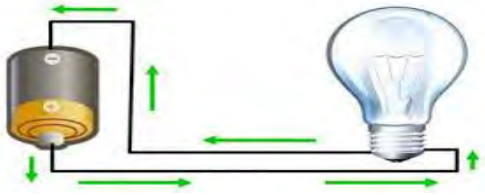


Figure 2.3 : example of simple electric circuit experiment

Tenaga Nasional Berhad (TNB) is the largest electric supply company in Malaysia that provide electricity supply [14]. Generation, transmission and distribution are the core activities of TNB and it also provide a maintaining power plant services, repairing, testing, procurement and construction of power plant and many more. Through generation sector, TNB generate the electricity from hydroelectric and thermal. The generation voltage is being step-up to 132KV or 275KV due to the boundaries of transmission rating voltage. Usually, this power plant will be built far from the consumer and it required transmission line to supply the generation of the electricity. Transmission is an important medium that connected between the generation or supply and the consumer. In transmission phase, the voltage will be step-down using step down transformer that is 132/33KV for the distribution sector. Then, in distribution sector, the supply will be distributed to the consumer.

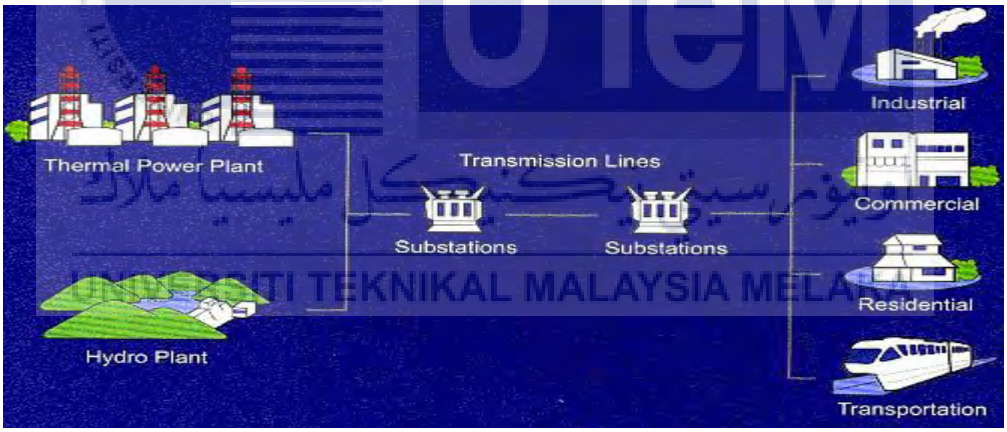



Figure 2.4 : TNB electricity supply system

### 2.2.3 Energy Management & Energy Audit

Energy management defined that it can, minimize cost, maximize profit and enhance competitive position by the judicious and the utilizations of energy with effectively [15]. The objectives of energy management are to reduce waste energy or energy cost, to reduce the affect to environment and maintain optimum energy acquisition and utilizations. Energy management

can be executing in any type of facility such as industrial, commercial buildings and residential area. Other than that, system and procedure that being used to energy avoidance is the strategy of adjusting and optimizing energy. The potential benefit that can be obtain from energy management are reduction in energy cost and can increase owner facility profit in term of business model [16]. In spite of that, service level are being improved in term of maintenance and operation of energy services. There are a few requirement that must be needed in energy management action plan such as well define goal, building structure report, requirement resource for both internal and external, investment cost criteria, action plan, energy utilization monitoring and targeting result that can be achieved and lastly is training plan. Based on all this criteria, monitoring is the most important step in energy management in order to achieve the goals. From this, to make sure continuous improvement, long term commitment needed when delivered an energy management project.

Energy management can be done by using the system and procedure of energy audit. Energy audit is the key in identifying the waste area that occur and more about the way of energy are able to be understood. To determine ways to reduce energy consumption and to reduce the cost is the primary objective of energy audit. There are two type of energy audit that are preliminary audit and detailed energy audit [17]. Preliminary audit can referred as *brief audit*. Essentially an initial data gathering effort and quick overview of energy use patterns. Method that been used in preliminary audit is used existing or easily obtained data. Other than that, it estimated the scope for saving and identify the attention area that need to be concern. References points are being set in this auditing process and the quick improvement that can be made are being identified. In energy detailed audit, an instrumented data collection of all energy consuming equipment and processes in an area, followed by a detailed energy and cost analysis of the different processes. In spite of that, it may result most accurate estimated of energy avoidance and cost energy savings. The interactive effect of all projects data for the energy use of entire equipment and energy cost saving calculation and the cost of the project are being considered. Detailed energy audit was being execute in three phase that are pre-audit phase, audit phase and post-audit phase. Pre-audit phase involve in data collecting to make as baseline for the project meanwhile audit phase is a process to identify the potential saving in term of energy consumption and cost and retrofit action such as replace equipment with high efficiency

to improve the operation of the equipment. Post-audit phase is a data analysis in order to achieve the goal of the project.

### 2.2.4 Energy saving for Commercial Buildings

Currently, Suruhanjaya Tenaga (ST) showed that the statistical of energy consumption in commercial building in Malaysia has been increased from year to year due to the rapid growth of development. Increase in energy consumption can increase the cost of energy bill for the owner facility. Nowadays, most of facility's owner want to reduce the cost of energy consumption by implementing energy saving or energy management program. The amount of energy that being reduced in process or system are known as energy saving. The unnecessary energy usage which does not correspond to the production of utility and service can be reduce by energy saving [18]. Besides that, in term of financial, the electricity bills can be reduce when implementing energy saving. The percentage to find the potential energy saving in commercial buildings is about 25% to 35% based on the previous research that had been done by the others [19]. Energy saving work that will take place in commercial building is the installation and improvement of equipment. This may cause the investment by the owner facility in order to achieve the goals. The return of investment would be worth it if achieving the result of energy saving with effectively [20].



Equipment that usually involve in energy saving project is lighting and air-conditioning system. Usually, in commercial building, lighting can consume about 40% to 50% of the energy usage and the number of installation of lighting is a lot due to fulfill the desired light level. The normally lamp that being used in commercial building is fluorescent lamp. The recommendation for energy avoidance in this situation is by replacing the lighting system with lamp that has high efficiency which is consume less energy but produce the same level of desired output of the light. For air-conditioning system, usually commercial building use centralized air-conditioning system that supply for large space for cooling. This unit system has a few type of cooling system operation such as water cooled chiller, cooling tower and central unit air conditioning system. During the auditing process, the potential of energy saving for this system can be identified by checking the operating hours, room temperature, energy consumption and etc. From this, all

data needed can be used to improve this cooling system. Therefore, the energy avoidance can be determine. Energy consumption for commercial building must continuously being monitored in order to achieve energy saving. The available historical data can potentially improve the energy efficiency and energy wasting can be identified for efficient utilizations. As example, for monitoring and analyzing energy consumption can be obtain from electric meter that show the amount of energy use which are readily available data. The fundamental root in how well energy data can be normalized against influencing factor are the statistical energy saving calculations [21]. Physical energy models of building of varying detail are based on Energy Methods. From these, historic data can be used to calibrated the energy model, and from specific measures it can be used to both which are future energy used and saving estimated [22]. However, the detailed information about a building which may not be available often may rely upon this technique. Other than that, these type of models without precise inputs, the estimated value can cause high uncertainty.

### 2.2.5 International Performance Measurement & Verification Protocol (IPMVP)

In order to increase the investment in demand management and renewable energy project around the world, energy and water efficiency, , IPMVP was being established by Efficiency Evaluation Organization (EVO) [23]. There are a few activities that being promoted by IPMVP for efficiency investment such as common terms and method to calculate the performance of efficiency project for buyers, sellers and financier are being document by IPMVP. Besides that, different level of accuracy and cost and to identify savings either whole facility or individual energy conservation measures, method are being provided by IPMVP. M&V plan content are being specified in IPMVP. In other perspective, a qualified professional are required to develop M&V plan in every single energy saving project. Benefit that can be obtaining from IPMVP is the cost transaction in EPC is lower. This is due to the negotiation for EPC can be simplifying by specification of IPMVP as basis for designing M&V project.

Before selecting a suitable option from IPMVP, M&V plan must be conducted. The process of using measurement to determine actual saving created by energy management program is known as M&V activities. Some or all the following ways are consist in M&V

activities such as maintenance and meter installation of calibration, screening and data gathering, estimated goals and development of a computation method, measure data by computation and reporting, third party verification of reports and quality assurance. The process of M&V can be classified into three categories that is plan, install and maintaining [24]. In plan phase, ECMs are being identified and baseline energy was being document. Then, all M&V activities are being planned and coordinate to design the ECMs. ECM's was being installed and the operations are being verify are being execute in install phase. Lastly, in maintaining, all data was being gathered and the saving was verified. The project feedback is then being document.

IPMVP provided four option that is Option A, B, C and D. One or two of this option was being selected after M&V plan has been done in each project. All of this option has a different method and type of measurement that is Option A is a partially measure retrofit isolation, Option B is a retrofit isolation, Option C is a whole facility measurement and Option D is calibrated simulation. In Option A, partially it mean some parameter that may be fixed and it may be either short term or continuous measurement. In this option, the field measurement are being estimated based on manufacture's specifications, historical data and engineering judgement. The estimated parameter of documentation of the source and justification are required in this process due to the factor of plausible saving error. In Option B, the measurement was taken throughout the post-retrofit period. The frequency range of measurement from short-term to continuous was depending on the length of the reporting period and expected variations in the savings. Option C has same method as Option B but Option C was including the whole facility level measurement and this option provide a continuous measurement throughout the reporting period. In this option, routine adjustment and non-routine adjustment is required for the saving evaluation. Technique that being used in routine adjustment such as comparison or regression analysis. Option A, B and C use same technique saving calculation by using routine adjustment and non-routine adjustment. Option D more too calibrated simulation through simulation of the whole facility or use of component energy.

### 2.2.6 Energy Saving Companies (ESCO)

ESCO is a companies that provide EPC contract for an owner facility who want to implement energy saving in their building. In term of the operation of the equipment, the party that responsible for the operation may be ESCO or the owner depending on the energy performance contract between these two parties. Outside of either's parties control such as weather may result the change in equipment operation and it is important to allow the changes in the performance contract. These two parties also may be assigned for maintenance responsibility and there are four categories of variable that account for all the change are being considered cause it might affect the energy cost avoidance [25]. Firstly, ESCO as the controlled variable for retrofit part, next is the facility characteristic and operation is the controlled variable for the owner. Third, ESCO and the owner are the controlled variable for the maintenance of the equipment operation and lastly the variable that are outside of the parties controlled such as weather, energy price or natural disaster. If the energy saving project are delivered as expected, ESCO will receive it payment.

### 2.2.7 Energy Performance Contract (EPC)

The energy saving that will be created was based on the engineering design of Energy Conservation Measures and the evaluation of the performance of the ECM's. The energy efficiency of building infrastructure including heating, cooling, ventilation systems, lighting and peak-load management are being improve by using the ECM's method. An engineering investigation that identify potential replacements of equipment or upgrade it in the existing systems enhance energy efficiency are being achieve in a cost-effective manner [26]. The savings produced from Energy Efficiency (EE) measure help to finance renewable measure for those facility owner who want to 'green' their buildings often implement EPC project because 'EE Pays for Green'. The financial to implement energy efficiency project are provided by EPC to the owner of the facility with guarantee that the energy efficiency project will produce energy savings. EPC also provided a contract of reporting the performance of the ECM's for a specified duration.

### 2.2.8 Self-Organizing Map (SOM)

There are two type of categories of artificial neural network which are supervised learning and unsupervised learning. The term in supervised learning was defined that for each input pattern have a target output and the required output produced was learn by the network. It also known as the behavior of the process under study that was learned by the network. Meanwhile, unsupervised learning, without external help, the network was learned to form their own classification of the training data. The input pattern sharing common features which is define the class membership and those features across the range of input pattern are able to be identify by the network. In Self-Organizing Map (SOM), it used the unsupervised learning technique due to, during the learning there is no human intervention. Professor Kohonen was the developer of the SOM and the useful of SOM in many application has been proved.

SOM is one of the most popular neural network model and the system is based on competitive learning. Besides that, to detect features inherent to the problem, SOM can be used and it also known as Self-Organizing Map Features (SOMF). Without knowing the class membership of input data, SOM was used to clustering the data. Other than that, a topology preserving mapping from high dimensional space to map units was provided. A two dimensional lattice was usually form by the map units or neurons and thus the mapping from high dimensional space onto a plane was mapped. The mapping preserve the relative distance between the points defined the property of topology preserving. Points that are close to each other in the input space are mapped to nearby units in the SOM. A cluster analyzing tool of high dimensional data was serve by the SOM and it also has the capability to generalize. The network can categorize or characterize inputs that it's has never encountered before defined the term of generalization capability of the SOM and the map unit it is mapped to was assimilated with a new input.



## 2.3 Related Previous Works for Commercial Building Energy Avoided Measurement & Verification

Option A is partially measure retrofit isolation such as measurement and verification of lighting and chiller system energy saving [27]. Study showed that this option only measure a

specific equipment only. In order to execute the auditing process, all data was collected to being analyses. Most of commercial building will consume 40 percent or more in lighting system. There are a few way to reduce the energy consumption for lighting such as retrofit lighting fixture and retrofit lighting system with a dimmer. Retrofit lighting has a few method to achieve the energy saving that is by maintaining the illumination level but reduce the connected lighting load. Other than that, the lamp can be replace with high efficient lamp that consume less energy as example replacing the fluorescent lamp with compact fluorescent lamp that consume less energy but produce desired illuminance level. For the chiller system, high efficient chiller was replaced the old chiller and old chiller baseline data from each month was collected in order to compared it with the new chiller data. All power draw of the old chiller and new chiller was measure at each load to calculate the improvement of the chiller efficiency. This research could be better if they considered the heating and cooling of the building [28]. This is due to the use of the chiller for air-conditioning in building. They can reduce the temperature of the room based on the surrounding temperature.

Other study also show that potential area of energy saving can be identifying by conducting energy audit on the building [29]. All energy consumption data of the building was being collected through electricity bills that is monthly bills. Energy audit was performed to appropriate standard information such as architecture drawing, floor area and electrical consumption. This is due to energy saving plan and technical measure must be correctly made and being implemented in order to achieve a better result [30]. The energy consumption must being classified based on the type of equipment used such as lighting, air-conditioning and load socket. From this method, the energy waste and potential saving can be identify. Retrofit action can take place such as replace a new air-conditioning that use an inverter and use 28W T5 tube rather than 36W fluorescent lamp that can reduce cost and energy consumption. Other than that, the financial evaluation for their payback period upon their implementation of difference retrofit measure that projected energy saving. The lack of this study is they ignore the data monitoring process because to determine the energy saving, it must be in long term in order to maintain the improvement of the energy efficiency. Long term commitment is needed for this project for continuous improvement.

Electrical energy performance can be improved to reduce the energy waste [31]. The lighting design also can affect the energy saving potential such as delamping, relamping and maintenance of the lamp. The term of delamping mean the design of the lighting bulb needed at desired illuminance place and remove unnecessary light bulb to prevent energy waste [32]. This method can be execute by measuring the lux level at location that need highly desirable light level and it can be design how much lamp needed fulfill the desired illuminance level. The number of lamp also can be reduce at location that has natural source. The new wiring diagram also can be designed to ease the people to turn ON and OFF based on the suitable switch that connected the lamp. Installing an automatic system and sensor to reduce the energy waste and relamping the lamp by replacing the fluorescent with high efficiency lamp such as compact fluorescent lamp (CFL), Light Emitted Diode (LED) and etc. From this project, there are few recommendation that need to be made that is maintenance should be include such as cleaning. The dirty condition on the lamp can reduce the desired lux level and in order to achieve back the desired lux level, cleaning schedule or maintenance schedule was created.

From the previous research, it also show that energy saving can be determine by using the whole facility measurement, Option C that is adherence to the IPMVP [33]. Method that been used is by considered two independent variables in the analysis that is CDD and number of working day in a month. This data also known as governing factor that is called routine adjustment. All data for these two variables was collected for one year period. Statistical procedure to find relationship among a set of variable is known as regression analysis. In regression analyses, four type of energy saving analyses have been presented in the case study that is single linear regression with cost avoidance for each independent, single linear regression with normalized saving for each independent, multiple linear regression with cost serving and multiple linear regression with normalized saving. By plotting the independent variables and dependent variable in a graphical method can obtained the value of single linear regression. The coefficient of the graph is the straight linear line in the graph. There will be one regression coefficient. Same concept as single linear regression for multiple linear regression but the relationship of a set of independent variables are being compared. The multi independent variable in this study are between CDD and number of working days. The proportion of variation in dependent variable predictable by a set of independent variables is the coefficient of determination. Result obtain showed that the two independent variable that is CDD and number

of working days is primarily affected the energy consumption in the building. From this case study, static factor in a building are not being considered. Static factor need to be considered in order to obtain more accurate energy saving result.

Previous study showed that the SOM can classify a large amount of miscellaneous electric (MELs) data into several cluster by inherent similarities [34]. Method that being stated in this study was, to form a cluster, similar or share common features in the input of the data point are mapped to neurons that are positioned closed. Other than that, similar power supply unit with a different type of load will be partitioned in to the same cluster for the purpose of load identification meanwhile different features are expected with different cluster of loads. In the representation of SOM, the weight vector in SOM by showing the distance between the adjacent pair of neurons was illustrated by the Unified Distance Matrix (U-Matrix)[36]. The more distant neuron indicate the darker colors while the closely spaced neuron represent the light colors. Thus, a cluster can be roughly considered by the group of light colors and the boundary region as the dark part. Without any human intervention in an unsupervised manner, this gives the detail about the number of cluster in the data. Other than that, SOM also can be used to analyze electric power consumption [35]. An excellent tools to extract and visualize information from large scale system is SOM. Data from and electric power system in group of buildings are being used by these map to analyze it as it state in the method that being used. The most representative electric variables and weather variables to visualize and analyze the power consumption of the whole building by using SOM has been applied. It comprises as first step for acquisition and storage data from electric system. Moreover, extract information based on data mining facilitate and finally analyzing and decision making by using visualization technique. The SOM has been trained which is reduce the dimension and visualize the data set that have been used by the stored data. Otherwise, to analyze the information, visualize technique and hit map have been applied. To represent active and reactive energy consumption, the hit map has been revealed as a very accurate technique.

## 2.4 Summary of the Chapter

In this project, based on the M&V plan to determine the energy saving, Option C was selected that is adherence to the IPMVP. Cooling Degree Day, number of working days, number of student and number of class are the four independent variables that will be considered in data analysis. Other than that, the static factor also being considered to prevent the result of saving from be under estimated or over estimated. From the review of previous research that are done by others, the implementation of real M&V plan are not be done properly in Malaysia due to the some factor such as static factor are being ignore during the execution phase. Therefore, in this project, the implementation of M&V plan for commercial building will be properly execute through the significant guidelines in order to achieve most accurate result compare to other previous work. In chapter 3, the significant method has been configured and explain well.

# Chapter 3

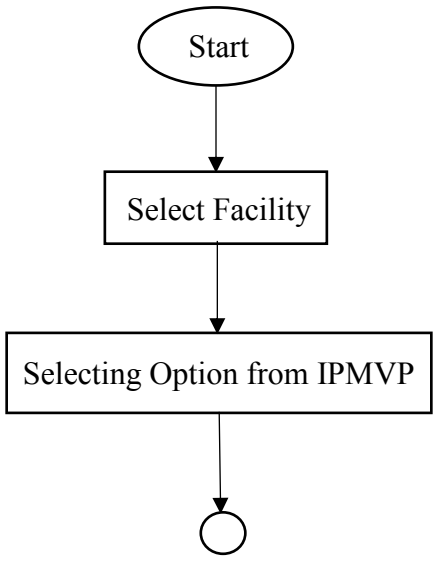
# Methodology

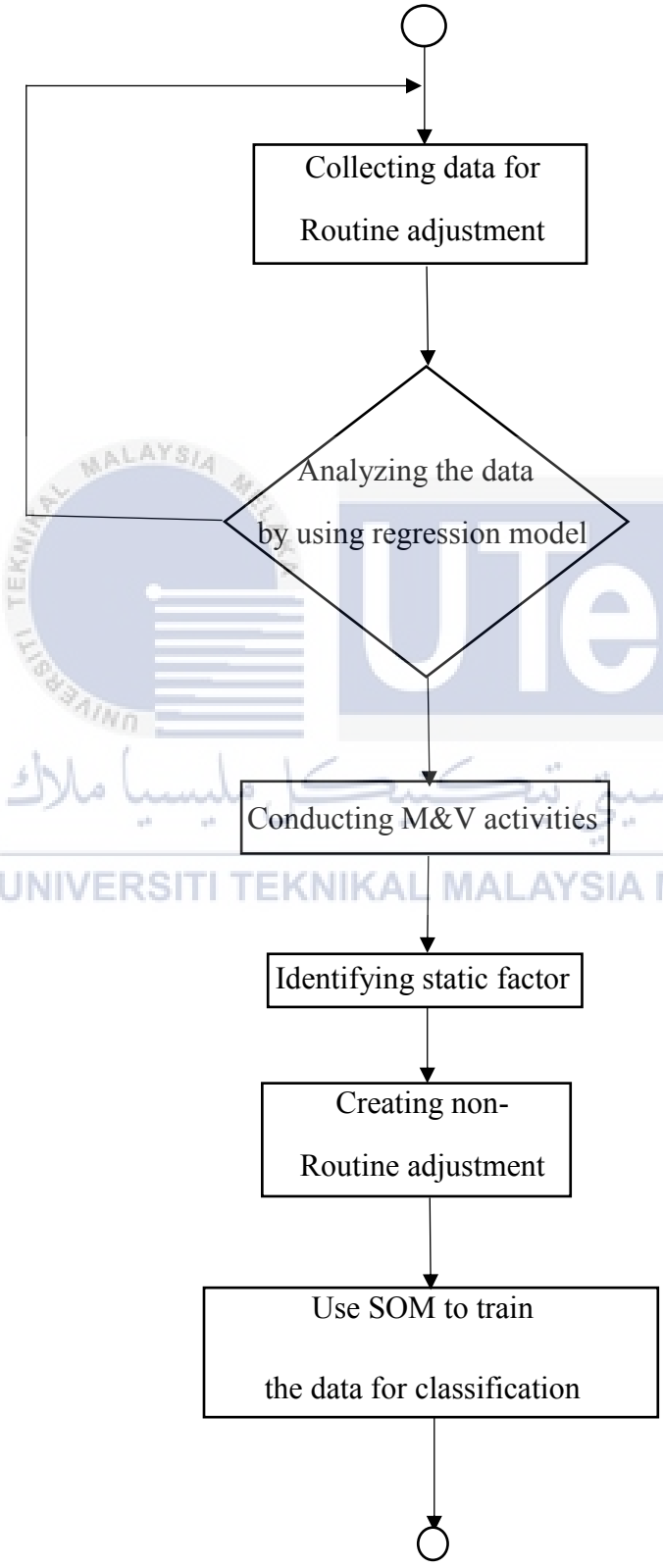
## 3.1 Overview

This chapter will cover all the elements of the projection in order to ensure the objectives of the project will be achieved. In additional, several skill and analysis data need to be used to solve the problem in order to achieve the legality and high reliability of the results. This chapter also covers the details of the procedures during the data collection phase as well as a discussion of the predicted variables of the study. Below, the details of the methodology will be explained well.



## 3.2 Flowchart





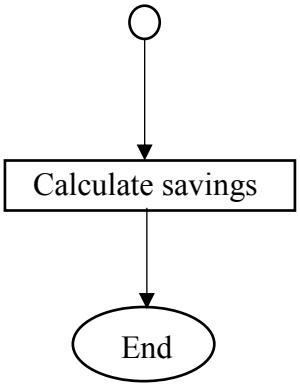



Figure 3.1: Flowchart Diagram

### 3.2.1 Building Profile

In this project, building of Faculty of Manufacturing (FKP) UTeM has been selected to execute this study. FKP has two blocks facility that is block A and block B. In block A, the facility present in there are lecture hall, lecturer room and computer laboratory room. Meanwhile in block B, is the laboratory that has instrument, machine and tools. This faculty is occupied by 1281 FKP's resident which include student, staff and lecturer. This facility operate on normal working days that is from Monday to Friday starting at 8:00 am until 10:00 pm.



Figure 3.2: Faculty manufacturing buildings

### 3.2.2 IPMVP Framework of Calculating Energy savings

Option C, whole facility measurement that adherence to IPMVP will be used in this project to determine the energy avoidance. Energy saving cannot be directly measure according to IPMVP, since saving represent the absence of energy use. By comparing measured energy use before and after implementation of an energy management program can determine the savings. The impact of ECM on the energy consumption must be separated from the impact of independent variables such as weather condition, working days, production and occupancy, in order to properly report the saving. Before the installation of ECM take place, the energy baseline must be adjusted to the same conditions (independent variable) of the reporting period. Simple comparison of cost or usage before and after implementation of an ECM distinguishes the proper saving report from this adjustment. In general,

Savings = (Baseline Energy – Reporting Period) ± Adjustment (3.1)

### 3.2.3 Routine Adjustment data

In this phase, there are two type of adjustment that is routine adjustment and non-routine adjustment. Energy governing factor that are predictable affecting energy consumption and has a trend are routine adjustment. Independent variables are the type of energy governing factor. In this project, CDD, number of working days, number of students and number of class are been used for the independent variables. CDD, number of working days, number of student and number of class has been collected in period of one year.



**(i) Number of working days**

The number of working days data has been obtained based on the almanac calendar from August 2014 to July 2015. For the adjusted baseline data, number of working days data in period from May 2015 until April 2016 also has been collected for the analysis.

**(ii) Number of Students**

Data for number of student and number of class in which was session 2013/2014, 2014/2015 and 2015/2016 has been collected from FKP management office. Session 2013/2014 and

2014/2015 will be used for the baseline data meanwhile session 2015/2016 will be used for the adjusted baseline data.

**(iii) Number of Class**

Number of class that being used in one year for the baseline data has been obtained from FKP management. The number of class that being used was calculated based on every class schedule that being obtained from the management team. All class that in the building that being used was calculated in order to obtain the number of class data.

**(iv) CDD**

In order to obtain CDD value, average ambient temperature is needed for the calculation in the formula. The surrounding temperature for daily hour's data in UTeM's area for the radius of 10 km has been collected for the calculation of average ambient temperature as presented in Equation (3.2):

Average Ambient Temperature = (maximum temperature in daily hours + minimum temperature in daily hours) /2 (3.2)



The specification to obtain CDD in Malaysia, the value of average ambient temperature must be minus with 18 $C^0$ due to Malaysia was located on the equator based on earth map. Different locations have different value to be minus in order to obtain CDD. In general, the formula that being used to obtain CDD

CDD = Average Ambient Temperature – 18 $C^0$ (3.3)

The energy governing factors that occur "one-off" affecting energy consumption during reporting period are known as non-routine adjustment. Static factor is the energy governing factor. Static factor occur when there is a change in size of buildings, design and operation of the equipment installed and unexpected activities. In this section, static factor that has been identified is unexpected activities that being conducts other than the normal working days. As example, the society of FKP student's has conducted an event on the faculty on Saturday or

Sunday. This factor must be monitored and properly manage in order to prevent it from affecting the result.

### 3.2.4 Modelling Regression Analyses

To determine the mathematical relationship between the parameter measurement and energy use with one or more independent variables is called regression analysis. Mathematical modelling is used in M&V to prepare the routine adjustment term in various versions of equation. Modelling involve finding a mathematical relationship between dependent variable and independent variables. The type of regression use in this project is multiple regression analysis. In this study, the energy consumption at FKP's building are the dependent variable meanwhile independent variables are CDD, number of working days, number of students and number of class that been used. The relationship between multi independent variables, CDD, number of working days, number of students and number of class and dependent variable, energy consumption of the buildings are being compared. Using graphical method in Microsoft Excel, the multi independent variable and dependent data was being plotted. This may result a straight linear line will be produce in the graph and it is known as coefficient of regression $\mathbf{R^2}$. The proportion of variation in dependent variable (**Y**) predictable by a set of independent variables (**X**) is the coefficient of determination $\mathbf{R^2}$. Multiple linear regression equation is :



$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots\ldots. B_kX_k \quad (3.4)$$

Where,

$b_1$ is the first independent variable slope

$b_2$ is the second independent variable slope

$X_1$ is the first independent variable and

$X_2$ is the second independent variable

Constraint: The correlation could be consider contribute much to the energy consumption when $R^2 > 0.75$.

### 3.2.5 Self-Organizing Map (SOM)

SOM was being used to analyze all data that have been collected. The output of SOM will be in term of visual and it was being analyze by using visualize technique. The following step are the step that being used in this phase.

**(i) Data Organization**

The input data that being used was the baseline energy which are the energy consumption of block A and block B buildings of FKP. The range of this baseline energy that being used was from August 2014 until July 2015.

**(ii) Data Training**

In this phase, the data structure must be normalized. During the trained of SOM, the normalization was copied to the map structure. 'Var', 'range', 'log' or 'logistic' was the four type of normalization that being used. The variance variable to unity and the mean to zero was normalize by the 'var' data input and the variable value between zero and one was being scale by the 'range' input data. All possible value between zero and one was being scale by the 'log' that is known as logarithmic transformation and the 'logistic' or softmax transformation. During normalization, the optimum number of neuron must be considered. Data that being used in SOM was CDD, number of working days (NWD), average temperature (AVT), energy consumption (CON), maximum demand (KW), energy consumption bill (BILL), Number of students (NOS) and number of class (NOC).

**(iii) Selecting the best features**

After the data being trained by SOM for classification, the best result obtained among four normalization method which is 'log', 'var', 'range' and 'logistic' will be analyze. Thus, the best feature will be obtain from this analysis

### 3.2.6 Identifying Error and Uncertainty in Measurement

Error is a difference between the measured value from a measurement and true value of thing being measured meanwhile uncertainty is the quantification of the doubt about the measurement result. Error and uncertainties can come from a few factor such as the measuring instrument, item being measured, the measurement process and etc. 'How big is the margin' and 'how bad is the doubt' must be identified since there is always margin of doubt in any measurement.

Saving are deemed to be statistically valid if they are large relative to the statistical variations. The saving need to be larger than twice the standard error of the baseline value.

$$\text{Saving} > 2\ \text{SE} \tag{3.5}$$

Where, SE is Standard Error



### 3.2.7 Statistic of Mathematical Equation

Statistic is the branch of mathematic used to summarize, analyze and interpret a group of number, data or observations considering uncertainty. There are a few statistical calculation that being used in this project in order to determine the estimate energy avoidance.

(i) **Mean (average)**

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \tag{3.6}$$

Where,

$x_i$ is adding the individual data points

n is the total number of data points

(ii) **Variance and Standard Deviation**

Variance;

$$S^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1} \quad (3.7)$$

Standard Deviation;

$$s = \sqrt{S^2} \quad (3.8)$$

(iii) **Standard Error**

$$SE = \frac{s}{\sqrt{n}} \quad (3.9)$$



Standard error of the estimate;

$$SE_{(monthly)} = \sqrt{\frac{\sum(Yi' - Yi)^2}{n-p-1}} \quad (3.10)$$

$$SE_{(annually)} = \sqrt{12} \times SE_{(monthly)} \quad (3.11)$$

Where,

Yi' = Adjusted Baseline Energy

Yi = Baseline Energy

n = Total number of data

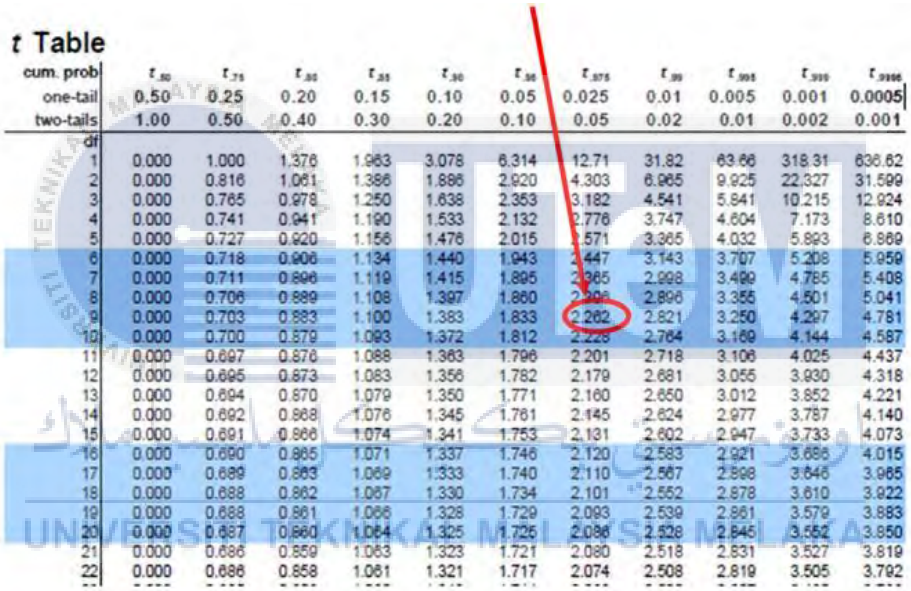
p = the number of independent variables

(iv) **Absolute and Relative Precision**

Other than that, to calculate the annual saving estimate, it can be determined by using the calculation of absolute and relative precision. It can be conclude from the formula below ;

Absolute precision = t × SE $_{(annual)}$ (3.12)

Where, t = value from t-table



*t* Table

| cum. prob | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| one-tail | 0.50 | 0.25 | 0.20 | 0.15 | 0.10 | 0.05 | 0.025 | 0.01 | 0.005 | 0.001 | 0.0005 |
| two-tails | 1.00 | 0.50 | 0.40 | 0.30 | 0.20 | 0.10 | 0.05 | 0.02 | 0.01 | 0.002 | 0.001 |
| df | | | | | | | | | | | |
| 1 | 0.000 | 1.000 | 1.376 | 1.963 | 3.078 | 6.314 | 12.71 | 31.82 | 63.66 | 318.31 | 636.62 |
| 2 | 0.000 | 0.816 | 1.061 | 1.386 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 22.327 | 31.599 |
| 3 | 0.000 | 0.765 | 0.978 | 1.250 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 | 10.215 | 12.924 |
| 4 | 0.000 | 0.741 | 0.941 | 1.190 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 7.173 | 8.610 |
| 5 | 0.000 | 0.727 | 0.920 | 1.156 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 5.893 | 6.869 |
| 6 | 0.000 | 0.718 | 0.906 | 1.134 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 5.208 | 5.959 |
| 7 | 0.000 | 0.711 | 0.896 | 1.119 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 4.785 | 5.408 |
| 8 | 0.000 | 0.706 | 0.889 | 1.108 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 4.501 | 5.041 |
| 9 | 0.000 | 0.703 | 0.883 | 1.100 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 4.297 | 4.781 |
| 10 | 0.000 | 0.700 | 0.879 | 1.093 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 4.144 | 4.587 |
| 11 | 0.000 | 0.697 | 0.876 | 1.088 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 4.025 | 4.437 |
| 12 | 0.000 | 0.695 | 0.873 | 1.083 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 3.930 | 4.318 |
| 13 | 0.000 | 0.694 | 0.870 | 1.079 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 3.852 | 4.221 |
| 14 | 0.000 | 0.692 | 0.868 | 1.076 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 3.787 | 4.140 |
| 15 | 0.000 | 0.691 | 0.866 | 1.074 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 3.733 | 4.073 |
| 16 | 0.000 | 0.690 | 0.865 | 1.071 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 3.686 | 4.015 |
| 17 | 0.000 | 0.689 | 0.863 | 1.069 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 3.646 | 3.965 |
| 18 | 0.000 | 0.688 | 0.862 | 1.067 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 3.610 | 3.922 |
| 19 | 0.000 | 0.688 | 0.861 | 1.066 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 3.579 | 3.883 |
| 20 | 0.000 | 0.687 | 0.860 | 1.064 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 3.552 | 3.850 |
| 21 | 0.000 | 0.686 | 0.859 | 1.063 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 3.527 | 3.819 |
| 22 | 0.000 | 0.686 | 0.858 | 1.061 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 3.505 | 3.792 |

Figure 3.3: t-table

Relative precision = $\frac{\text{absolute precision}}{savings} \times 100\%$ (3.13)

### 3.2.8 Auditing process and M&V activities

In this phase, the auditing process will take place in the building. This process must be done properly in order to determine the potential saving in the facility. Option C that has been

selected from IPMVP is the whole facility measurement. In this M&V option, usually it involve in multiple ECMs that will be install in the facility and it can create large savings. The energy usage will be measure from electricity meter (electricity bills).

### 3.2.9 Identifying Static Factor and Non-Routine Adjustment

Usually, during energy audit work, static factor can been identified. By using appropriate method in saving calculation for baseline adjustment, static factor should always be monitored and recorded to account. The cost of tracking changes in the static factor depend on the facility's size, the difficulty of detecting changes and the surveillance procedure already in place. In this project, example of static factor is addition number of equipment in the buildings during reporting period. Non-routine adjustment should be made so that the energy use during baseline period and reporting period is compared at the same number of functions organized by the FKP's society in the building. Static factor are the most difficult issue to manage and the conflict may arise if they are not properly managed.

### 3.2.10 Energy Cost Avoidance

The saving during the baseline period energy and reporting period are being comparing for energy cost avoidance. In other word, the condition when the baseline energy is adjusted to conditions of reporting energy period is energy cost avoidance. The equation that can be concluded is :

$$E_a = (E_b - E_r) \pm R_{aj} \pm NR_{aj} \quad (3.14)$$

So that;

$E_a$ is Energy Avoided

$E_b$ is Baseline Energy

$E_r$ is Reporting Period

$R_{aj}$ is Routine Adjustment

$NR_{aj}$ is Non-Routine Adjustment

The adjusted energy baseline in energy cost avoidance was normally found by first developing a mathematical model which correlates the actual baseline energy data with appropriate independent variable such as CDD and number of working days in the baseline period. To produce the adjusted baseline energy, each reporting period's independent variables are then inserted into this baseline model. The most common way to representing energy saving report of an ECM can be done by this approach.

### 3.3 Summary of the Chapter

All the significant method that being describe in this chapter has been properly being implement for this project. The regression analysis for FKP's building will being analyses separately due to this block has different price in tariff for their energy consumption. From this, all data that has been collected has been analyze using SOM in order to select the best feature that suitable for energy saving project.

# Chapter 4

# Result and Discussion

## 4.1 Introduction

Option C from IPMVP that is whole facility measurement has been selected due to FKP's building has its own TNB's reading meter. One of the objective in this project is to model the regression method for correlation identifying. All data for routine adjustment has been collected such as dependent and independent variables. Independent variables data that has been collected are CCD, number of working days, number of students and number of class meanwhile energy consumption is the dependent variable. All this data has been analyze in order to identify the correlation relationship between all this variables through regression method.



## 4.2 Routine Adjustment Data

### 4.2.1 Independent Variables

#### (i) CDD

CDD data that has been obtained based on the ambient temperature in UTeM's area in radius of 10 km. The period of this data is for one year that is from May 2014 until April 2015 has been taken from Solar Laboratory monitoring record.

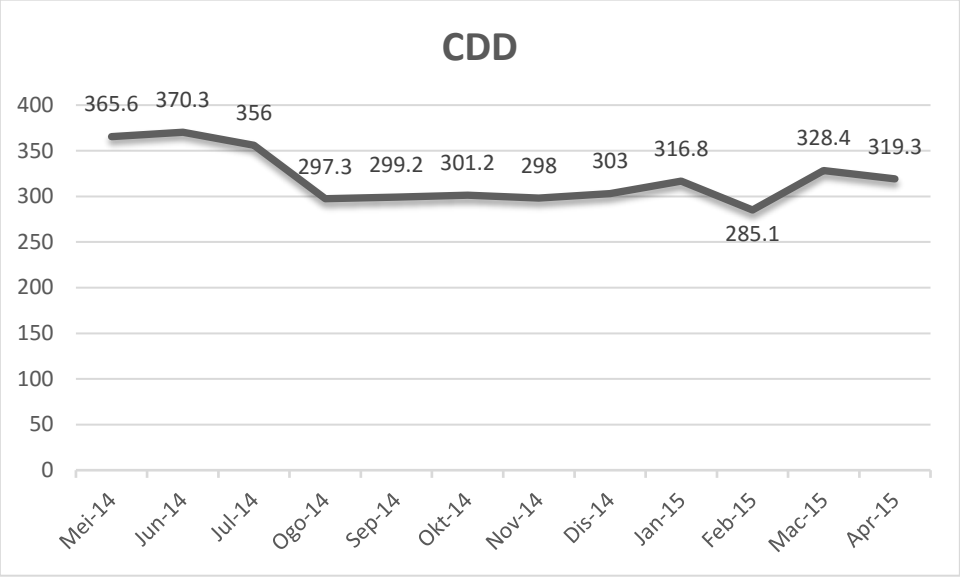



Figure 4.1: CDD for one year

The Figure 4.1 shows the value of CCD that been obtained from the calculation based on real ambient temperature. From this graph, it presents that the value of CDD are going up and down through the period. This is due to the number of day in that month. As example, it shows that from January 2015 to February 2015, the value of CDD drop vigorously and increase rapidly increase from February 2015 to March 2015. This is because, the number of days in February 2015 is 28 days while January and March 2015 has 31 days in that month. It also showed that the value of CDD in May and June 2014 are higher than other. This is due to worse haze situation that has been experienced by Melaka in that month. The higher the air pollution index (IPU) reading, the temperature will increased. In that month, it show that Malaysia has high reading IPU that cause by the haze and it affect the CDD value because it depend on the average ambient temperature value.

**(ii) Number of working days**


Figure 4.2: Number of working days

The Figure 4.2 shows the data number of working days. This data was obtained from the almanac calendar for Melaka state. The numbers of working days drop from January 2015 to February 2015. This is cause by the number of public holiday in that month such as Chinese New Year two day public holiday in the month of February 2015.

**(iii) Number of student**

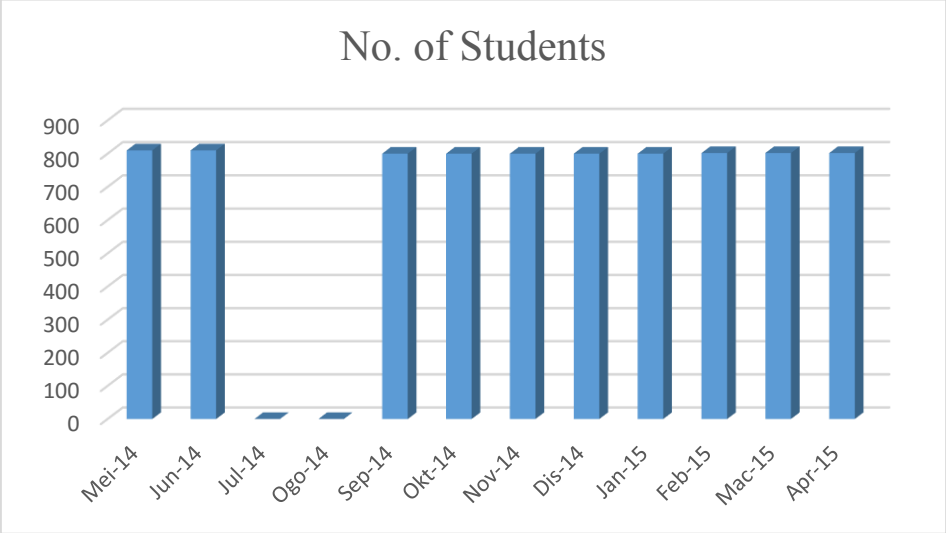



Figure 4.3: Number of students

Figure 4.3 showed that the number of student present in FKP. From the graph it show that in August 2014, the number of student was zero same as July 2015. This is due to semester break has taken place during that month that being obtained from the calendar of UTeM.



**(iv) Number of class**

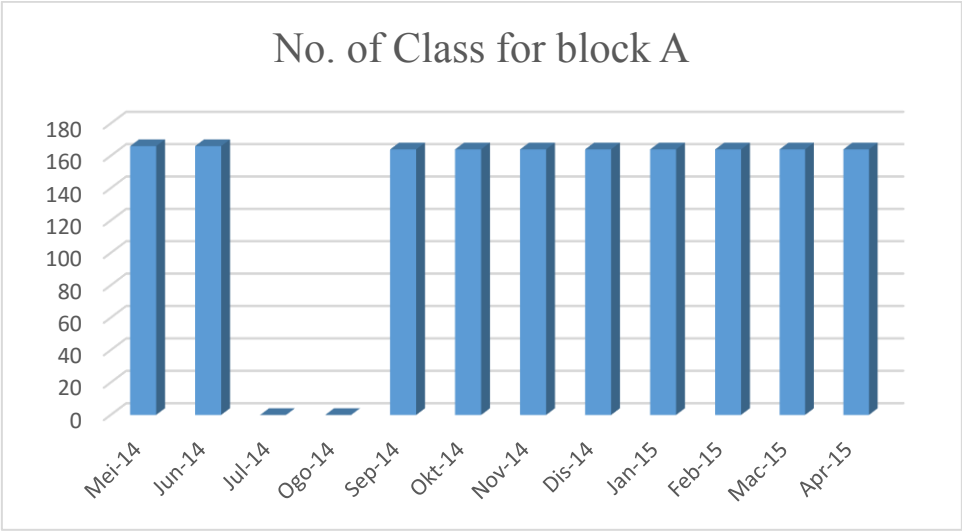


Figure 4.4: No. of class for block A

Figure 4.4 show that number of class that being used in block A FKP building's for one year. As illustrated in the figure above, it show that number of class during July 2014 and August 2014 is zero. This is due to semester break of the student during this period.

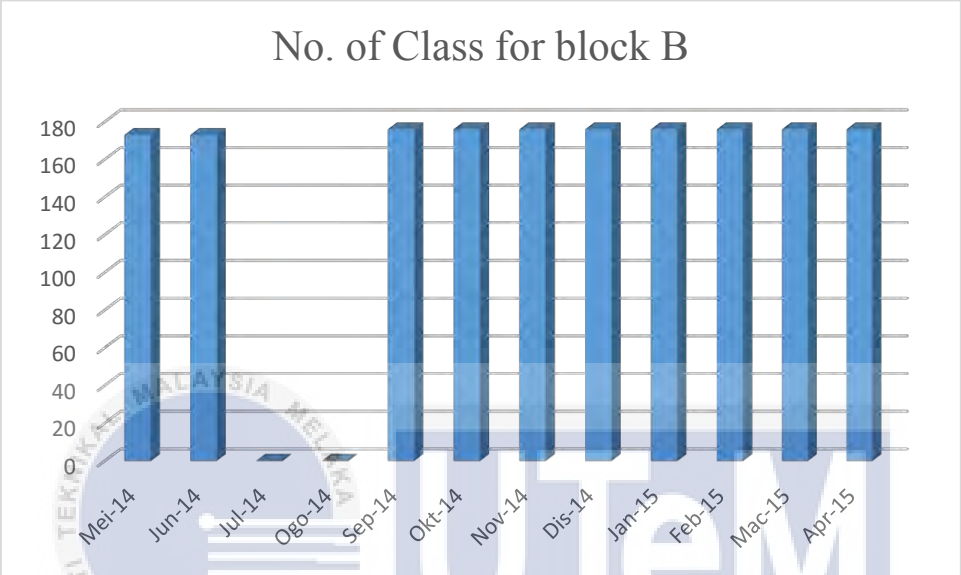



Figure 4.5: No. of class for block B



Figure 4.5 show that number of class that being used in block B FKP building's for one year. As it shown in the figure, the number of class that being used for block B was different with block A. This is due different block of buildings. The number of class in July 2014 and August 2014 was drop to zero was due to semester break take place in those two month.

### 4.2.2 Dependent Variables

#### (i) Energy Consumption for block A

Table 4.1: Energy consumption for Block A

| Month | Energy Consumption (kWh) Block A |
|---|---|

| | |
|---|---|
| Mei-14 | 12825 |
| Jun-14 | 10211 |
| Jul-14 | 11565 |
| Ogos-14 | 10298 |
| Sept-14 | 10507 |
| Okt-14 | 12387 |
| Nov-14 | 11904 |
| Dis-14 | 11772 |
| Jan-15 | 10447 |
| Feb-15 | 9502 |
| Mac-15 | 14341 |
| Apr-15 | 12950 |

The Table 4.1 represents the energy consumption in FKP's block A from August 2014 to July 2015. This data was obtained from the electricity bills of FKP's for Block-A building. From the table, it shows that energy consumption in February 2015 is less than others month. This is due to the number of working days in that month that affect the energy usage.

**(ii) Energy consumption for block B**

Table 4.2: Energy consumption for block B

| Month | Energy Consumption (kWh) Block B |
|---|---|
| Mei-14 | 62773 |
| Jun-14 | 49476 |
| Jul-14 | 48036 |
| Ogos-14 | 55095 |
| Sept-14 | 53152 |
| Okt-14 | 56284 |
| Nov-14 | 54927 |
| Dis-14 | 52768 |
| Jan-15 | 48103 |
| Feb-15 | 46417 |
| Mac-15 | 62805 |
| Apr-15 | 62909 |

This block has a machine and instrument for the student in their learning process. From table 4.2, it shows that the energy consumption in July 2015 is less than other month. During this month, it was a semester break for the student. Therefore, the usage of the energy was less.

### 4.3 Correlation Analysis

FKP's building has two blocks which are block A and block B. The analysis was being an analysis in separate method due to these two blocks has a different price in tariff. This analysis has been done in multiple regression method based on the number of independent variable contained.

#### 4.3.1 Single Linear Regression

**(i) Block A**

The Figure 4.6 illustrates the correlation analysis of the relationship between the energy consumption and number of working days for Block A. The value of coefficient $R^2$ has been showed in the graph that is 0.460.3. The detailed result can be obtain through the summary output of regression analysis.



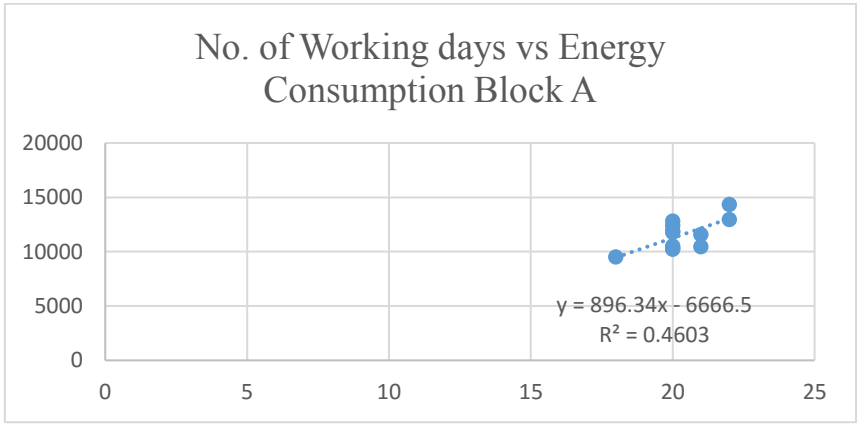



Figure 4.6: Correlation analysis measure the relationship between energy consumption and number of working days for block A

Table 4.3: Statistical analysis for energy use vs number of working days

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.678456 |
| R Square | 0.460302 |
| Adjusted R Square | 0.406332 |
| Standard Error | 1092.343 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 10176769 | 10176769 | 8.528881 | 0.015289 |
| Residual | 10 | 11932127 | 1193213 | | |
| Total | 11 | 22108897 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | -6666.54 | 6248.705 | -1.06687 | 0.311111 | -20589.5 | 7256.443 | -20589.5 | 7256.443 |
| No. of Working days | 896.3421 | 306.9218 | 2.920425 | 0.015289 | 212.4777 | 1580.207 | 212.4777 | 1580.207 |

This Table 4.3 shows the value that has been obtained through the analysis such as coefficients, standard error and etc. This value can be used in the calculation of energy saving

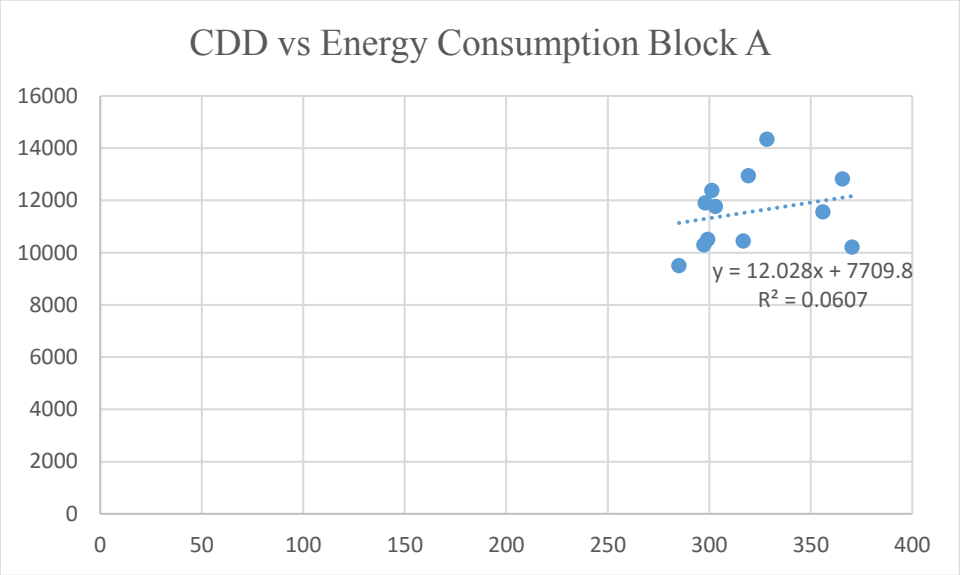



Figure 4.7: Correlation analysis measure the strength relationship between the energy consumption and CDD

The Figure 4.7 shows the relationship between energy consumption and CDD. The mathematical expression was presented in the linear regression line with y = 12.028x + 7709.8, where y is the energy use (kWh) and x is the value of CDD. This graph also showed the value of its coefficient that is $R^2 = 0.0607$.



Table 4.4 showed the statistical analysis of single linear regression analysis relationship between the energy consumption and CDD. All the value has been presented in table. It prove that the number of coefficient in this table is same as in the graph for energy consumption against CDD

Table 4.4: Statistical analysis for Energy use vs CDD

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.246421 |
| R Square | 0.060723 |
| Adjusted R Square | -0.0332 |
| Standard Error | 1441.054 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 1342524 | 1342524 | 0.646489 | 0.440066 |
| Residual | 10 | 20766373 | 2076637 | | |
| Total | 11 | 22108897 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 7709.796 | 4805.439 | 1.60439 | 0.13971 | -2997.39 | 18416.98 | -2997.39 | 18416.98 |
| CDD | 12.0284 | 14.95984 | 0.804046 | 0.440066 | -21.3042 | 45.361 | -21.3042 | 45.361 |

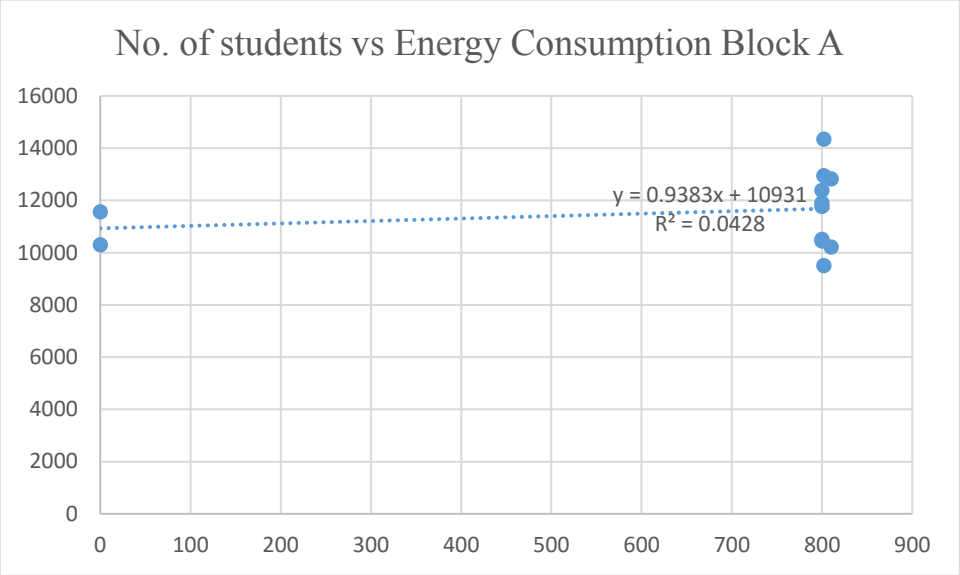



Figure 4.8: Correlation analysis measure the strength relationship between the energy consumption and no. of student

The Figure 4.8 shows the relationship between energy consumption and no. of student. The mathematical expression was presented in the linear regression line with y = 0.9383x + 10931, where y is the energy use (kWh) and x is the value of number of student. This graph also showed the value of its coefficient that is $R^2 = 0.0428$.

Table 4.5 showed the statistical analysis of single linear regression analysis relationship between the energy consumption and number of student. All the value has been presented in table. It prove that the number of coefficient in this table is same as in the graph for energy consumption against number of students

Table 4.5: Statistical analysis for Energy use vs no. of student

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.206789 |
| R Square | 0.042762 |
| Adjusted R Square | -0.05296 |
| Standard Error | 1454.767 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 945413.6 | 945413.6 | 0.446719 | 0.519026 |
| Residual | 10 | 21163483 | 2116348 | | |
| Total | 11 | 22108897 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 10931.49 | 1028.618 | 10.62736 | 9.08E-07 | 8639.589 | 13223.4 | 8639.589 | 13223.4 |
| no of students | 0.938336 | 1.403915 | 0.668371 | 0.519026 | -2.18978 | 4.066453 | -2.18978 | 4.066453 |

.

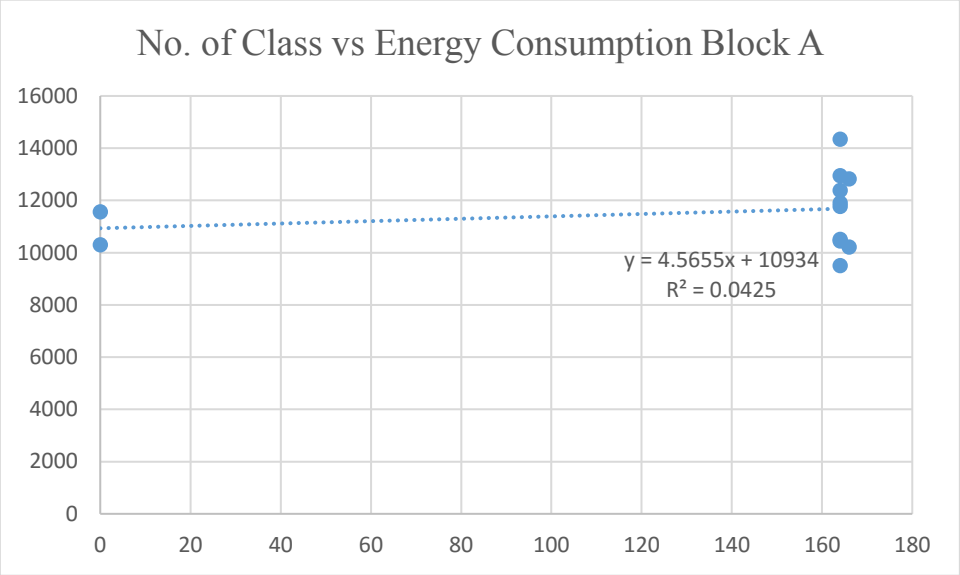



Figure 4.9: Correlation analysis measure the strength relationship between the energy consumption and no. of class

The Figure 4.9 shows the relationship between energy consumption and no. of class. The mathematical expression was presented in the linear regression line with y = 4.5655x – 10934, where y is the energy use (kWh) and x is the value of number of class. This graph also showed the value of its coefficient that is $R^2 = 0.1044$.

Table 4.6: Statistical analysis for Energy use vs no. of class

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.20609 |
| R Square | 0.042473 |
| Adjusted R Square | -0.05328 |
| Standard Error | 1454.987 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 939037 | 939037 | 0.443573 | 0.52047 |
| Residual | 10 | 21169860 | 2116986 | | |
| Total | 11 | 22108897 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 10933.62 | 1028.77 | 10.62785 | 9.07E-07 | 8641.373 | 13225.86 | 8641.373 | 13225.86 |
| No. of Class | 4.565458 | 6.854913 | 0.666012 | 0.52047 | -10.7082 | 19.83916 | -10.7082 | 19.83916 |

Table 4.6 showed the statistical analysis of single linear regression analysis relationship between the energy consumption and number of student. All the value has been presented in table. It prove that the number of coefficient in this table is same as in the graph for energy consumption against no. of class.

ii) Block B

Figure 4.10 showed the relationship between numbers of working days against energy consumption. From the graph, it showed the mathematical expression was presented as y = 848.21x + 3660 in this graph where y is the energy consumption while x is the number of working days.

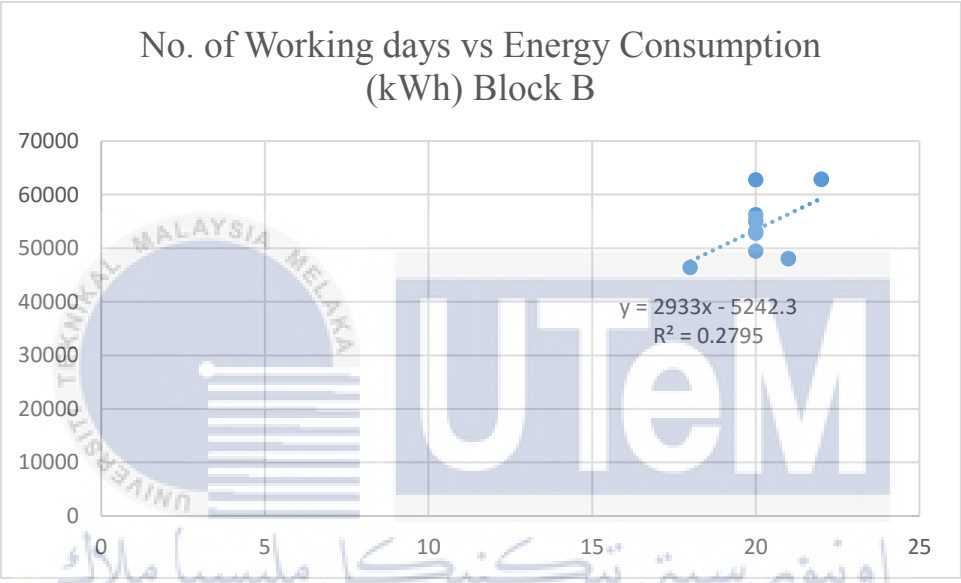



Figure 4.10: Correlation analysis measure the strength between number of working days and energy consumption



Table 4.6 showed the statistical analysis between number of working days and energy consumption. The value of coefficient obtain in the table is same as the graph above $R^2$ = 0.2795.

Table 4.7: Statistical analysis relationship between numbers of working days and energy consumption

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.528708 |
| R Square | 0.279532 |
| Adjusted R Square | 0.207485 |
| Standard Error | 5299.5 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 1.09E+08 | 1.09E+08 | 3.879865 | 0.077178 |
| Residual | 10 | 2.81E+08 | 28084703 | | |
| Total | 11 | 3.9E+08 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | -5242.25 | 30315.59 | -0.17292 | 0.866162 | -72789.6 | 62305.09 | -72789.6 | 62305.09 |
| No. of Working days | 2933 | 1489.031 | 1.969737 | 0.077178 | -384.768 | 6250.768 | -384.768 | 6250.768 |

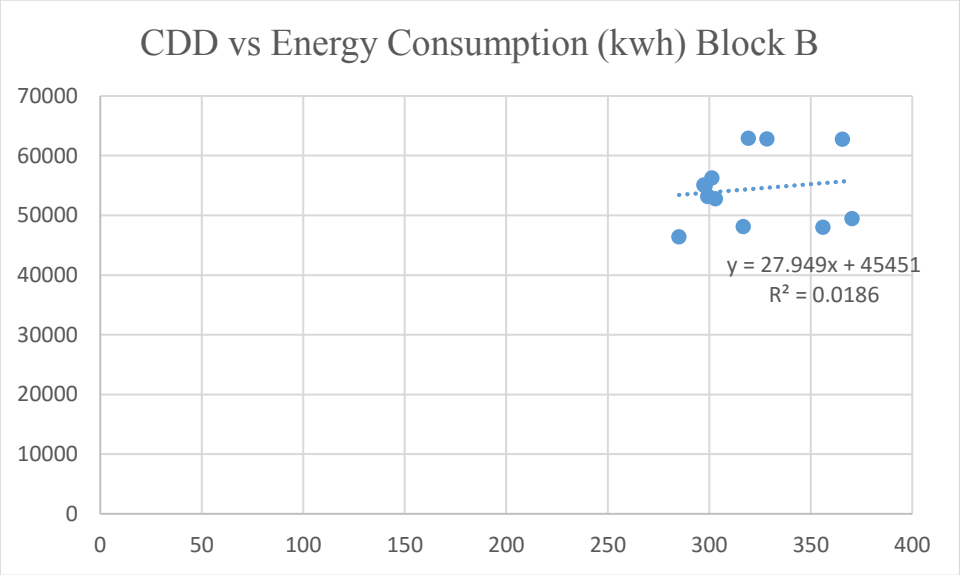



Figure 4.11: Correlation analysis measure the strength relationship between CDD and energy consumption

Figure 4.11 showed the correlation analysis measurement of the strength relationship between CDD and energy consumption. This two variables was expressed in mathematical expression as presented in the graph that is y = 27.949x + 45451 where y is the energy consumption while x is the CDD.



Table 4.8 show summary output of the statistical analysis between CDD and energy consumption. The value such as standard error, t-statistic, p-value coefficient and etc. can be obtain from this analysis.

Table 4.8: Statistical Analysis between CDD and energy consumption

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.136363 |
| R Square | 0.018595 |
| Adjusted R Square | -0.07955 |
| Standard Error | 6185.171 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 7248461 | 7248461 | 0.189471 | 0.672602 |
| Residual | 10 | 3.83E+08 | 38256343 | | |
| Total | 11 | 3.9E+08 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 45451.2 | 20625.5 | 2.203642 | 0.052119 | -505.27 | 91407.67 | -505.27 | 91407.67 |
| CDD | 27.94921 | 64.20937 | 0.435282 | 0.672602 | -115.118 | 171.0166 | -115.118 | 171.0166 |

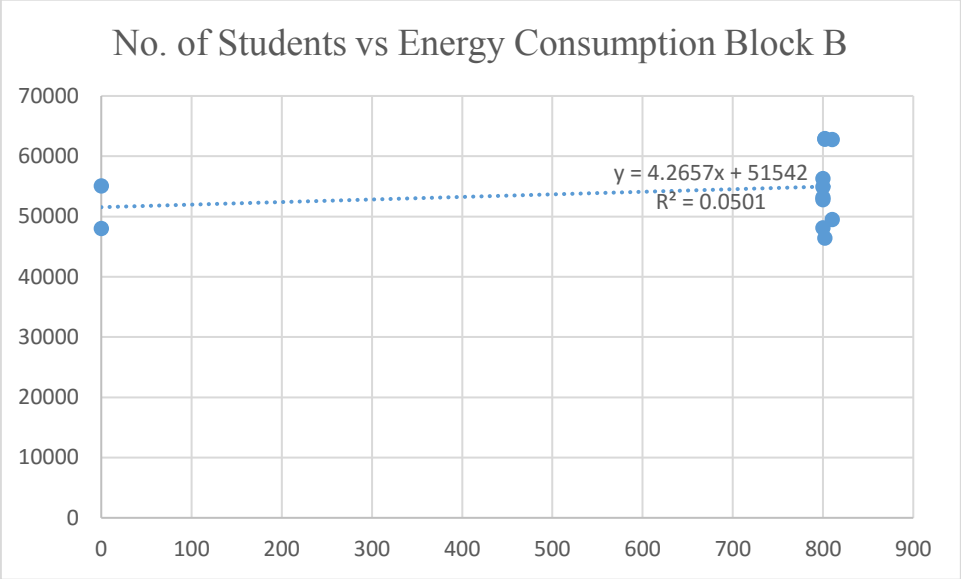



Figure 4.12: Correlation analysis measure the strength relationship between no. of student and energy consumption

Figure 4.12 showed the correlation analysis measurement of the strength relationship between CDD and energy consumption. This two variables was expressed in mathematical expression as presented in the graph that is $y = 4.2657x + 51542$ where y is the energy consumption while x is the number of student. The value of $R^2 = 0.0501$.



Table 4.9 showed the statistical analysis between number of students and energy consumption. The value of coefficient obtain in the table is same as the graph above.

Table 4.9: Statistical Analysis between No. of student and energy consumption

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.223881 |
| R Square | 0.050123 |
| Adjusted R Square | -0.04487 |
| Standard Error | 6085.01 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 19538425 | 19538425 | 0.527676 | 0.484242 |
| Residual | 10 | 3.7E+08 | 37027347 | | |
| Total | 11 | 3.9E+08 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 51542.36 | 4302.511 | 11.9796 | 2.97E-07 | 41955.77 | 61128.95 | 41955.77 | 61128.95 |
| No of students | 4.265717 | 5.872304 | 0.726413 | 0.484242 | -8.81859 | 17.35003 | -8.81859 | 17.35003 |

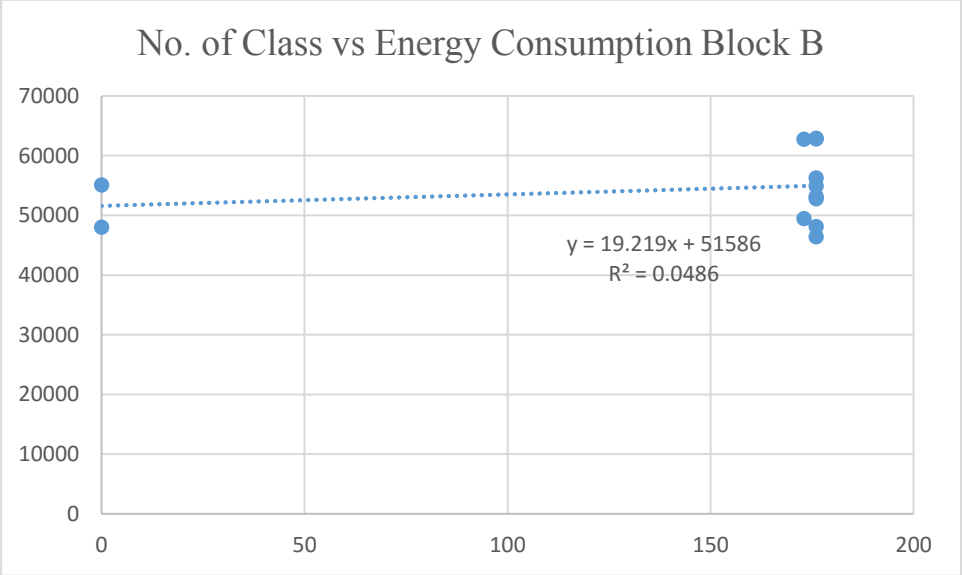



Figure 4.13: Correlation analysis measure the strength relationship between no. of class and energy consumption

Figure 4.13 showed the correlation analysis measurement of the strength relationship between number of class and energy consumption. This two variables was expressed in mathematical expression as presented in the graph that is y = 19.219x -51586 where y is the energy consumption while x is the number of student. The value of $R^2 = 0.0486$.



Table 4.10 show summary output of the statistical analysis between number of class and energy consumption. The value such as standard error, t-statistic, p-value coefficient and etc. can be obtain from this analysis

Table 4.10: Statistical Analysis between no. of class and energy consumption

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.220459 |
| R Square | 0.048602 |
| Adjusted R Square | -0.04654 |
| Standard Error | 6089.879 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 18945633 | 18945633 | 0.510848 | 0.49112 |
| Residual | 10 | 3.71E+08 | 37086626 | | |
| Total | 11 | 3.9E+08 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 51586.18 | 4305.691 | 11.98093 | 2.97E-07 | 41992.51 | 61179.86 | 41992.51 | 61179.86 |
| No. of Class | 19.21939 | 26.89018 | 0.714736 | 0.49112 | -40.6957 | 79.13445 | -40.6957 | 79.13445 |

### 4.3.2 Multiple Linear Regression

#### (i) Block A

Table 4.11: Multiple regression table for block A

| Month | CDD | No. of Working days | no of students | No. of Class | Energy Consumption (kWh) Block A |
|---|---|---|---|---|---|
| Mei-14 | 365.6 | 20 | 810 | 166 | 12825 |
| Jun-14 | 370.3 | 20 | 810 | 166 | 10211 |
| Jul-14 | 356 | 21 | 0 | 0 | 11565 |
| Ogos-14 | 297.3 | 20 | 0 | 0 | 10298 |
| Sept-14 | 299.2 | 20 | 800 | 164 | 10507 |
| Okt-14 | 301.2 | 20 | 800 | 164 | 12387 |
| Nov-14 | 298 | 20 | 800 | 164 | 11904 |
| Dis-14 | 303 | 20 | 800 | 164 | 11772 |
| Jan-15 | 316.8 | 21 | 800 | 164 | 10447 |
| Feb-15 | 285.1 | 18 | 802 | 164 | 9502 |
| Mac-15 | 328.4 | 22 | 802 | 164 | 14341 |
| Apr-15 | 319.3 | 22 | 802 | 164 | 12950 |

This multiple variable as shown in table 4.11 will be the baseline data for block A in this project in order to determine the saving by using SOM.



Table 4.12 shows the statistical analysis for multiple variables toward energy consumptions. The mathematical equation for this correlation can be expressed as $y = 2.8702x_1 + 860.1401x_2 + 215.2782\ x_3 - 1045.22x_4 - 7639.27$ where $x_1$ is the CDD, $x_2$ is the number of working days, $x_3$ is the number of student, $x_4$ is the number of class and y is the energy consumption.

Table 4.12: Statistical analysis of multiple linear regression analysis for block A

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.736867 |
| R Square | 0.542974 |
| Adjusted R Square | 0.281816 |
| Standard Error | 1201.449 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 4 | 12004546 | 3001136 | 2.0791 | 0.187178 |
| Residual | 7 | 10104351 | 1443479 | | |
| Total | 11 | 22108897 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | -7639.27 | 7323.251 | -1.04315 | 0.331558 | -24956 | 9677.469 | -24956 | 9677.469 |
| CDD | 2.870166 | 13.51862 | 0.212312 | 0.837914 | -29.0963 | 34.83663 | -29.0963 | 34.83663 |
| No. of Working days | 860.1401 | 371.7616 | 2.313688 | 0.053893 | -18.9363 | 1739.216 | -18.9363 | 1739.216 |
| No. of students | 215.2782 | 442.6223 | 0.48637 | 0.641562 | -831.357 | 1261.914 | -831.357 | 1261.914 |
| No. of Class | -1045.22 | 2160.886 | -0.4837 | 0.643364 | -6154.9 | 4064.465 | -6154.9 | 4064.465 |



The value of $R^2$ must be greater than 0.75 in order to show it has good relationship between the variables. The larger the number of variables, the greater the value of $R^2$ will be. However the value obtain $R^2$= 0.542974 is satisfied enough.

**(ii) Block B**

Table 4.13: Multiple regression table for block B

| Month | CDD | No. of Working days | no of students | No. of Class | Energy Consumption (kwH) Block B |
|---|---|---|---|---|---|
| Mei-14 | 365.6 | 20 | 810 | 173 | 62773 |
| Jun-14 | 370.3 | 20 | 810 | 173 | 49476 |
| Jul-14 | 356 | 21 | 0 | 0 | 48036 |
| Ogos-14 | 297.3 | 20 | 0 | 0 | 55095 |
| Sept-14 | 299.2 | 20 | 800 | 176 | 53152 |
| Okt-14 | 301.2 | 20 | 800 | 176 | 56284 |
| Nov-14 | 298 | 20 | 800 | 176 | 54927 |
| Dis-14 | 303 | 20 | 800 | 176 | 52768 |
| Jan-15 | 316.8 | 21 | 800 | 176 | 48103 |
| Feb-15 | 285.1 | 18 | 802 | 176 | 46417 |
| Mac-15 | 328.4 | 22 | 802 | 176 | 62805 |
| Apr-15 | 319.3 | 22 | 802 | 176 | 62909 |

This multiple variable as shown in table 4.13 will be the baseline data for block B in FKP. This data will be used to compared with the result obtain after implementation of the energy saving project in this building by using SOM.



The table 4.14 showed the statistical analysis between multiple variables that is CDD, number of working days, number of students and number of class toward energy consumption of building in block B. The value of coefficient obtain is $R^2 = 0.6305343$. The mathematical expression for this multiple variables can be expressed as $y = -277.0479x_1 - 6449.5283x_2 + 919.48087\,x_3 - 4193.229x_4 + 9845.7618$ where $x_1$ is the CDD, $x_2$ is the number of working days, $x_3$ is the number of student, $x_4$ is the number of class and y is the energy consumption. The value of $R^2$ obtained is less than 0.75. However, SOM was used in this project in order to show the best independent variable that suitable.

Table 4.14**:** Statistical analysis of multiple linear regression analysis for block B

SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.7940619 |
| R Square | 0.6305343 |
| Adjusted R Square | 0.419411 |
| Standard Error | 4535.9221 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 4 | 2.46E+08 | 61447442 | 2.98657 | 0.098308 |
| Residual | 7 | 1.44E+08 | 20574589 | | |
| Total | 11 | 3.9E+08 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 9845.7618 | 28612.58 | 0.344106 | 0.740872 | -57812.2 | 77503.77 | -57812.2 | 77503.77 |
| CDD | -277.0479 | 127.7515 | -2.16865 | 0.06675 | -579.132 | 25.03652 | -579.132 | 25.03652 |
| No. of Working days | 6449.5283 | 1989.411 | 3.241929 | 0.014215 | 1745.32 | 11153.74 | 1745.32 | 11153.74 |
| No of students | 919.48087 | 396.5207 | 2.318872 | 0.053483 | -18.1416 | 1857.103 | -18.1416 | 1857.103 |
| No. of Class | -4193.229 | 1818.065 | -2.30642 | 0.054473 | -8492.27 | 105.8123 | -8492.27 | 105.8123 |

## 4.4 Self-Organizing Map

All data has been trained by SOM in order to select the best independent variable that can affect energy saving project. SOM has been used to trained the data due to the constraint to get the value of $R^2$>0.75 in the regression analysis. Four set of SOM normalization ( 'log, 'var', 'logistic, range) has been applied and optimized for SOM classification and of the numerical features. The combination between various normalization method ( 'log, 'var', 'logistic, range) and optimum number of neurons from 120 to 420 are consist in each simulation. All the following table will show all normalization method result. From the table, very small value of quantization and topography error that is near or equal to zero has been selected as the best features. Good and smooth classification was achieved through hexagonal lattice for all normalization method that was indicate by the low value of quantization and topography error. Other than that, simulation result for time training which is equal to zero will not be selected due to short training time. All classification was achieved by less than or equal six second for the training time. However, the selected features from the result must be compare with the U-matrix result. If the map cannot being analyze through visualization technique, high resolution of the map must be selected as the best feature.



### 4.4.1 Block A

(i) 'log'

Table 4.15: Result from MATLAB simulation using hexagonal topology and 'log' normalization method for block A

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | [20,6] | 0.002 | 0.125 | 0 |
| 140 | [20,7] | 0 | 0 | 0 |
| 160 | [23,7] | 0 | 0.125 | 1 |
| 180 | [23,8] | 0 | 0 | 1 |
| 200 | [25,8] | 0 | 0 | 1 |
| 220 | [28,8] | 0 | 0.125 | 1 |
| 240 | [27,9] | 0 | 0.125 | 1 |
| 260 | [29,9] | 0 | 0.5 | 2 |
| 280 | [28,10] | 0 | 0.25 | 2 |
| 300 | [30,10] | 0 | 0.375 | 2 |

| 320 | [32,10] | 0 | 0.125 | 2 |
|---|---|---|---|---|
| 340 | [31,11] | 0 | 0.625 | 3 |
| 360 | [33,11] | 0 | 0.75 | 4 |
| 380 | [35,11] | 0 | 0.875 | 4 |
| 400 | [36,11] | 0 | 0.875 | 4 |
| 420 | [35,12] | 0 | 0.625 | 5 |

Table 4.15 showed the simulation result from MATLAB simulation using hexagonal topology and 'log' normalization method. Number of neuron of 180 and 280 has been selected as the best features due to low quantization error and topography error with different time training. However, the selected feature produce a low linkage of the data in the U-matrix as shown in figure 4.14 and 4.15.

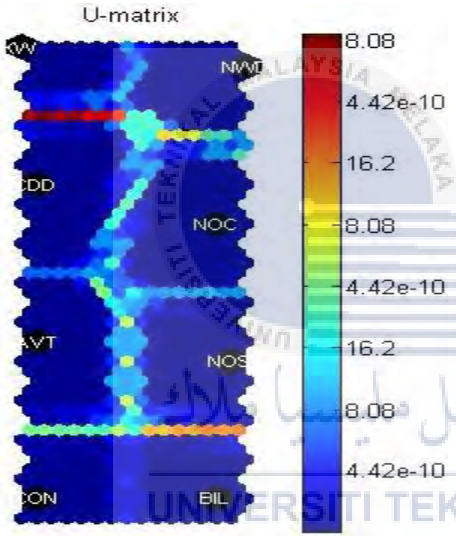



Figure 4.14: The U Matrix for 200 number of neurons

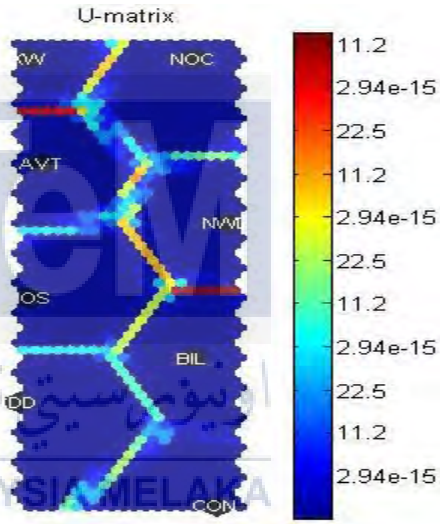



Figure 4.15: The U Matrix for 320 number of neurons

All result for U-matrix classification was being analyzed in order to select the best features. Figure 4.14, U-matrix for 200 number of neuron was the best selection.

(ii) 'var'

Table 4.16: Result from MATLAB simulation using hexagonal topology and 'var' normalization method for block A

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | [12,10] | 0 | 0 | 0 |
| 140 | [13,11] | 0 | 0 | 0 |
| 160 | [13,12] | 0 | 0.25 | 1 |
| 180 | [15,12] | 0 | 0 | 1 |
| 200 | [15,13] | 0 | 0 | 1 |
| 220 | [16,14] | 0 | 0 | 1 |
| 240 | [17,14] | 0 | 0.125 | 1 |
| 260 | [17,15] | 0 | 0.25 | 2 |
| 280 | [18,16] | 0 | 0.5 | 2 |
| 300 | [19,16] | 0 | 0.375 | 2 |
| 320 | [19,17] | 0 | 0.75 | 2 |
| 340 | [20,17] | 0 | 0.625 | 3 |
| 360 | [20,18] | 0 | 0.875 | 3 |
| 380 | [21,18] | 0 | 0.125 | 4 |
| 400 | [21,19] | 0 | 0.625 | 4 |
| 420 | [22,19] | 0 | 0.75 | 5 |



Table 4.16 show the result from MATLAB simulation using hexagonal topology and 'log' normalization method. As shown in the table, 180 and 260 number of neurons has been selected as the best feature as it has very small quantization and topography error. After it selected, it has been compared to it U-matrix classification result in the simulation to undergo visualization technique analysis. The result obtained from the U-matrix, the map cannot be analyze due to its low resolution of the map as shown in figure 4.16 and 4.17.

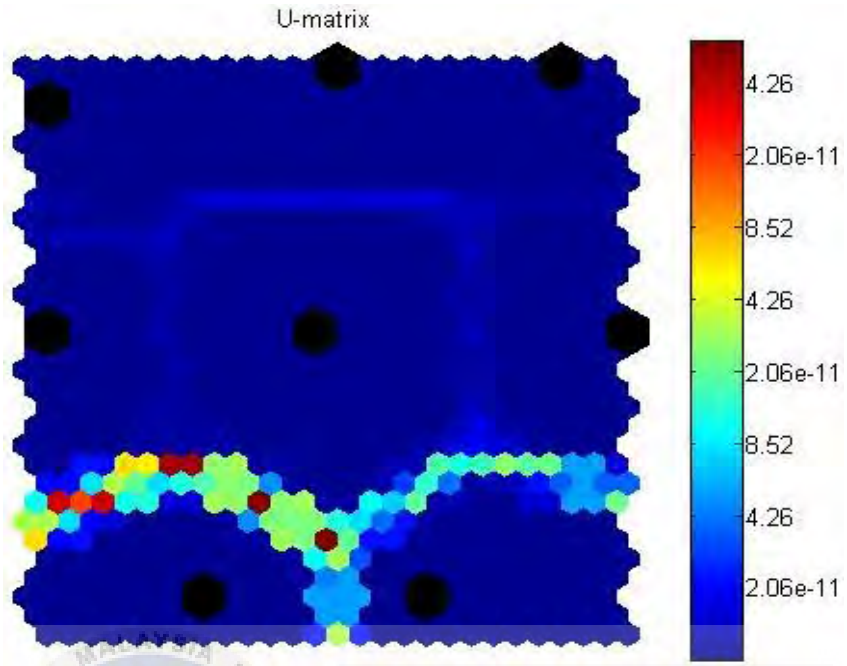



Figure 4.16: Result of U-matrix from the simulation of 220 number of neurons

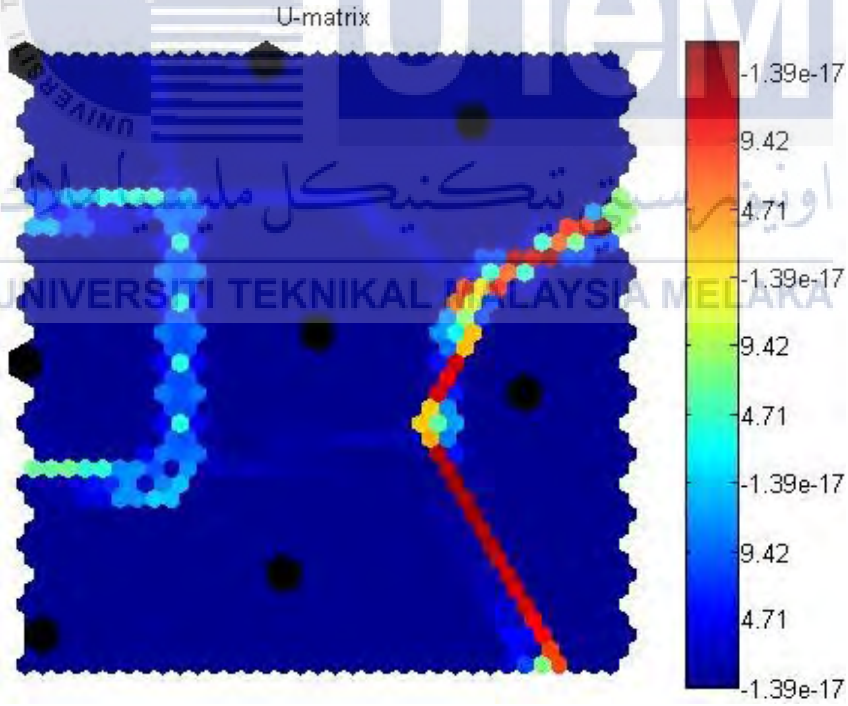



Figure 4.17: Result of U-matrix from the simulation of 380 number of neurons

Low resolution of the map define that the result obtain is not accurate and poor meanwhile, high resolution of the map give an accurate and better result to be selected. From this, 160 number of neuron has been selected after it been analyze by using visualize technique to obtain high resolution of the map and the linkage between the data compare to other simulation result as shown in figure 4.18. It's also has low value in quantization and topography error which was 0.5 with two second training time. Thus for 'var' normalization method, U-matrix result obtained as shown in figure 4.18 was the best selection.

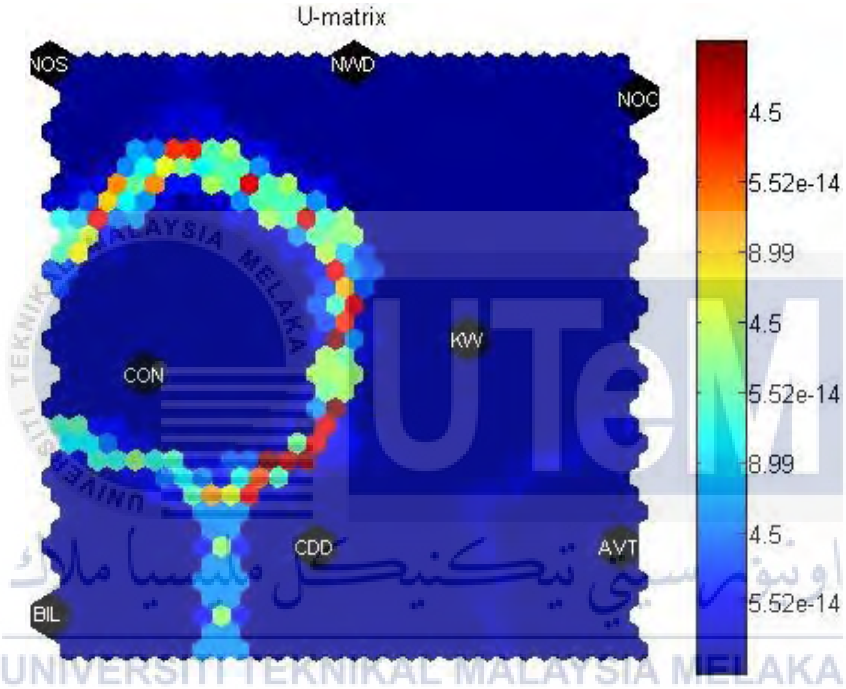



Figure 4.18**:** Result of U-matrix from the simulation of 280 number of neurons

(iii) 'range'

Table 4.17: Result from MATLAB simulation using hexagonal topology and 'range' normalization method for block A

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 12,10 | 0 | 0 | 0 |
| 140 | 13,11 | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| 160 | 13,12 | 0 | 0.25 | 0 |
| 180 | 15,12 | 0 | 0 | 1 |
| 200 | 15,13 | 0 | 0.125 | 1 |
| 220 | 16,14 | 0 | 0.125 | 1 |
| 240 | 17,14 | 0 | 0.125 | 1 |
| 260 | 17,15 | 0 | 0.125 | 1 |
| 280 | 18,16 | 0 | 0.5 | 2 |
| 300 | 19,16 | 0 | 0.5 | 2 |
| 320 | 19,17 | 0 | 0.375 | 3 |
| 340 | 20,17 | 0 | 0.375 | 3 |
| 360 | 20,18 | 0 | 0.375 | 3 |
| 380 | 21,18 | 0 | 0.375 | 4 |
| 400 | 21,19 | 0 | 0.625 | 4 |
| 420 | 22,19 | 0 | 0.375 | 5 |

As shown in table 4.17 result from MATLAB simulation using hexagonal topology and 'range' normalization method, 180 and 380 number of neurons has been selected due to the result of quantization and topography with different training time obtained in the simulation was very small and nearly to zero. The result obtain in the U-matrix also has been analyze in order to determine whether the result was accurate enough to prove it as shown in figure 4.19 and 4.20.

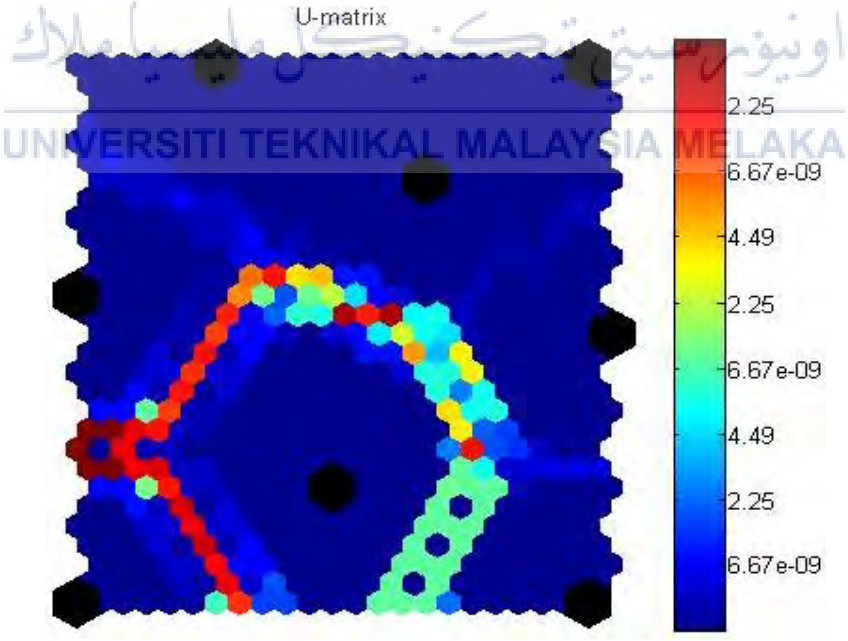



Figure 4.19: Result of U-matrix from the simulation of 180 number of neurons

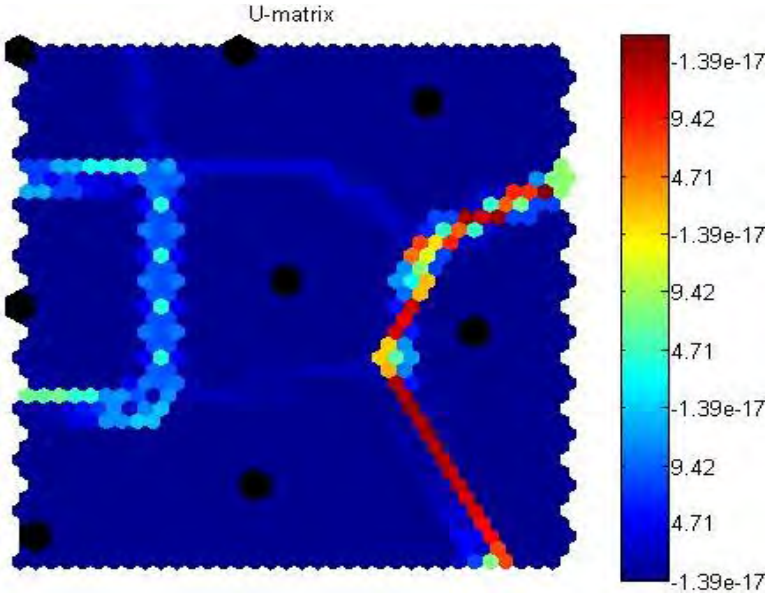



Figure 4.20: Result of U-matrix from the simulation of 280 number of neurons

As it shown in figure 4.19, the map cannot be analyze through visualization because it has low resolution of the map same as figure 4.20. U-matrix classification result that being obtained from all optimum number of neurons has been analyze in order to obtain the most accurate result. Thus, through the analysis from the map, quantization and topography error, 360 number of neurons has been selected as the most accurate result compared to other number of neurons as shown in figure 4.21. It also has high amount of linkage in the map compared to other result that being obtained from U-matrix and has low value of topography error and quantization error which was 0.375 and 0 respectively. For 'range' normalization method, U-matrix result obtained as shown in figure 4.21 was the best selection.

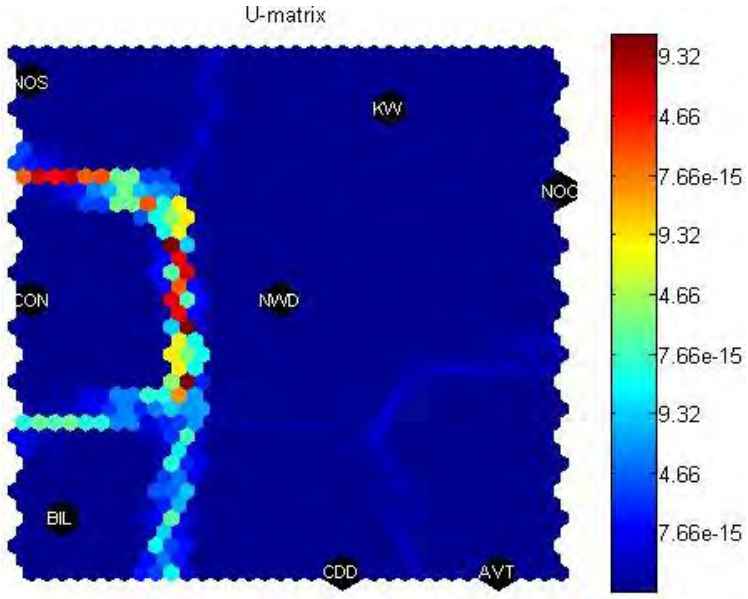



Figure 4.21: Result of U-matrix from the simulation of 360 number of neurons

(iv) 'logistic'

Table 4.18: Result from MATLAB simulation using hexagonal topology and 'logistic' normalization method for block A

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 12,10 | 0 | 0 | 0 |
| 140 | 13,11 | 0 | 0 | 0 |
| 160 | 13,12 | 0 | 0 | 0 |
| 180 | 15,12 | 0 | 0 | 1 |
| 200 | 15,13 | 0 | 0.25 | 1 |
| 220 | 16,14 | 0 | 0.25 | 1 |
| 240 | 17,14 | 0 | 0 | 1 |
| 260 | 17,15 | 0 | 0.375 | 2 |
| 280 | 18,16 | 0 | 0.375 | 2 |
| 300 | 19,16 | 0 | 0.5 | 2 |
| 320 | 19,17 | 0 | 0.625 | 3 |
| 340 | 20,17 | 0 | 0.375 | 3 |
| 360 | 20,18 | 0 | 0.75 | 3 |
| 380 | 21,18 | 0 | 0.75 | 4 |
| 400 | 21,19 | 0 | 0.625 | 5 |

| | | | | |
|---|---|---|---|---|
| 420 | 22,19 | 0 | 0.75 | 5 |

Table 4.17 show the result obtained from the simulation using hexagonal topology and 'logistic' normalization method by using MATLAB software. As shown in the table, 240 and 340 number of neuron has been selected due to it has zero value in quantization and topography error with different time training. However, the result obtained from U-matrix is not satisfied due to its image in the map cannot being analyze as shown in figure 4.22 and 4.23.

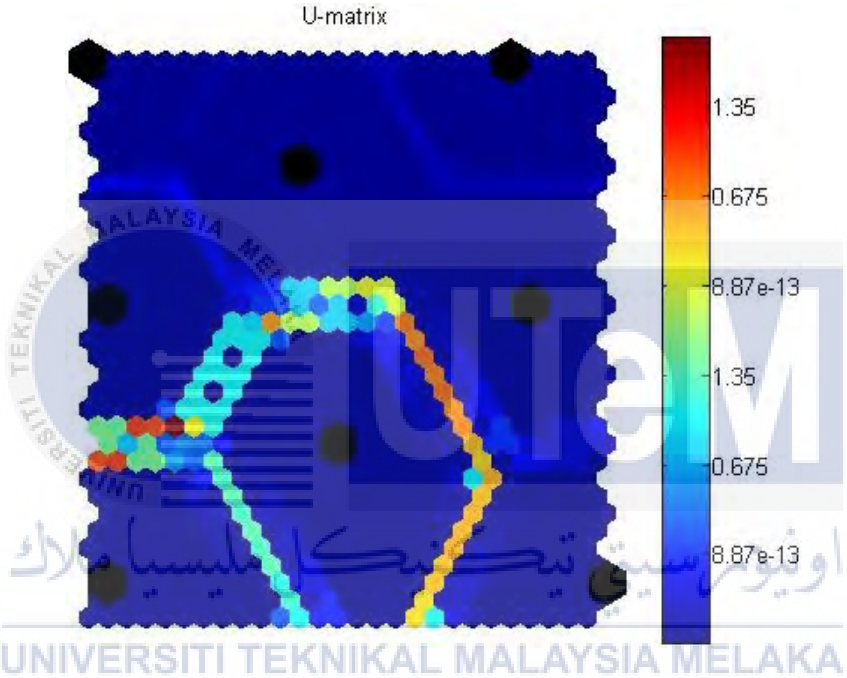





Figure 4.22: Result of U-matrix from the simulation of 240 number of neurons

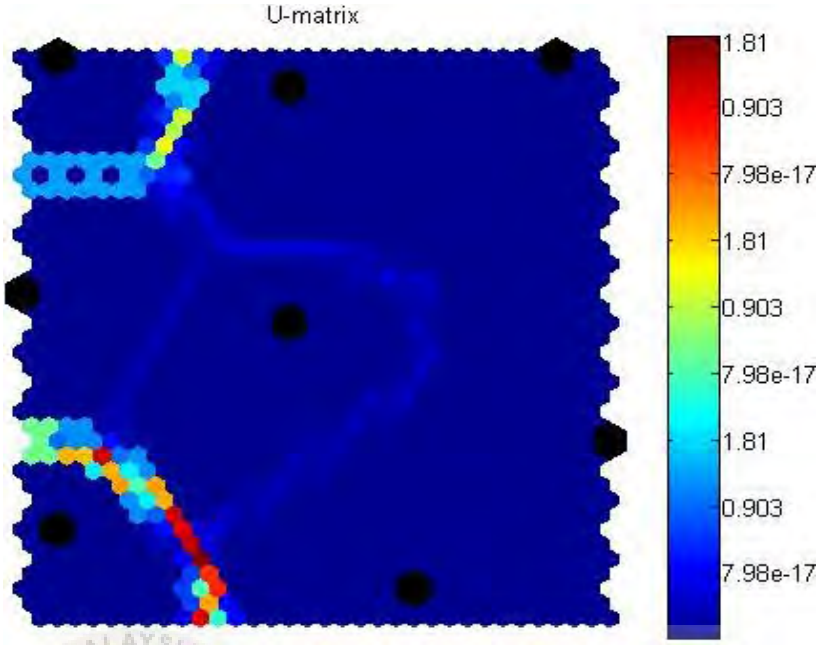



Figure 4.23: Result of U-matrix from the simulation of 340 number of neurons

Thus, all map that being obtain from the U-matrix classification for all number of neuron that being simulated which is from 120 to 420 are being analyze to get the most accurate result. After analyze it, better result or image from the U-matrix that has high resolution in the map and low value of quantization and topography error was obtain from 280 number of neurons as shown in figure 4.24. For 'logistic' normalization method, U-matrix result obtained as shown in figure 4.24 was being selected.

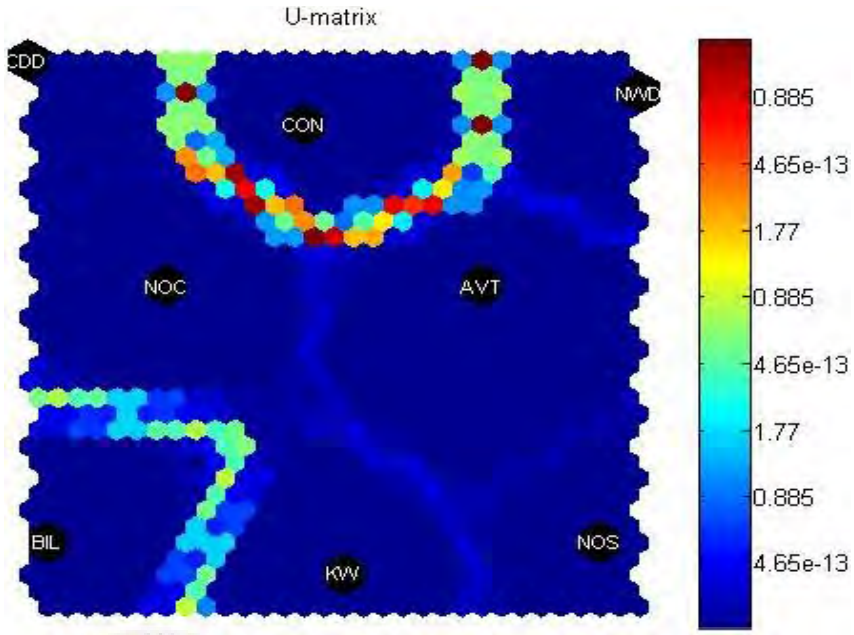



Figure 4.24: Result of U-matrix from the simulation of 280 number of neurons

### 4.4.2 Block B

(i) 'log'

Table 4.19: Result from MATLAB simulation using hexagonal topology and 'log' normalization method for block B

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 20,6 | 0.01 | 0.125 | 0 |
| 140 | 23,6 | 0 | 0.125 | 0 |
| 160 | 23,7 | 0 | 0.125 | 1 |
| 180 | 26,7 | 0 | 0 | 1 |
| 200 | 25,8 | 0 | 0.125 | 1 |
| 220 | 28,8 | 0 | 0.25 | 1 |
| 240 | 30,8 | 0 | 0.25 | 1 |
| 260 | 29,9 | 0 | 0.375 | 2 |
| 280 | 31,9 | 0 | 0.5 | 2 |
| 300 | 33,9 | 0 | 0.625 | 2 |
| 320 | 32,10 | 0 | 0.625 | 3 |
| 340 | 34,10 | 0 | 0.75 | 3 |
| 360 | 36,10 | 0 | 0.625 | 3 |
| 380 | 35,11 | 0 | 0.625 | 4 |
| 400 | 36,11 | 0 | 0.5 | 4 |

| | | | | |
|---|---|---|---|---|
| 420 | 38,11 | 0 | 0.875 | 5 |

Table 4.19 show the result of simulation using hexagonal topology and 'log' normalization method for block B using MATLAB software. From the table, 200 and 280 number of neurons was being selected has best feature with different time training classification. This is because the quantization and topography error for 180 number of neurons is zero while 260 is near to zero value. Result obtained from U-matrix for 180 and 260 number of neurons as shown in figure 4.25 and 4.26.

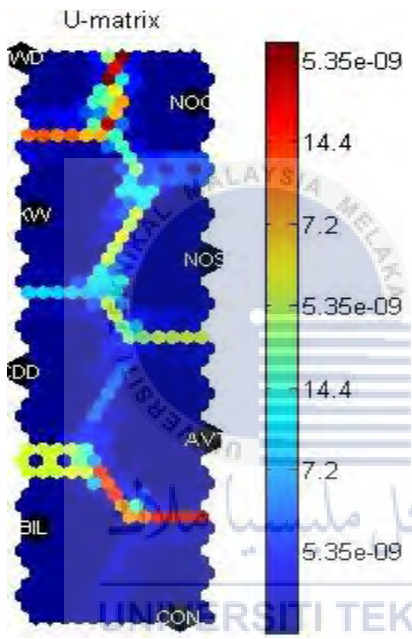



Figure 4.25: Result of U-matrix from the simulation of 180 number of neurons

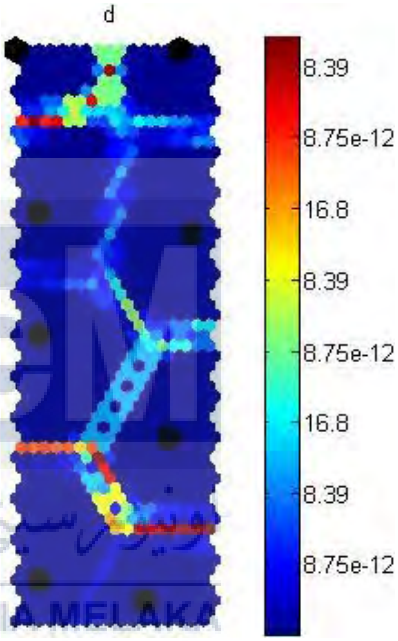



Figure 4.26: Result of U-matrix from the simulation of 260 number of neurons

U-matrix result that being obtained from the simulation also being considered in order to determine the most accurate result. From the analysis of each U-matrix result simulation, it show that figure 4.25 was the most accurate result compared to other due to its linkage between the data is high and the value of quantization and topography value is zero. Thus, for 'log' normalization method in block B, figure 4.25 with 180 number of neurons was selected as the best selection.

(ii) 'var'

Table 4.20: Result from MATLAB simulation using hexagonal topology and 'var' normalization method for block B

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 12,10 | 0 | 0 | 0 |
| 140 | 13,11 | 0 | 0 | 0 |
| 160 | 13,12 | 0 | 0 | 1 |
| 180 | 15,12 | 0 | 0 | 1 |
| 200 | 15,13 | 0 | 0 | 1 |
| 220 | 16,14 | 0 | 0.375 | 1 |
| 240 | 17,14 | 0 | 0 | 1 |
| 260 | 17,15 | 0 | 0.5 | 2 |
| 280 | 18,16 | 0 | 0.25 | 2 |
| 300 | 19,16 | 0 | 0.25 | 3 |
| 320 | 19,17 | 0 | 0.5 | 3 |
| 340 | 20,17 | 0 | 0.875 | 3 |
| 360 | 20,18 | 0 | 0.625 | 3 |
| 380 | 21,18 | 0 | 0.375 | 4 |
| 400 | 21,19 | 0 | 0.75 | 5 |
| 420 | 22,19 | 0 | 0.5 | 6 |

Table 4.20 show the result obtain from the simulation using hexagonal topology and 'var' normalization method for block B by using MATLAB software. As shown in the table, the best features that has been selected was 180 and 260 number of neurons due to small quantization and topography with different training time. Result obtained in U-matrix was represented as a map in figure 4.25 and 4.26.

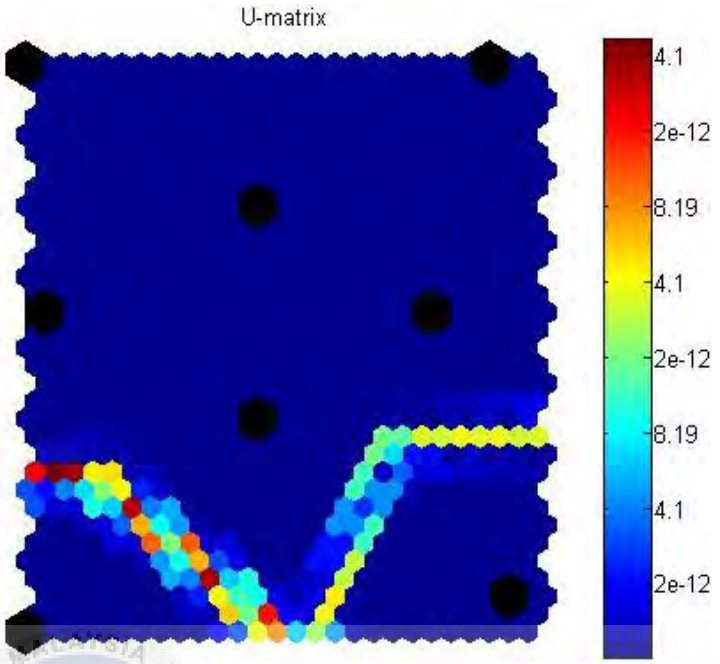



Figure 4.27: Result of U-matrix from the simulation of 240 number of neurons

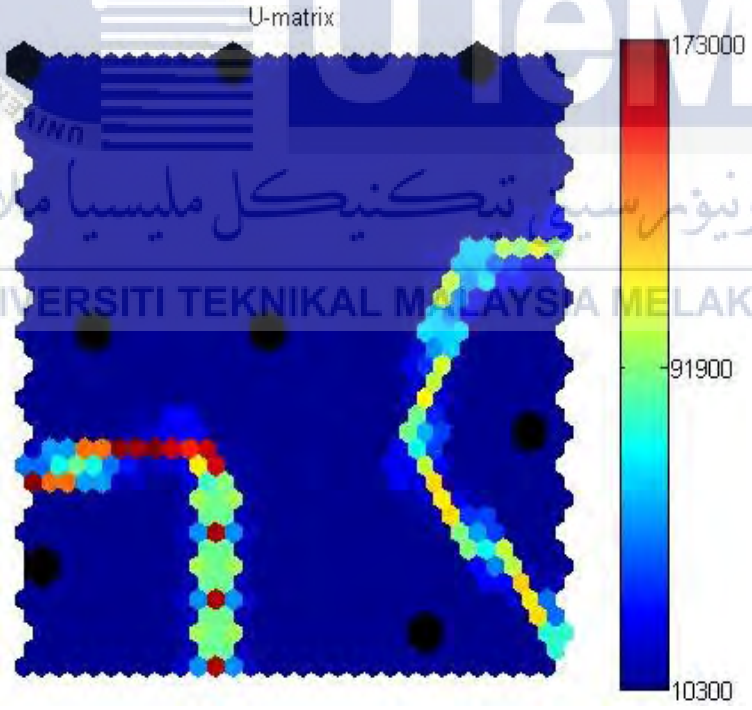



Figure 4.28: Result of U-matrix from the simulation of 300 number of neurons

As shown in figure 4.27 and 4.28, both map cannot been analyze. This showed that the result obtained from the simulation was not satisfied and accurate enough. Thus, each of the number of neuron simulation result of U-matrix classification was being analyze to get the most accurate result. From this phase, 160 number of neuron was selected as shown in figure 4.29.

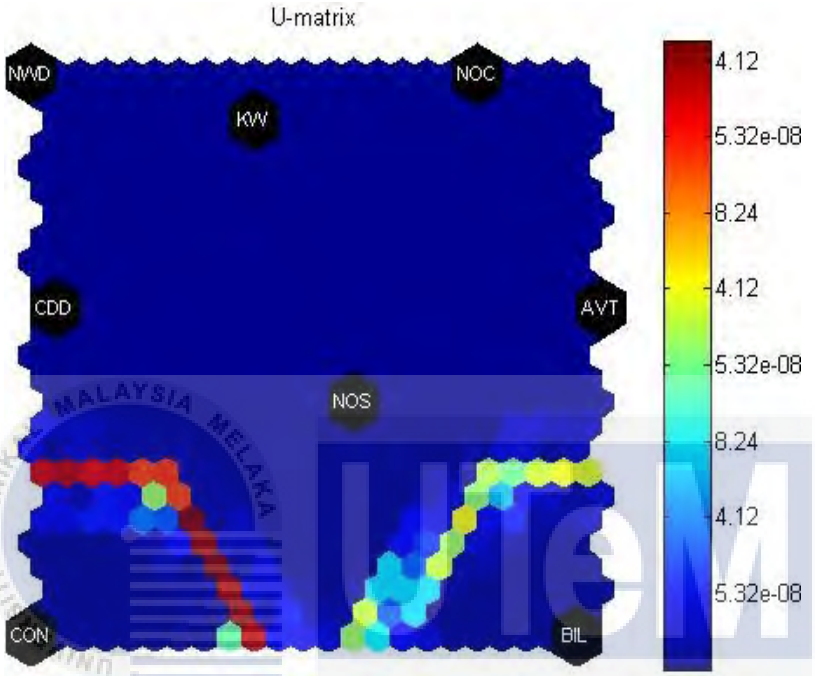



Figure 4.29: Result of U-matrix from the simulation of 160 number of neurons

Figure 4.29 showed that 160 number of neurons has high amount of linkage between the data and has very mall value of quantization and topography error which was zero and one second training time. Thus, this result was being selected as the best selection for 'var' normalization method in block B.

(iii) 'range'

Table 4.21: Result from MATLAB simulation using hexagonal topology and 'range' normalization method for block B

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 12,10 | 0 | 0 | 1 |
| 140 | 13,11 | 0 | 0 | 1 |
| 160 | 13,12 | 0 | 0 | 1 |

| | | | | |
|---|---|---|---|---|
| 180 | 15,12 | 0 | 0 | 1 |
| 200 | 15,13 | 0 | 0 | 1 |
| 220 | 16,14 | 0 | 0 | 2 |
| 240 | 17,14 | 0 | 0.25 | 2 |
| 260 | 17,15 | 0 | 0.125 | 2 |
| 280 | 18,16 | 0 | 0.5 | 3 |
| 300 | 19,16 | 0 | 0.25 | 4 |
| 320 | 19,17 | 0 | 0.5 | 4 |
| 340 | 20,17 | 0 | 0.25 | 4 |
| 360 | 20,18 | 0 | 0.625 | 4 |
| 380 | 21,18 | 0 | 0.25 | 5 |
| 400 | 21,19 | 0 | 0.25 | 5 |
| 420 | 22,19 | 0 | 0.5 | 5 |

Table 4.21 show the result obtain from the simulation using hexagonal topology and 'range' normalization method for block B by using MATLAB software. As shown in the table, the best features that has been selected was 200 and 220 number of neurons has been selected as the best features due to its quantization and topography error was zero with different time training as shown in table 4.21. The simulation result obtained from U-matrix was shown in figure 4.30 and 4.31.



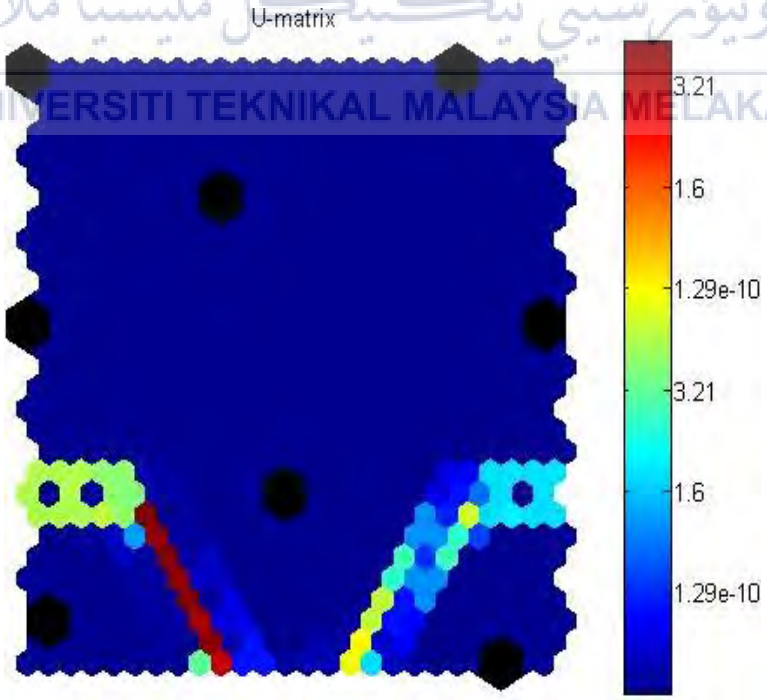


Figure 4.30: Result of U-matrix from the simulation of 200 number of neurons

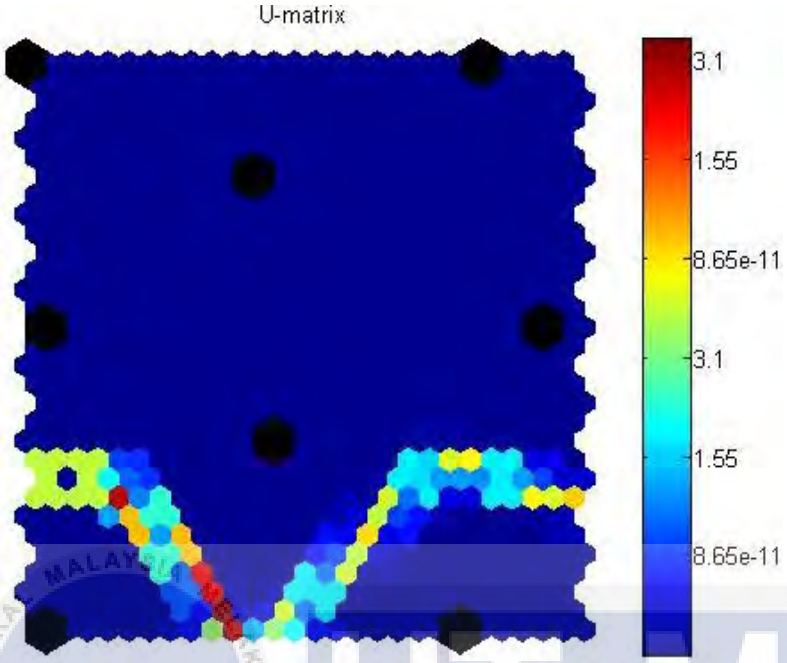



Figure 4.31: Result of U-matrix from the simulation of 220 number of neurons

From the figure 4.30 and 4.31, the map cannot being analyze using visualization technique due to its resolution was low. Thus, each of the number of neuron simulation result of U-matrix was being analyzed in order to obtain most accurate result. The result obtained was 400 number of neurons as shown in figure 4.32 due to its linkage between the data was high and quantization and topography error was near zero.



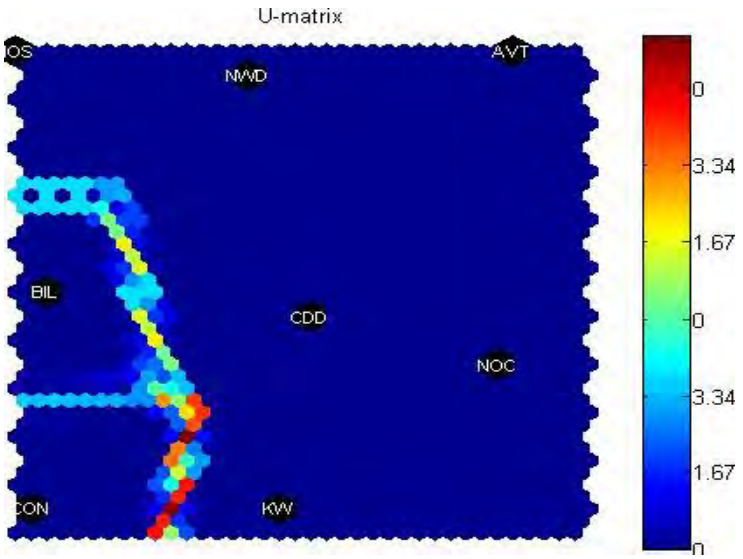


Figure 4.32: Result of U-matrix from the simulation of 400 number of neurons

(iv) 'logistic'

Table 4.22: Result from MATLAB simulation using hexagonal topology and 'logistic' normalization method for block B

| No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|
| 120 | 12,10 | 0 | 0.125 | 0 |
| 140 | 13,11 | 0 | 0.25 | 1 |
| 160 | 13,12 | 0 | 0 | 1 |
| 180 | 15,12 | 0 | 0 | 1 |
| 200 | 15,13 | 0 | 0 | 1 |
| 220 | 16,14 | 0 | 0.125 | 1 |
| 240 | 17,14 | 0 | 0.25 | 1 |
| 260 | 17,15 | 0 | 0.125 | 2 |
| 280 | 18,16 | 0 | 0.375 | 2 |
| 300 | 19,16 | 0 | 0.75 | 2 |
| 320 | 19,17 | 0 | 0.625 | 3 |
| 340 | 20,17 | 0 | 0.5 | 3 |
| 360 | 20,18 | 0 | 0.5 | 3 |
| 380 | 21,18 | 0 | 0.75 | 4 |
| 400 | 21,19 | 0 | 0.625 | 5 |
| 420 | 22,19 | 0 | 0.625 | 5 |



Table 4.22 show the result obtain from the simulation using hexagonal topology and 'logistic' normalization method for block B by using MATLAB software. As shown in the table above, the best feature that has been selected based on low quantization and topography error was 200 and 260 number of neurons. The result of U-matrix from the simulation for both feature also being analyzed in order to determine the result whether it accurate or not as shown in figure 4.33 and 4.34.

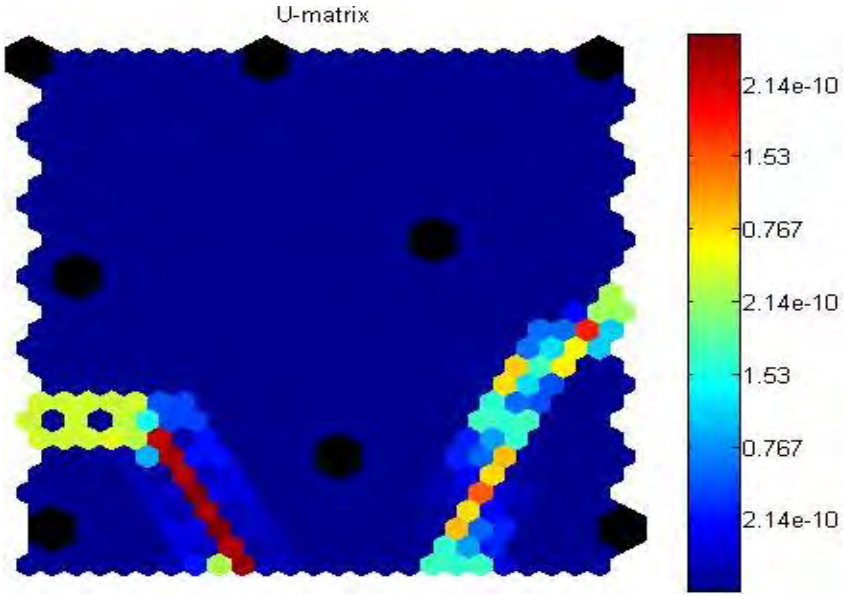



Figure 4.33: Result of U-matrix from the simulation of 200 number of neurons

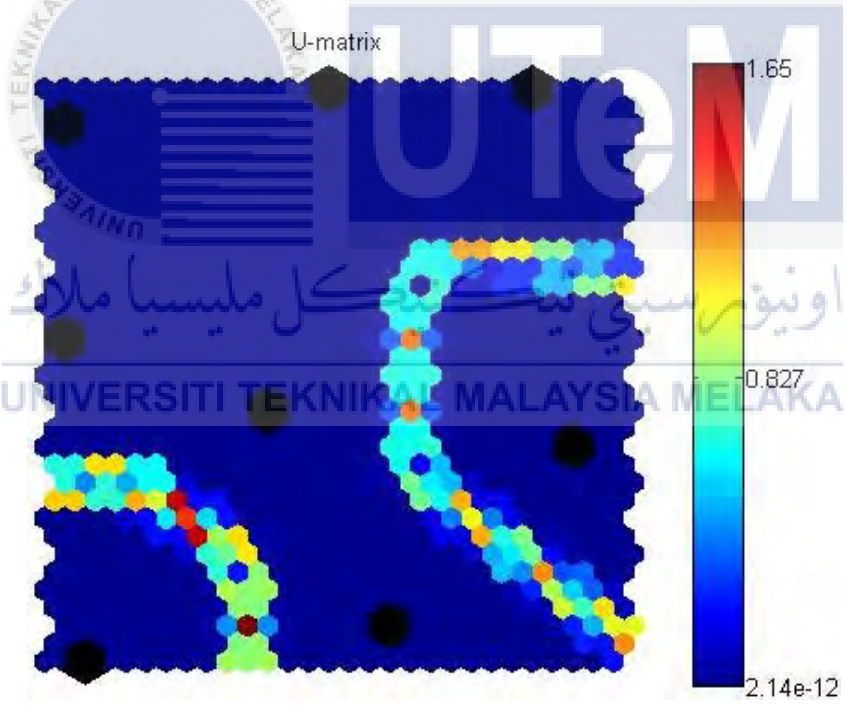



Figure 4.34: Result of U-matrix from the simulation of 260 number of neurons

From the result obtain from figure 4.33 and 4.34, the map cannot being analyze. However, each of the result of U-matrix was analyzed to determine the most accurate result obtain based on the

map obtained. After being analyzed each number of neuron simulation U-matrix result, 280 number of neurons was selected as the most accurate result as shown in figure 4.35. The value of it quantization and topography error was zero and 0.375 respectively. The figure also show that it has high amount of linkage between the data. Thus this result was selected as the best selection of 'logistic' normalization method for block B.

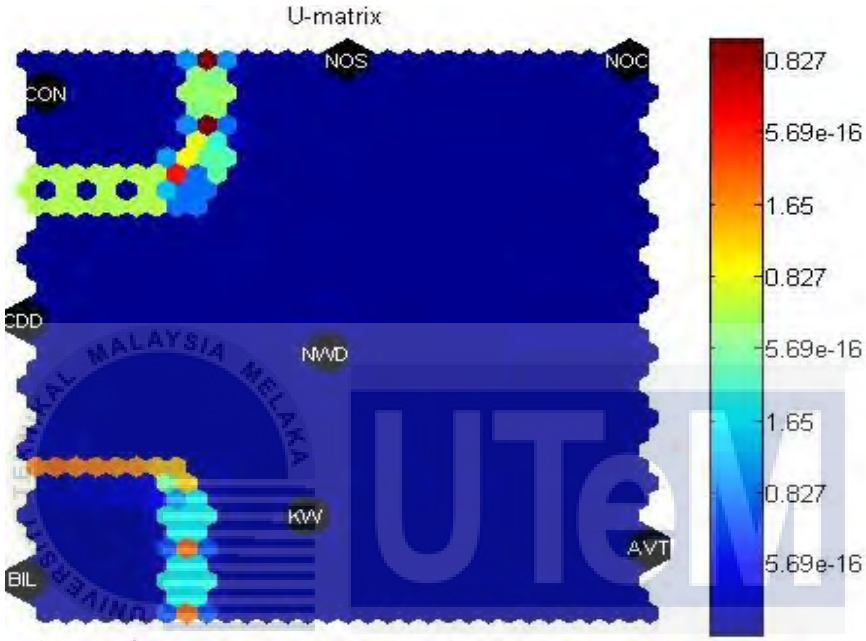



Figure 4.35: Result of U-matrix from the simulation of 280 number of neurons



### 4.4.3 Selecting the best features among the normalization method

#### 4.4.3.1 Block A

Table 4.23: Four normalization method result that has been selected through analysis for block A

| Normalization method | No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|---|
| 'log' | 200 | [25,8] | 0 | 0 | 1 |
| 'var' | 280 | [18,16] | 0 | 0.5 | 2 |
| 'range' | 360 | [20,18] | 0 | 0.375 | 3 |
| 'logistic' | 280 | [18,16] | 0 | 0.375 | 2 |

Table 4.23 showed the best or accurate result obtained from the four normalization method for block A. Based on this table, low quantization and topography error was in 'log' and 'range' and 'logistic' normalization method. However, U-matrix classification result that being obtained which produce good and smooth map in each normalization method also must be considered. From the analysis through this four method, 'range' has high amount of linkage between the data and good and smooth map was produced from the simulation as shown in figure 4.21. From the map, it also show that independent and dependent variables was being clustered. It show that energy consumption (CON) and energy electricity bill (BILL) was the dependent variables. Meanwhile, other data such AVT, CDD, NOS, NOC, KW and NWD was the independent variables as it show in figure 4.21. It show that all the independent variables data has a linkage in each other in the map. It prove that all independent variables correlate each other that can impact energy saving project.

#### 4.4.3.2 Block B

Table 4.24**:** Four normalization method result that has been selected through analysis for block B

| Normalization method | No. of Neurons | Map Size | Quantization error | Topographic Error | Training Time (sec) |
|---|---|---|---|---|---|
| 'log' | 180 | [26,7] | 0 | 0 | 1 |
| 'var' | 160 | [13,12] | 0 | 0 | 1 |
| 'range' | 400 | [21,19] | 0 | 0.25 | 5 |
| 'logistic' | 280 | [18,16] | 0 | 0.375 | 2 |

Table 4.24 show four normalization method result that has been selected through analysis for block B. From this table, the best selection that will be selected was 'log' and 'var' normalization method simulation result as both quantization and topography error was zero. However, this result are not satisfied enough because it also need to analyze the U-matrix classification result that has been obtain through the simulation which produce a map to prove that the result is accurate in order to achieve the best result. Based on the analysis of each normalization method U-matrix result, it show that 'range' normalization method has the most accurate result. This is

due to high resolution, good and smooth map was produced and high amount of linkage between the data as shown in figure 4.32. Based on this analysis, from the map produced in 'range' normalization method, it cluster between the independent and dependent variables. The U-matrix classification through the map produced that BILL and CON was the dependent variables and NOC, NOS, NWD, KW, CDD and AVT was the independent variables. Figure 4.32 also showed that, relationship between the independent variables data is strong which was it prove that all the independent variables data that being used in this analysis can impact energy saving project.

## 4.6 Reporting Uncertainty

### 4.6.1 Reporting Period and Energy Savings for block A

Table 4.25 show the estimated saving for block A in period of one year. The period for reporting period was from May 2014 until April 2015. This data that being used for the reporting period was the independent and dependent variables data. All this data has been used in order to produce the adjusted baseline data. From adjusted baseline data, the total estimated energy saving can be achieved was obtained in the table. As shown before, the multiple regression analysis has been modelled which produced the value of constant for each independent variables data from the equation. The equation that being obtain from the multiple regression analysis for block A was as $y = 2.8702x_1 + 860.1401x_2 + 215.2782\ x_3 - 1045.22x_4 - 7639.27$, which was $x_1$ was the CDD, $x_2$ was number of working days, $x_3$ was the number of student, $x_4$ was the number of class and 7639.27 was the value of intercept. This value of the equation will be used as the factor for the adjusted baseline data which was in period from May 2015 until April 2016. Table 4.25 show the total energy avoided for one year was 100992.9 kWh.

Table 4.25: Total energy saving calculation for block A

| Post retrofit data | | | | | Adjusted Baseline Data | | | | | | | Savings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | CDD | No. of Working days | No. of Students | No. of Class | Energy Consumption( kWh) Block A | Factors | | | | | Adjusted Consumption (kWh) | Energy Avoided (kWh) |
| | | | | | | sensitivity1 | sensitivity2 | sensitivity3 | sensitivity4 | constant | | |
| | | | | | | **2.8702$x_1$** | **860.14$x_2$** | **215.278$x_3$** | **-1045.22$x_4$** | **-7639.27** | | |
| Mei-15 | 369.7 | 20 | 802 | 164 | 13026 | 1061.1 | 17202.8 | 172653.1 | -171416 | -7639.27 | 11861.67 | -1164.33 |
| Jun-15 | 351.9 | 21 | 802 | 164 | 13070 | 1010.011 | 18062.94 | 172653.1 | -171416 | -7639.27 | 12670.72 | -399.28 |
| Jul-15 | 352.9 | 22 | 0 | 0 | 11307 | 1012.882 | 18923.08 | 0 | 0 | -7639.27 | 12296.69 | 989.6938 |
| Ogos-15 | 347.4 | 20 | 0 | 0 | 11461 | 997.0957 | 17202.8 | 0 | 0 | -7639.27 | 10560.63 | -900.372 |
| Sept-15 | 327.3 | 19 | 1151 | 224 | 11810 | 939.4053 | 16342.66 | 247785.2 | -234129 | -7639.27 | 23298.73 | 11488.73 |
| Okt-15 | 351.2 | 21 | 1151 | 224 | 12825 | 1008.002 | 18062.94 | 247785.2 | -234129 | -7639.27 | 25087.6 | 12262.6 |
| Nov-15 | 329 | 20 | 1151 | 224 | 11810 | 944.2846 | 17202.8 | 247785.2 | -234129 | -7639.27 | 24163.74 | 12353.74 |
| Dis-15 | 337.6 | 20 | 1151 | 224 | 11357 | 968.968 | 17202.8 | 247785.2 | -234129 | -7639.27 | 24188.43 | 12831.43 |
| Jan-16 | 363.2 | 20 | 1151 | 224 | 10828 | 1042.444 | 17202.8 | 247785.2 | -234129 | -7639.27 | 24261.9 | 13433.9 |
| Feb-16 | 307.1 | 19 | 1151 | 224 | 10777 | 881.428 | 16342.66 | 247785.2 | -234129 | -7639.27 | 23240.75 | 12463.75 |
| Mac-16 | 402.6 | 23 | 1151 | 224 | 11774 | 1155.529 | 19783.22 | 247785.2 | -234129 | -7639.27 | 26955.41 | 15181.41 |
| Apr-16 | 398.6 | 21 | 1151 | 224 | 12772 | 1144.048 | 18062.94 | 247785.2 | -234129 | -7639.27 | 25223.65 | 12451.65 |
| | | | | | 142817 | | | | | | 243809.9 | 100992.9 |

**T**able 4.25 show that the total of estimated energy savings that can be achieved in block A in one year was 100992.9 kWh. All the value in the table was used in statistic mathematical equation in order to find the standard error.

#### 4.6.1.1 Statistic of Mathematical Equation for block A

**(**i) Standard Error (monthly) for the Multi-Regression Analysis

$SE_{mr}$ (monthly) = $\sqrt{\frac{\sum(Yi'-Yi)^2}{n-p-1}}$

The value of standard error (montly) for block A can be obtain from table 4.12. The value obtained was 1201.449 kWh.

(ii) Standard Error (annually) for the Multi-Regression Analysis

$SE_{mr}$ (annually) = $\sqrt{12} \times SE_{mr}$ (monthly)

= $\sqrt{12} \times$ 1201.449 kWh

= 4161.94 kWh



(iii) Absolute Precision

Absolute precision = t × $SE_{mr}$ (annually)

The value of t was obtained from the t-statistic for 7 DF (12-4-1(multi-regression model)), at 95% confidence level was 2.36.

Absolute precision = 2.36 × 4161.94 = 9822.1784 kWh

(iv) Relative Precision

Relative precision = absolute precision / total energy avoided

= (9822.1784kWh / 100992.9 kWh) × 100

= 9.73%

(v) Reporting Result

The estimated annual savings for block A are **100992.9 kWh ± 9.73%** at confidence level 95%.

### 4.6.2 Reporting Period and Energy Savings for block B

Table 4.26 show the estimated saving for block B in period of one year. The period for reporting period was from May 2014 until April 2015. This data that being used for the reporting period was the independent and dependent variables data. All this data has been used in order to produce the adjusted baseline data. From adjusted baseline data, the total estimated energy saving can be achieved was obtained in the table. As shown before, the multiple regression analysis has been modelled which produced the value of constant for each independent variables data from the equation. The equation that being obtain from the multiple regression analysis for block A was as $y = -277.0479x_1 + 6449.5283x_2 + 919.48087x_3 – 4139.229x_4 + 9845.7618$, which was $x_1$ was the CDD, $x_2$ was number of working days, $x_3$ was the number of student, $x_4$ was the number of class and 9845.7618 was the value of intercept. This value of the equation will be used as the factor for the adjusted baseline data which was in period from May 2015 until April 2016. Table 4.26 show the total energy avoided for one year was 1282488 kWh.

Table 4.26: Total energy avoided for block B

| Post Retrofit Data | | | | Adjusted Baseline Data | | | | | | | | Savings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | CDD | No. of Working days | no of students | No. of Class | Energy Consumption (kwh) Block B | Factors | | | | | adjusted consumption | Energy Avoided |
| | | | | | | sensitivity1 | sensitivity2 | sensitivity3 | sensitivity4 | constant | | |
| | | | | | | -277.049$x_1$ | 6449.528$x_2$ | 919.481$x_3$ | -4193.229$x_4$ | 9845.7618 | | |
| Mei-15 | 369.7 | 20 | 802 | 176 | 57696 | -102425 | 128990.6 | 737423.7 | -738008 | 9845.7618 | 35827.073 | -21868.9 |
| Jun-15 | 351.9 | 21 | 802 | 176 | 51742 | -97493.2 | 135440.1 | 737423.7 | -738008 | 9845.7618 | 47208.054 | -4533.95 |
| Jul-15 | 352.9 | 22 | 0 | 0 | 45832 | -97770.2 | 141889.6 | 0 | 0 | 9845.7618 | 53965.18 | 8133.18 |
| Ogos-15 | 347.4 | 20 | 0 | 0 | 49584 | -96246.4 | 128990.6 | 0 | 0 | 9845.7618 | 42589.887 | -6994.11 |
| Sept-15 | 327.3 | 19 | 1151 | 212 | 47447 | -90677.8 | 122541 | 1058322 | -888965 | 9845.7618 | 211066.96 | 163620 |
| Okt-15 | 351.2 | 21 | 1151 | 212 | 53313 | -97299.2 | 135440.1 | 1058322 | -888965 | 9845.7618 | 217344.57 | 164031.6 |
| Nov-15 | 329 | 20 | 1151 | 212 | 47767 | -91148.8 | 128990.6 | 1058322 | -888965 | 9845.7618 | 217045.5 | 169278.5 |
| Dis-15 | 337.6 | 20 | 1151 | 212 | 45396 | -93531.4 | 128990.6 | 1058322 | -888965 | 9845.7618 | 214662.89 | 169266.9 |
| Jan-16 | 363.2 | 20 | 1151 | 212 | 54290 | -100624 | 128990.6 | 1058322 | -888965 | 9845.7618 | 207570.46 | 153280.5 |
| Feb-16 | 307.1 | 19 | 1151 | 212 | 38339 | -85081.4 | 122541 | 1058322 | -888965 | 9845.7618 | 216663.32 | 178324.3 |
| Mac-16 | 402.6 | 23 | 1151 | 212 | 56494 | -111539 | 148339.2 | 1058322 | -888965 | 9845.7618 | 216003.36 | 159509.4 |
| Apr-16 | 398.6 | 21 | 1151 | 212 | 53772 | -110431 | 135440.1 | 1058322 | -888965 | 9845.7618 | 204212.5 | 150440.5 |
| | | | | | 601672 | | | | | | 1884159.8 | 1282488 |

#### 4.6.2.1 Statistic of Mathematical Equation for block B

(i) Standard Error (monthly) for the Multi-Regression Analysis

$SE_{mr}$ (monthly) = $\sqrt{\frac{\sum(Yi'-Yi)^2}{n-p-1}}$

The value of standard error (montly) for block B can be obtain from table 4.14. The value obtained was 4535.9221 kWh.

**(ii) Standard Error (annually) for the Multi-Regression Analysis**

$SE_{mr}$ (annually) = $\sqrt{12}$ × $SE_{mr}$ (monthly)

= $\sqrt{12}$ × 4535.9221 kWh

= 15712.8951 kWh



(iii) Absolute Precision

Absolute precision = t × $SE_{mr}$ (annually)

The value of t was obtained from the t-statistic for 7 DF (12-4-1(multi-regression model)), at 95% confidence level was 2.36.

Absolute precision = 2.36 × 15712.8951 = 37082.4324 kWh

(iv) Relative Precision

Relative precision = absolute precision / total energy avoided

= (37082.4324 kWh / 1282488 kWh) × 100

= 2.89%

(v) Reporting Result

The estimated annual savings for block B are **1282488 kWh ± 2.89%** at confidence level 95%.

# Chapter 5

## Conclusion and Recommendation

### 5.0 Conclusion

As a conclusion, the best regression modeling has been applied for the correlation identifying. In order to show a good relationship in the correlation identifying, the value of $R^2$ that must be obtain supposed to be above 0.75. Multiple linear regression method analysis was used in this project which was multiple of independent variable data against dependent variable data. The independent data that being used for this analysis was CDD, number of working days, number of student and number of class and the dependent data was the energy bill consumption of the building. The period that being used for all the data was in the period of one year which from May 2014 until April 2015. However, the result obtained from the multiple regression analysis for all those data does not achieve above than 0.75. Thus, SOM was used in order to identify the variable that can impact the energy saving project. Through the analysis, four type of normalization method has been applied in order for SOM to train the data. Four type of normalization method that being used was 'log', 'var', 'range' and 'logistic'. All the data, CDD, NWD, NOS, NOC, AVT, CON and BILL was used in the MATLAB software in order to run the simulation. The optimum number of neurons that being considered was from 120 until 420. From the simulation result obtain, the most smallest or equal to zero the value of quantization and topography error was selected as the best feature. However, the map obtained from U-matrix figure for all number of neurons also must be considered in order to obtain the most accurate result. All the result obtained from those four normalization analysis will be compared to each other in order to select the best features. From the result obtained, 'range' has been choose as the best features due to it high resolution image of the map and high amount of linkage between the data from the U-matrix through visualization technique. Other than that, the value of quantization and topography error also near to zero. From the map, it show that CDD, NWD, NOS, AVT and NOC can impact the energy saving project. The energy avoided has been

quantify based on IPMVP for commercial building. The estimated annual saving for block A and block B was obtained through the calculation.

The recommendation for this project, increase the period of data in regression analysis in order to obtain higher value to show a good correlation between the variables. Other than that, in order to obtain good and smooth map from U-matrix classification in SOM is by increasing the number of the data.

**References**


[1] Suruhanjaya Tenaga, "Statistics - Malaysia Energy Information Hub." 2013, available at ; http://meih.st.gov.my/statistics [accessed on 20 September 2015]

[2] E. Green and M. Forum, "Greentech Malaysia," no. October. 2013. available at ; http://www.greentechmalaysia.my/ [accessed on 20 September]

[3] KETTHA, *National Green Technology Policy,* Ministry of Energy, Green Technology and Water, 2009

[4] Government of Malaysia, "Tenth Malaysia Plan," *Percetakan Nas. Malaysia Berhad, Headquaters, Kuala Lumpur.*, pp. 253–327, 2010.

[5] Government of Malaysia, "Menuju ke arah pertumbuhan hijau bagi meningkatkan kemampanan dan daya tahan," *Percetakan Nas. Malaysia Berhad, Headquaters, Kuala Lumpur*, pp.18-23, 2015.

[6] "Energy Service Companies _ Department of Energy." available at : http://energy.gov/eere/femp/energy-service-companies-0,2012 [accesse on 30 September]

[7] Join Research Centre, "Energy Performance Contracting Energy Efficiency", Institute of Energy and Transport available at: http://iet.jrc.ec.europa.eu/energyefficiency/european-energy-service-companies/energy-performance-contracting ,2014[accessed on 5 Novemeber 2015]

[8] Trading Economics,"Malaysia Population 1960-2015 _ Data,Chart, Calendar, Forecast, News." 2015, available at: http://www.tradingeconomics.com/malaysia/population[accessed on 8 November 2015]

[9] B. Stewart, “What is Energy?,” *Nature*, vol. 2, no. 40, pp. 270–271, 1870.

[10] C. D. Times, “Chapter 2 Qualitative Definition of Energy”, pp. 2- 7, 2006

[11] O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Eickemeier, P. Matschoss, G. Hansen, S. Kadner, S. Schlömer, T. Zwickel, and C. Von Stechow, *IPCC, 2011: Summary for Policymakers. In: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*. 2011.

[12] E. Charge, “Electrical Energy,” no. abbreviated C, pp. 1–6.

[13] The Department for Children, Schools and Families,“Energy and Power in Electric Circuits.” pp. 16-18, 2008

[14] K. Refer, T. O. The, L. Page, O. F. This, P. For, and I. Disclosures, “Tenaga Nasional Berhad,” no. June. pp. 1–6, 2011.

[15] Bureau of Energy Efficiency, “Energy Management and Audit,” *Gen. Asp. Energy Manag. Energy Audit*, pp. 57–81, 1997.

[16] E. Sugawara and H. Nikaido, “Properties of AdeABC and AdeIJK efflux systems of Acinetobacter baumannii compared with those of the AcrAB-TolC system of Escherichia coli.,” *Antimicrob. Agents Chemother.*, vol. 58, no. 12, pp. 7250–7, Dec. 2014.



[17] Energy Management Association of New Zealand, “Energy Management & Audit.”, pp. 3-7, 2014

[18] V. Oikonomou, F. Becchis, L. Steg, and D. Russolillo, “Energy saving and energy efficiency concepts for policy making,” *Energy Policy*, vol. 37, no. 11, pp. 4787–4796, 2009.

[19] R. Tilwani, “Energy savings potentials in buildings through energy audit A case study in an Indian building,” pp. 289–293, 2015.

[20] Schneider Electric, “Leading Techniques for Energy Savings in Commercial Office

Buildings," *Wp-Officesenergy-Us*, 2006.

[21] K. P. Hallinan, Y. Tesfay, J. Monn, E. Krehnovi, and P. Brodrick, "An Improved Method for Predicting Energy in Variable Occupancy Academic Buildings," *2nd World Sustain. Forum*, 2012.

[22] V. Cherkassky, S. R. Chowdhury, V. Landenberger, S. Tewari, and P. Bursch, "Prediction of electric power consumption for commercial buildings," *2011 Int. Jt. Conf. Neural Networks*, pp. 666–672, 2011.

[23] R. S. Kaplan, "*Measurement and Verification"*, vol. 11, no. 3, pp.21-35,2001.

[24] E. P. C. Toolkit and F. O. R. Higher, "Measurement and verification and the IPMVP", pp.56-58, 2009.

[25] EVO, "International Performance Measurement & Verification Protocol International Performance Measurement & Verification Protocol," *Effic. Valuat. Organ.*, vol. I, no. March, 2007.

[26] ICF International and NAESCO, "EPA Introduction to Energy Performance Contracting", pp.18-24, 2007.

[27] M. David, N Y Dahlan, "Development of Visual Basic Based GUI for Option A Energy Savings of IPMVP," p. 7, 2001.

[28] K. Baumert and M. Selman, "Heating and Cooling Degree Days," *WRI World Resour. Inst.*, no. January, pp. 1–12, 2003.

[29] O. K. Mohit and V. Oree, "Assessing the energy savings potential in public buildings through retrofit measures in tropical climates - A case study in Mauritius," *IEEE AFRICON Conf.*, vol. 2011, no. August 2010, 2013.

[30] F. Wang and A. Chen, "Energy Management Handbook," *Book*, no. April, p. 50, 2012.

[31] H. Singh, M. Seera, and M. A. Mohamad Idin, "Electrical energy audit in a Malaysian university - A case study," *PECon 2012 - 2012 IEEE Int. Conf. Power Energy*, no.

December, pp. 616–619, 2012.

[32] M. U. Khalid, M. Gul, M. M. Aman, and A. Hashmi, “Energy conservation through lighting audit,” *PECon 2012 - 2012 IEEE Int. Conf. Power Energy*, no. December, pp. 840–845, 2012.

[33] C.A. Cosmas, N Y Dahlan, "Development of Visual GUI for Option C Energy Saving of IPMVP ", p.p-2-3,2002

[34] L. Du, D.He, Y. Yang, J.A. Restrepo, B. Lu, R.G. Harley, T.G. Habetler, “ Self-Organizing Classification and Identification of Miscellaneous Electric Loads”, p-p 1-4

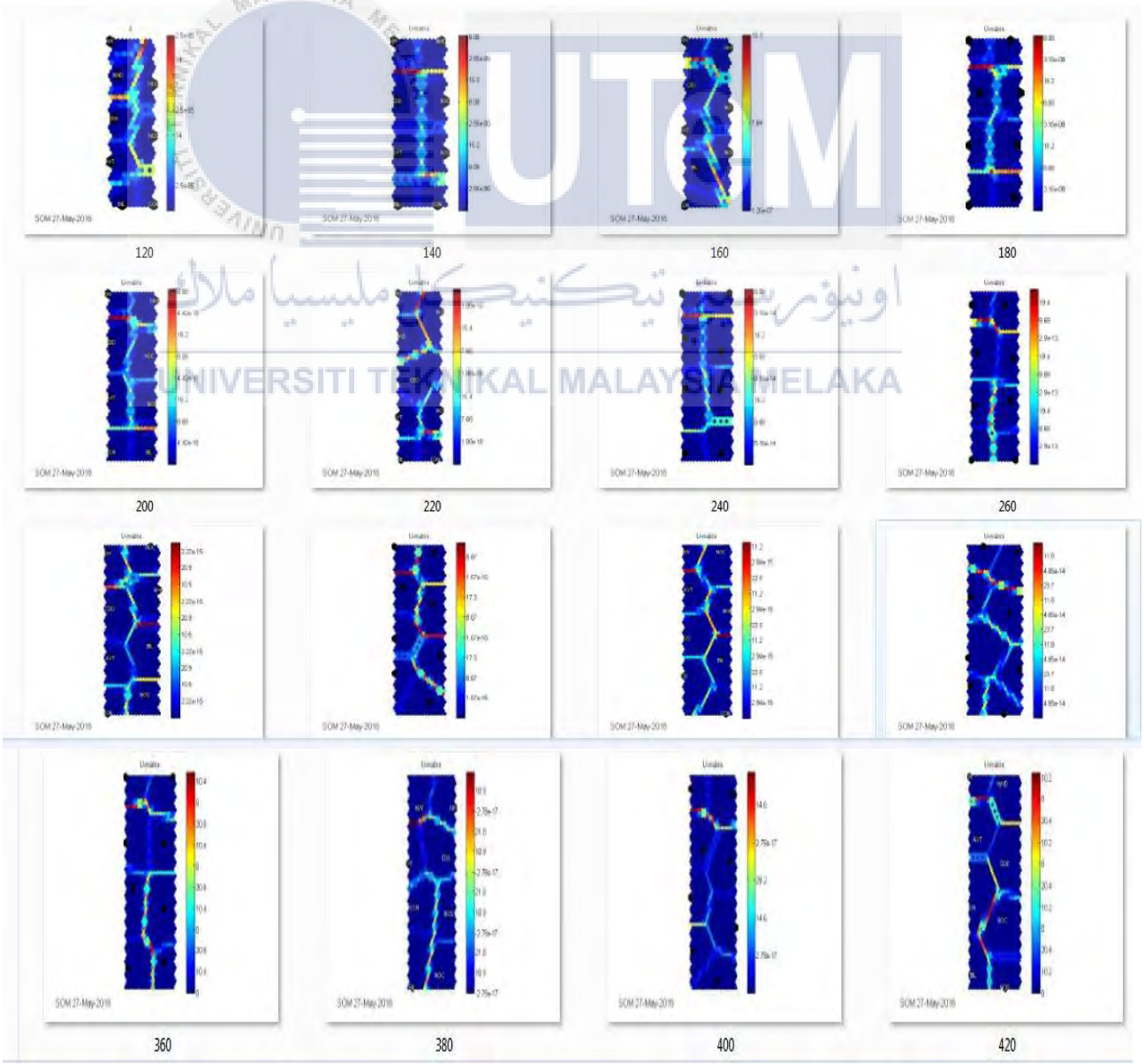
[35] M. Dominguez, J.J. Fuertes, I.Diaz, A.A. Cuadrado, S. Alonso, A. Moran, “ Analysis of Electric Power Consumption using Self-Organizing Maps”, *18th IFAC World Congress Milano(Italy)*,August – September 2012, pp. 2-5, 2011

[36] Z. H. Bohari, S. AB Ghani, M.F. Baharom, M. N. M. Nasir, M. H. Jali, Y. H. Md Thayoob, “Feature Analysis of Numerical Calculated Data from Sweep Frequency Analysis (SFRA) Traces Using Self Organizing Maps”, Journal Teknologi, UTM press, 2014

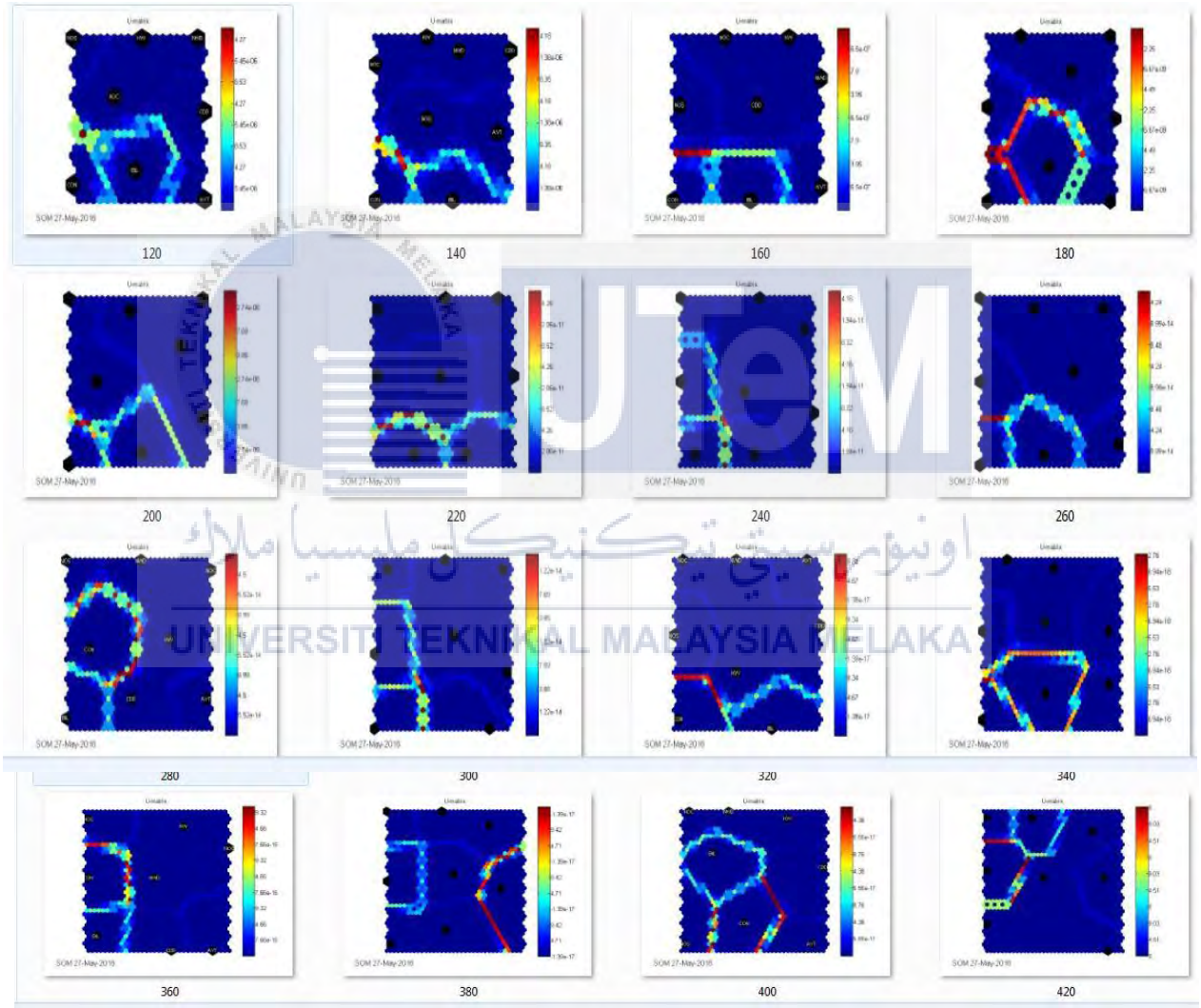
# APPENDIX A

SOM simulation result block A

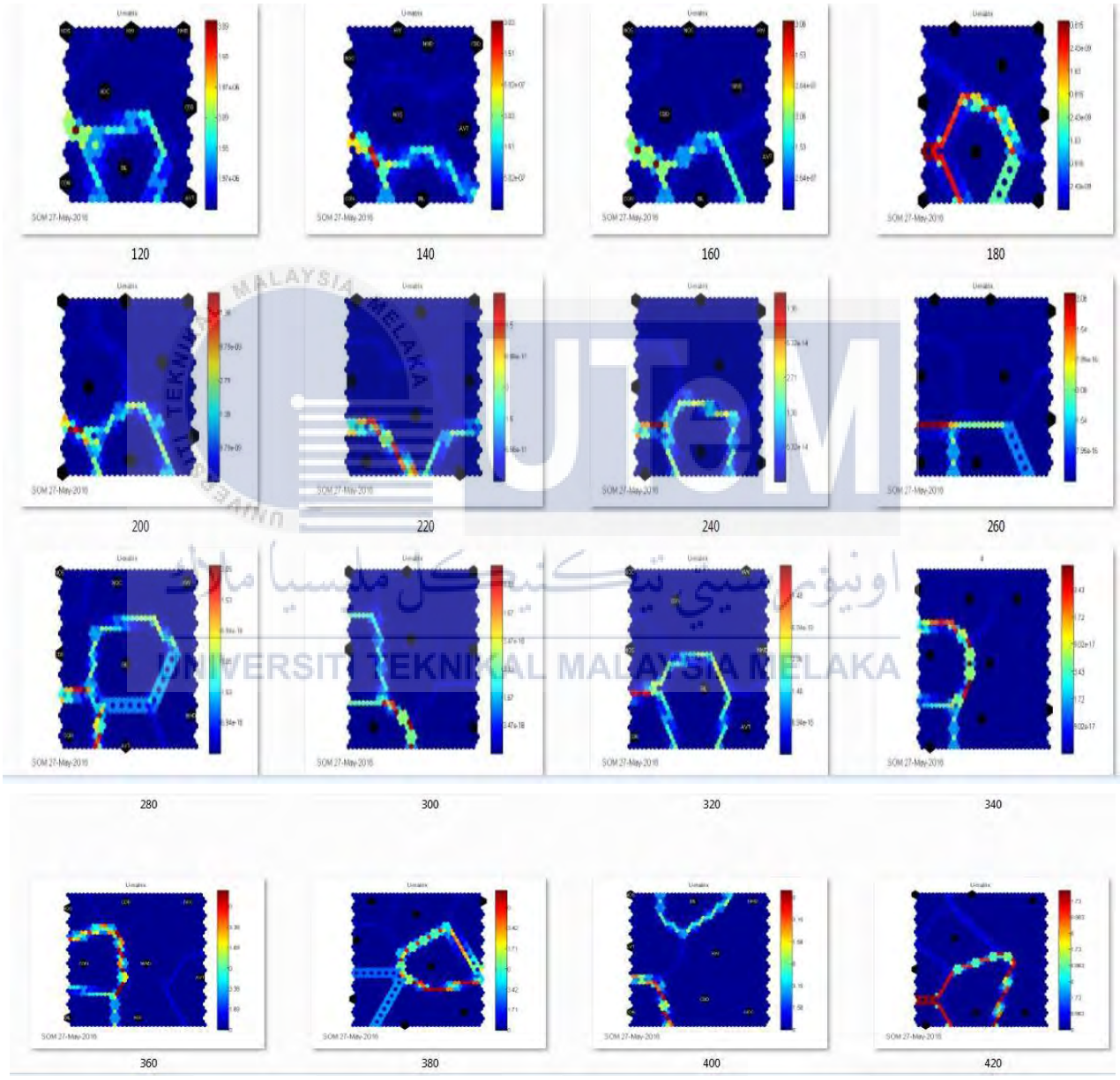
(i) ‘log’



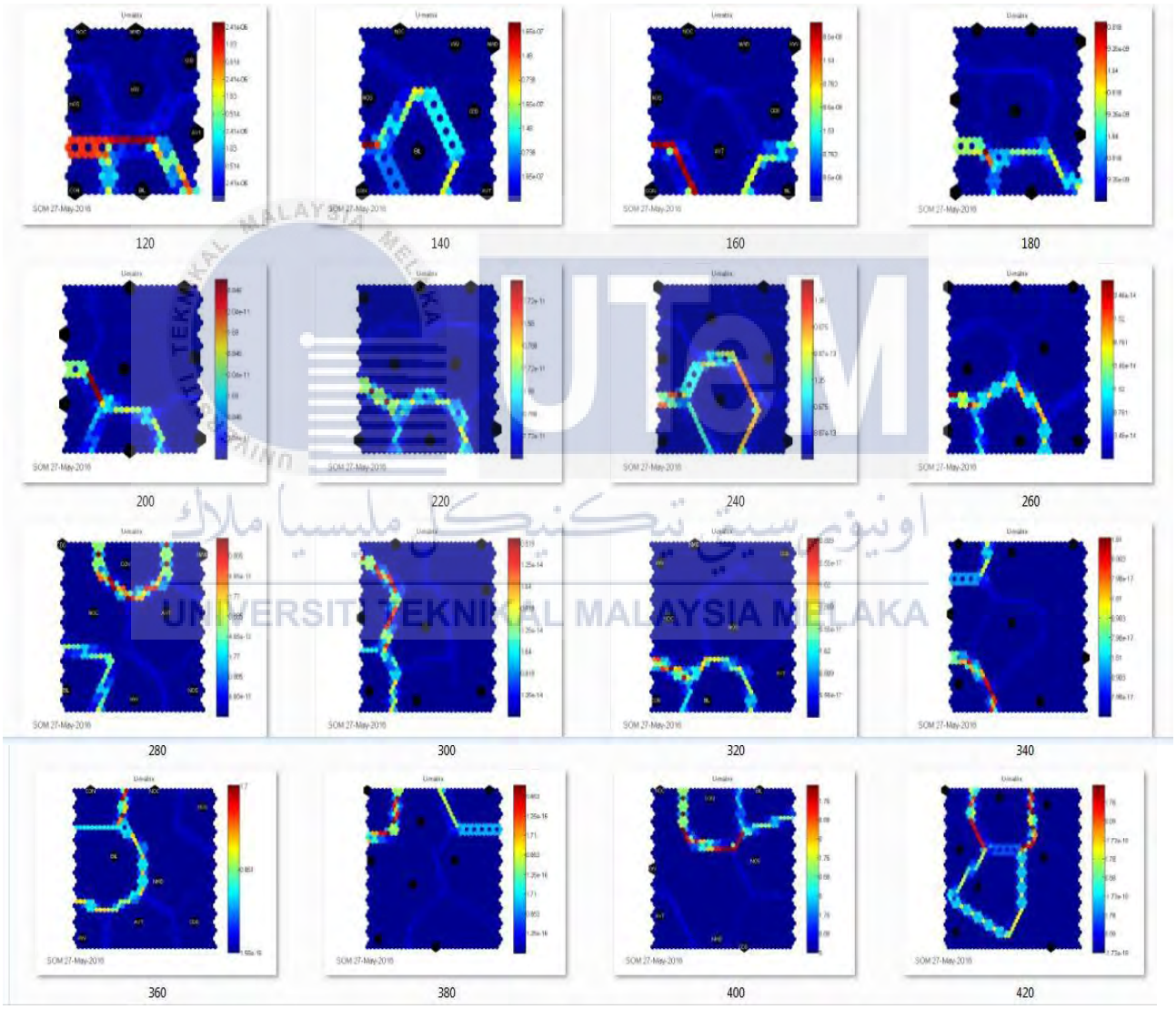
(ii) ‘var’



(iii) ‘range’



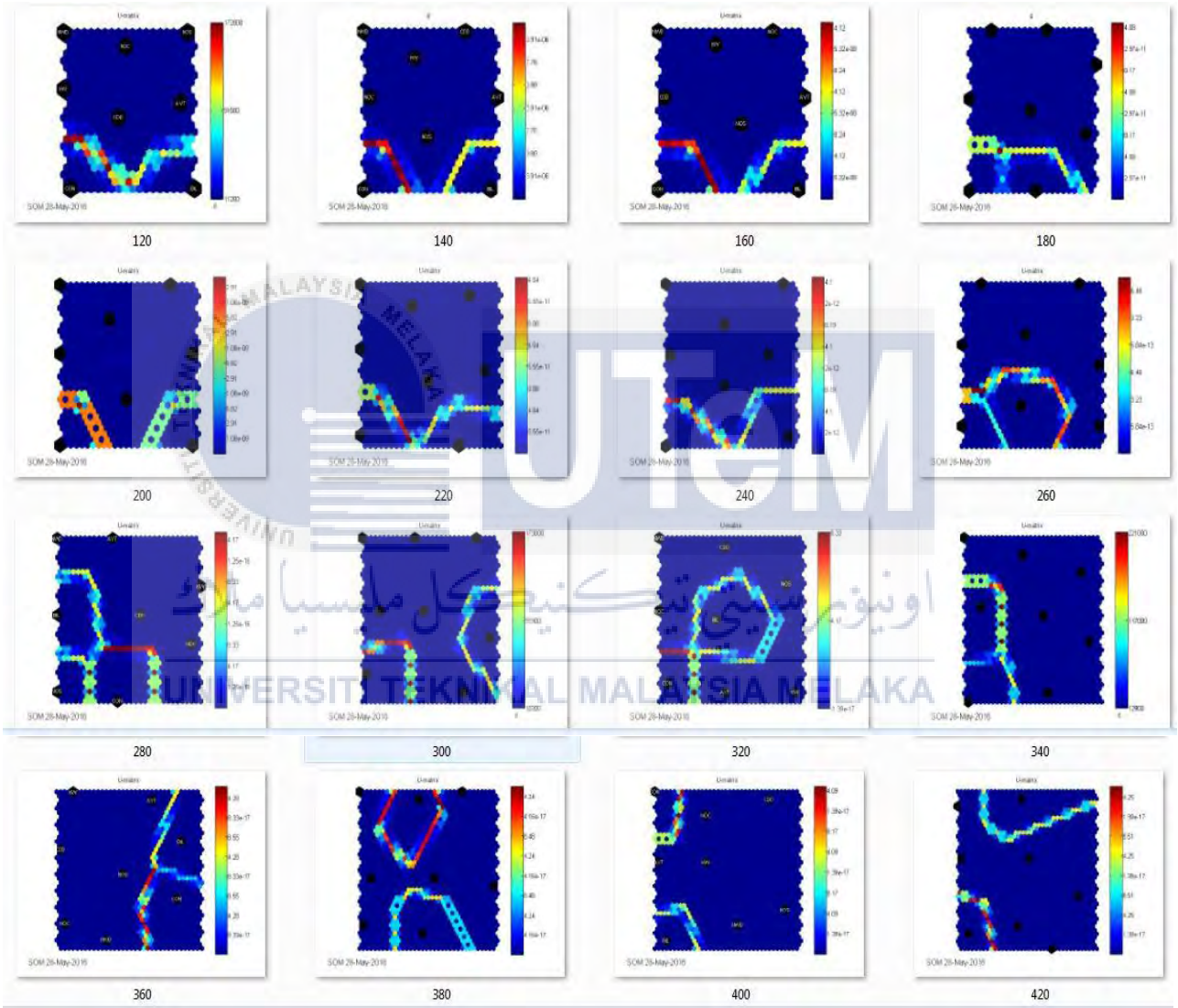
(iv) ‘logistic’



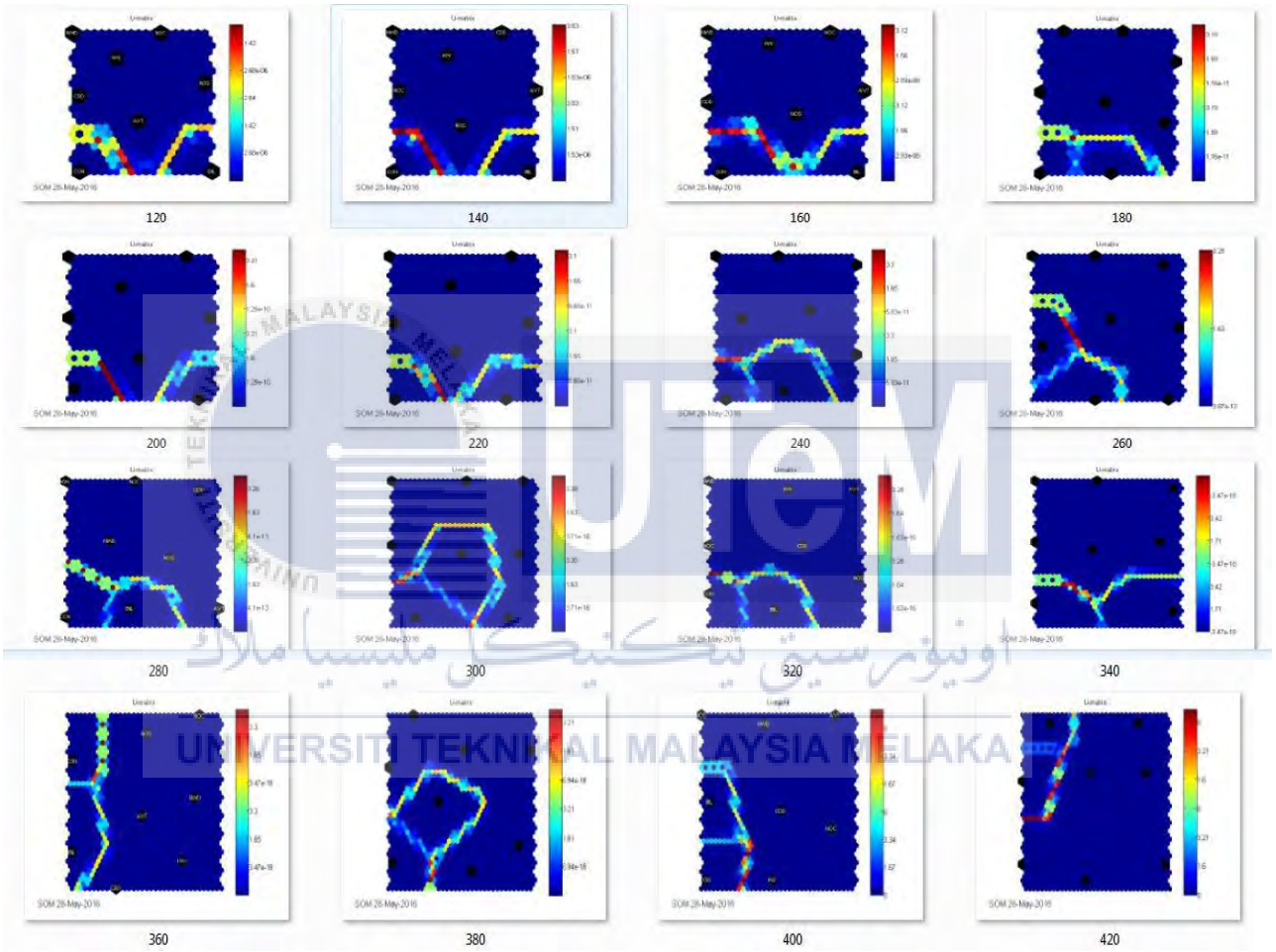
SOM simulation result block B

(i) ‘log’

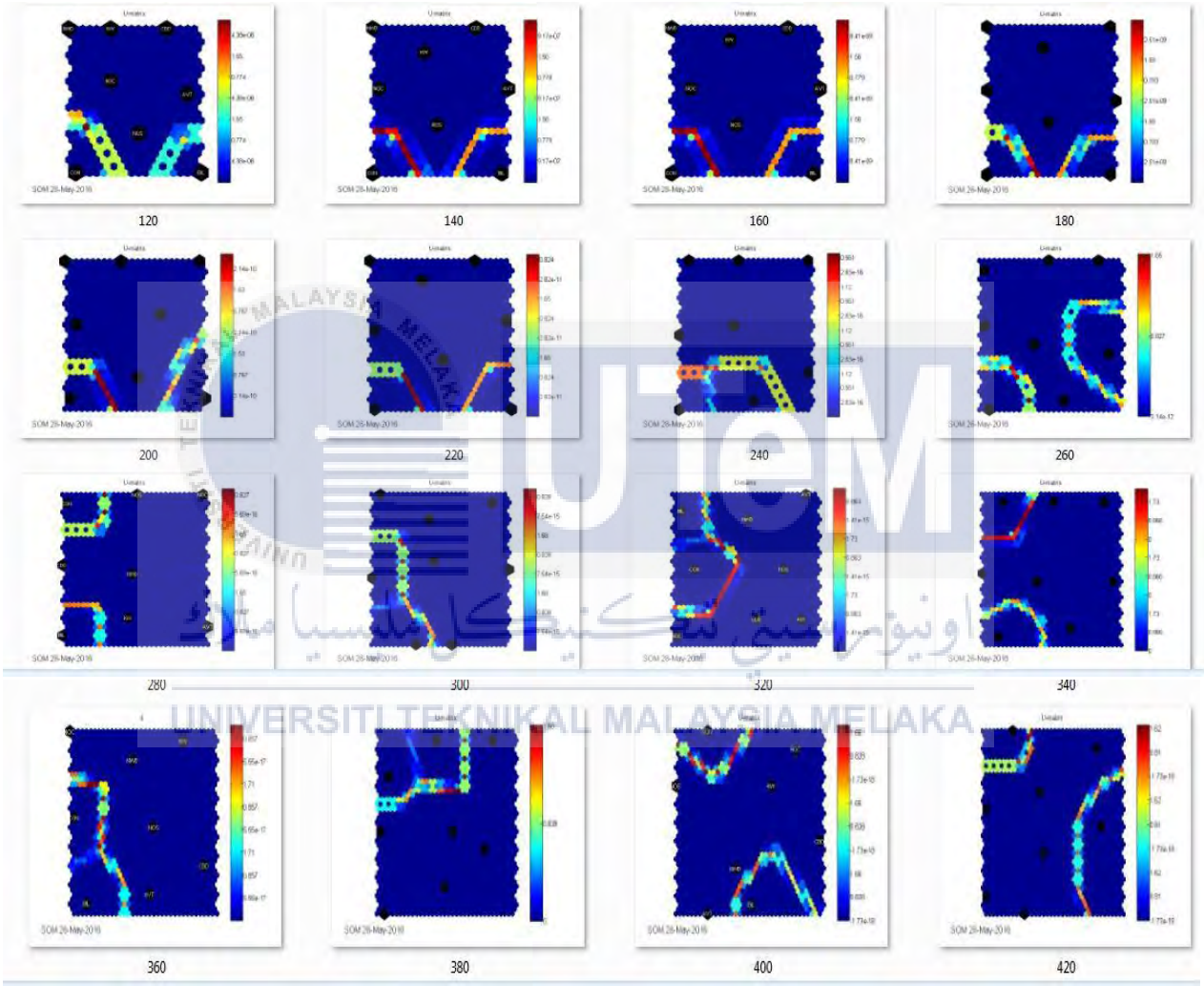
(ii) ‘var’



(iii) ‘range’



(iv) ‘logistic’



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| Penggenapan | :RM | 0.00 | | |
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| Kegunaan kWh | kWh | 0.00 | 12,825.00 | 12,825.00 |
| Kegunaan kWh | RM | 0.00 | 6,513.13 | 6,513.13 |
| ICPT ( RM 0.0225- ) | RM | - | 288.56- | 288.56- |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **6,224.57** | **6,224.57** |
| 6% GST ( 6% x RM 6,224.57 ) | RM | | | 373.47 |
| KWTBB (1.6%) | RM | | | 104.21 |

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**Jumlah Perlu Dibayar RM 6,170.55**

**Tarikh Bil : 01.10.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 0.00 | Terima Kasih |
| Caj Semasa | RM | 6,170.55 | 31.10.2015 |
| Penggenapan | RM | 0.00 | |
| Jumlah Bill | RM | 6,170.55 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.09.2015) | RM | 5,987.35 | Bayaran Akhir ( 09.09.2015 ) | RM | 5,987.35 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.09.2015 - 01.10.2015(30 Hari)
Tarif : 021 (B:Perdagangan)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| 200 | 200.00 | 0.435 | 87.00 |
| )0 | 11,610.00 | 0.509 | 5,909.49 |
| Jumlah | | | 5,996.49 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 11,810.00 | 11,810.00 |
| Kegunaan RM | RM | 0.00 | 5,996.49 | 5,996.49 |
| ICPT ( RM0.0225- ) | RM | - | 265.73- | 265.73- |
| Kegunaan Bulan Semasa | RM | 0.00 | 5,730.76 | 5,730.76 |
| 6% GST ( 6% X RM 5,730.76 ) | RM | | | 343.85 |
| KWTBB (1.6%) | RM | | | 95.94 |
| Caj Semasa | RM | | | 6,170.55 |

Muatan Tertinggi Dicatat 138.00 kW

| No Meter | | Faktor Meter | Bacaan Meter | | Kegunaan | Unit |
|---|---|---|---|---|---|---|
| | | | Dahulu | Semasa | | |
| M | 213503550 | 1.0000 | 23,220.00 | 25,071.00 | 1,851.00 | KVARh |
| M | 213503550 | 1.0000 | 198,326.00 | 210,136.00 | 11,810.00 | KWh |

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ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

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15454 (Gangguan bekalan)
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

No. Akaun : 0310 00706348 01
No. Kontrak : 151819
Deposit : RM0.00
No. Invois Cukai : 36842773

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 5,987.35**

**Tarikh Bil : 01.09.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 0.40- | |
| Caj Semasa | RM | 5,987.74 | 01.10.2015 |
| Penggenapan | RM | 0.01 | |
| Jumlah Bill | RM | 5,987.35 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.08.2015) | RM | 12,737.25 | Bayaran Akhir ( 13.08.2015 ) | RM | 5,907.06 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.08.2015 - 01.09.2015(31 Hari)
Tarif : 021 (B:Perdagangan)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| 200 | 200.00 | 0.435 | 87.00 |
| 200 | 11,261.00 | 0.509 | 5,731.85 |
| Jumlah | | | 5,818.85 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 11,461.00 | 11,461.00 |
| Kegunaan RM | RM | 0.00 | 5,818.85 | 5,818.85 |
| ICPT ( RM0.0225- ) | RM | - | 257.87- | 257.87- |
| Kegunaan Bulan Semasa | RM | 0.00 | 5,560.98 | 5,560.98 |
| 6% GST ( 6% X RM 5,560.98 ) | RM | | | 333.66 |
| KWTBB (1.6%) | RM | | | 93.10 |
| Caj Semasa | RM | | | 5,987.74 |

Muatan Tertinggi Dicatat 138.00 kW

| | No Meter | Faktor Meter | Bacaan Meter | | Kegunaan | Unit |
|---|---|---|---|---|---|---|
| | | | Dahulu | Semasa | | |
| M | 213503550 | 1.0000 | 186,865.00 | 198,326.00 | 11,461.00 | KWh |
| M | 213503550 | 1.0000 | 21,936.00 | 23,220.00 | 1,284.00 | KVARh |

Untuk maklumat bil dan bayaran terdahulu, sila layari-
https: //e-services.
tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat
JLN BANDA KABA
BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM1,052.12

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)



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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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www.facebook.com/tnbcareline

No. Akaun : 0310 00706348 01
No. Kontrak : 151819
Deposit : RM0.00
No. Invois Cukai : 36631332

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG

DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 12,737.25**

**Tarikh Bil : 01.08.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 6,830.20 | Segera |
| Caj Semasa | RM | 5,907.06 | 31.08.2015 |
| Penggenapan | RM | 0.01- | |
| Jumlah Bill | RM | 12,737.25 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.07.2015) | RM | 13,638.10 | Bayaran Akhir ( 19.06.2015 ) | RM | 6,807.90 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.07.2015 - 01.08.2015(31 Hari)
Tarif : 021 (B:Perdagangan)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| 200 | 200.00 | 0.435 | 87.00 |
| >200 | 11,107.00 | 0.509 | 5,653.46 |
| nlah | | | 5,740.46 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 11,307.00 | 11,307.00 |
| Kegunaan RM | RM | 0.00 | 5,740.46 | 5,740.46 |
| ICPT ( RM0.0225- ) | RM | - | 254.41- | 254.41- |
| Kegunaan Bulan Semasa | RM | 0.00 | 5,486.05 | 5,486.05 |
| 6% GST ( 6% X RM 5,486.05 ) | RM | | | 329.16 |
| KWTBB (1.6%) | RM | | | 91.85 |
| Caj Semasa | RM | | | 5,907.06 |

Muatan Tertinggi Dicatat 138.00 kW

| | No Meter | Faktor Meter | Bacaan Meter | | Kegunaan | Unit |
|---|---|---|---|---|---|---|
| | | | Dahulu | Semasa | | |
| M | 213503550 | 1.0000 | 20,818.00 | 21,936.00 | 1,118.00 | KVARh |
| M | 213503550 | 1.0000 | 175,558.00 | 186,865.00 | 11,307.00 | KWh |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA

75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM1,037.98

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan





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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOK A
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# Bil Elektrik Dan Invois Cukai

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

No. Akaun : 03100070634801
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151819
Kod Tarif B:021-Perdagangan

## Jumlah Perlu Bayar : RM 12,737.25

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 6,830.20 | Bayar Segera | |
| Caj Semasa | :RM | 5,907.06 | Bayar Sebelum | 31.08.2015 |
| Penggenapan | :RM | 0.01- | | |
| Jumlah Bil | :RM | 12,737.25 | | |

Tarikh Bil :
01.08.2015
Tempoh Bil
01.07.2015 - 01.08.2015 (31 hari)
No. Invois Cukai
36631332

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.07.2015) | RM | 13,638.10 | Bayaran Terakhir (19.06.2015) | RM | 6,807.90 |

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15454 ( gangguan bekalan )
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www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 11,307.00 | 11,307.00 |
| Kegunaan kWh | RM | 0.00 | 5,740.46 | 5,740.46 |
| ICPT ( RM0.0225- ) | RM | - | 254.41 - | 254.41 - |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **5,486.05** | **5,486.05** |
| 6% GST ( 6% x RM 5,486.05 ) | RM | | | 329.16 |
| KWTBB (1.6%) | RM | | | 91.85 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Faks: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 1,037.98
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan

**Caj Semasa** **RM 5,907.06**

(Untuk maklumat terperinci sila rujuk muka surat 2)



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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
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76100 DURIAN TUNGGAL MELAKA

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TENAGA NASIONAL BERHAD (200866-W)

# BIL ELEKTRIK DAN INVOIS CUKAI

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16454 (Gangguan bekalan)
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

No. Akaun : 0310 00706348 01
No. Kontrak : 151819
Deposit : RM0.00
No. Invois Cukai : 36420100

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 13,638.10**

**Tarikh Bil : 01.07.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 6,807.53 | Segera |
| Caj Semasa | RM | 6,830.59 | 31.07.2015 |
| Penggenapan | RM | 0.02- | |
| Jumlah Bill | RM | 13,638.10 | |
| Bil Terdahulu (01.06.2015) | RM | 6,807.90 | Bayaran Akhir ( 13.05.2015 ) RM 6,767.70 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.06.2015 - 01.07.2015(30 Hari)
Tarif : 021 (B:Perdagangan)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| 1 | 200.00 | 0.435 | 87.00 |
| >200 | 12,870.00 | 0.509 | 6,550.83 |
| Jumlah | | | 6,637.83 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 13,070.00 | 13,070.00 |
| Kegunaan RM | RM | 0.00 | 6,637.83 | 6,637.83 |
| ICPT ( RM0.0225- ) | RM | - | 294.08- | 294.08- |
| Kegunaan Bulan Semasa | RM | 0.00 | 6,343.75 | 6,343.75 |
| 6% GST ( 6% X RM 6,343.75 ) | RM | | | 380.63 |
| KWTBB (1.6%) | RM | | | 106.21 |
| Caj Semasa | RM | | | 6,830.59 |

Muatan Tertinggi Dicatat 138.00 kW

| No Meter | | Faktor Meter | Bacaan Meter | | Kegunaan | Unit |
|---|---|---|---|---|---|---|
| | | | Dahulu | Semasa | | |
| M | 213503550 | 1.0000 | 162,488.00 | 175,558.00 | 13,070.00 | KWh |
| M | 213503550 | 1.0000 | 19,618.00 | 20,818.00 | 1,200.00 | KVARh |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA

75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM1,199.83

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)



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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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# Bil Elektrik Dan Invois Cukai

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

No. Akaun : 03100070634801
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151819
Kod Tarif B:021-Perdagangan

## Jumlah Perlu Bayar : RM 6,807.90

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 0.00 | Terima Kasih | |
| Caj Semasa | :RM | 6,807.90 | | |
| Penggenapan | :RM | 0.00 | | |
| Jumlah Bil | :RM | 6,807.90 | Bayar Sebelum | 01.07.2015 |

Tarikh Bil
01.06.2015
Tempoh Bil
01.05.2015 - 01.06.2015 (31 hari)
No. Invois Cukai
36207359

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.05.2015) | RM | 6,767.70 | Bayaran Terakhir (13.05.2015) | RM | 6,767.70 |

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15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 13,026.00 | 13,026.00 |
| Kegunaan kWh | RM | 0.00 | 6,615.43 | 6,615.43 |
| ICPT ( RM0.0225- ) | RM | - | 293.09- | 293.09- |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **6,322.34** | **6,322.34** |
| 6% GST ( 6% x RM 6,322.34 ) | RM | | | 379.34 |
| KWTBB (1.6%) | RM | | | 105.85 |
| Surcaj Lewat Bayar | RM | | | 0.37 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Faks: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 1,195.79
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan

**Caj Semasa** **RM 6,807.90**

(Untuk maklumat terperinci sila rujuk muka surat 2)



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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
BLOCK A
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TENAGA NASIONAL BERHAD (200866-W)

# Bil Elektrik Dan Invois Cukai

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

No. Akaun : 03100070634801
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151819
Kod Tarif B:021-Perdagangan

## Jumlah Perlu Bayar : RM 6,767.70

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 0.00 | Terima Kasih | |
| Caj Semasa | :RM | 6,767.72 | | |
| Penggenapan | :RM | 0.02- | | |
| Jumlah Bil | :RM | 6,767.70 | Bayar Sebelum | 31.05.2015 |

Tarikh Bil :
01.05.2015
Tempoh Bil :
01.04.2015 - 01.05.2015 (30 hari)
No. Invois Cukai :
35964997

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.04.2015) | RM | 7,078.65 | Bayaran Terakhir (09.04.2015) | RM | 7,078.65 |

TNBCareline
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 12,950.00 | 12,950.00 |
| Kegunaan kWh | RM | 0.00 | 6,576.75 | 6,576.75 |
| ICPT ( RM0.0225- ) | RM | 0.00 - | 291.38 - | 291.38 - |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **6,285.37** | **6,285.37** |
| 6% GST ( 6% x RM 6285.37 ) | RM | | | 377.12 |
| KWTBB (1.6%) | RM | | | 105.23 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 1,188.81
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan



**Caj Semasa** **RM 6,767.72**

(Untuk maklumat terperinci sila rujuk muka surat 2)

0310007063480135964997000000676770

**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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BIL ELEKTRIK DAN INVOIS CUKAI

TENAGA NASIONAL
Better Brighter

No. Akaun : 0310 00706348 01
No. Kontrak : 151819
Deposit : RM0.00
No. Invois Cukai : 35757097


UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

120

**Jumlah Perlu Dibayar RM 7,078.65**

**Tarikh Bil : 01.04.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 0.00 | Terima Kasih |
| Caj Semasa | RM | 7,078.66 | 01.05.2015 |
| Penggenapan | RM | 0.01- | |
| Jumlah Bill | RM | 7,078.65 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.03.2015) | RM | 4,898.85 | Bayaran Akhir (09.03.2015) | RM | 4,898.85 |

Jenis Bacaan Bacaan biasa

Tempoh Bil : 01.03.2015 - 01.04.2015(31 Hari)
Tarif : 021 (B:Perdagangan)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| 200 | 200.00 | 0.4350 | 87.00 |
| 99999 | 14,141.00 | 0.5090 | 7,197.77 |
| Jumlah | | | 7,284.77 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 14,341.00 | 0.00 | 14,341.00 |
| Kegunaan RM | RM | 7,284.77 | 0.00 | 7,284.77 |
| ICPT ( RM0.0225- ) | RM | 322.67- | - | 322.67- |
| Kegunaan Bulan Semasa | RM | 6,962.10 | 0.00 | 6,962.10 |
| 6% GST ( 6% X RM 0.00 ) | RM | | | 0.00 |
| KWTBB (1.6%) | RM | | | 116.56 |
| Caj Semasa | RM | | | 7,078.66 |

Muatan Tertinggi Dicatat 138.00 kW

| | No Meter | Faktor Meter | Bacaan Meter Dahulu | Bacaan Meter Semasa | Kegunaan | Unit |
|---|---|---|---|---|---|---|
| M | 213503550 | 1.0000 | 15,135.00 | 16,756.00 | 1,621.00 | KVARh |
| M | 213503550 | 1.0000 | 122,171.00 | 136,512.00 | 14,341.00 | KWh |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA

75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM1,316.50

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan





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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

TENAGA NASIONAL
Better Brighter

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 35546075 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
BIL SALINAN
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/02/2015 | 5,387.65 | N | 28/02/2015 | 00001775 |
| BYRN. TERAKHIR | 12/02/2015 | 5,387.65 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 112,669.00 | 122,171.00 | 9,502.00 | KWh |
| M 213503550 | 1.0000 | 14,443.00 | 15,135.00 | 692.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 9,302.00 | 0.509 | 4,734.72 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 * | | 77.15 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 872.28
**TARIKH BACAAN** DAHULU : 01/02/2015
**KOD:** N SEMASA : 01/03/2015
BIL HARI: 28 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 4,898.87 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 4,898.87 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 4,898.87 |
| PENGGENAPAN | : | 0.02- |
| **JUMLAH PERLU DIBAYAR:** | | **4,898.85** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/03/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 35546075 | 01/03/2015 | **4,898.85** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 35336342 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/01/2015 | 6,072.85 | N | 31/01/2015 | 00001775 |
| BYRN. TERAKHIR | 12/01/2015 | 6,072.78 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 102,222.00 | 112,669.00 | 10,447.00 | KWh |
| M 213503550 | 1.0000 | 13,765.00 | 14,443.00 | 678.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 10,247.00 | 0.509 | 5,215.72 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 84.84 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 959.03
**TARIKH BACAAN** DAHULU : 01/01/2015
**KOD:** N SEMASA : 01/02/2015
BIL HARI : 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 5,387.56 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 5,387.56 |
| TUNGGAKAN | : | 0.07 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 5,387.63 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **5,387.65** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 03/03/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 35336342 | 01/02/2015 | 5,387.65 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 35175888 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/12/2014 | 6,141.10 | N | 31/12/2014 | 00001775 |
| BYRN. TERAKHIR | 24/12/2014 | 6,141.05 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 12,369.00 | 13,765.00 | 1,396.00 | KVARh |
| M 213503550 | 1.0000 | 90,450.00 | 102,222.00 | 11,772.00 | KWh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 11,572.00 | 0.509 | 5,890.15 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 95.63 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,080.67

**TARIKH BACAAN** DAHULU : 01/12/2014
**KOD:** N SEMASA : 01/01/2015
BIL HARI: 31 HARI

| | | | |
|---|---|---|---|
| NO TEL ADUAN | : 15454 | ***J U M L A H K E C I L*** | |
| NO TEL PERTANYAAN AM | : 1300885454 | JUMLAH CAJ | : 6,072.78 |
| PEJABAT | : 06-2828544 | PELARASAN ANGGARAN | : 0.00- |
| NO TIANG | : | PELBAGAI | : 0.00 |
| | | PENALTI | : 0.00 |
| | | BIL SEMASA | : 6,072.78 |
| | | TUNGGAKAN | : 0.05 |
| | | CAGARAN TAMBAHAN | : 0.00 |
| | | JUMLAH BIL | : 6,072.83 |
| | | PENGGENAPAN | : 0.02 |
| | | **JUMLAH PERLU DIBAYAR:** | **6,072.85** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/01/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 35175888 | 01/01/2015 | **6,072.85** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 34810943 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/11/2014 | 6,390.85 | N | 30/11/2014 | 00001775 |
| BYRN. TERAKHIR | 11/11/2014 | 6,390.82 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 78,546.00 | 90,450.00 | 11,904.00 | KWh |
| M 213503550 | 1.0000 | 10,676.00 | 12,369.00 | 1,693.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 11,704.00 | 0.509 | 5,957.34 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 96.71 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,092.79
**TARIKH BACAAN** DAHULU : 01/11/2014
**KOD:** N SEMASA : 01/12/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 6,141.05 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 6,141.05 |
| TUNGGAKAN | : | 0.03 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 6,141.08 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **6,141.10** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/12/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 34810943 | 01/12/2014 | **6,141.10** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 34614838 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/10/2014 | 5,418.60 | N | 31/10/2014 | 00001775 |
| BYRN. TERAKHIR | 15/10/2014 | 5,418.59 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 8,861.00 | 10,676.00 | 1,815.00 | KVARh |
| M 213503550 | 1.0000 | 66,159.00 | 78,546.00 | 12,387.00 | KWh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 12,187.00 | 0.509 | 6,203.18 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 100.64 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,137.13

**TARIKH BACAAN** DAHULU : 01/10/2014
**KOD:** N SEMASA : 01/11/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 6,390.82 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 6,390.82 |
| TUNGGAKAN | : | 0.01 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 6,390.83 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **6,390.85** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/12/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 34614838 | 01/11/2014 | **6,390.85** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 34394937 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

2 bil

**********
**BIL SALINAN**
**********

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/09/2014 | 5,636.30 | N | 30/09/2014 | 00001775 |
| BYRN. TERAKHIR | 19/09/2014 | 5,636.31 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 7,416.00 | 8,861.00 | 1,445.00 | KVARh |
| M 213503550 | 1.0000 | 55,652.00 | 66,159.00 | 10,507.00 | KWh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 10,307.00 | 0.509 | 5,246.26 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 85.33 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 964.54

**TARIKH BACAAN** DAHULU : 01/09/2014
**KOD:** N SEMASA : 01/10/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 5,418.59 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 5,418.59 |
| TUNGGAKAN | : | 0.01- |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 5,418.58 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **5,418.60** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/10/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 34394937 | 01/10/2014 | **5,418.60** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 34187555 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/08/2014 | 5,965.75 | N | 31/08/2014 | 00001775 |
| BYRN. TERAKHIR | 18/08/2014 | 5,965.74 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 44,724.00 | 55,652.00 | 10,928.00 | KWh |
| M 213503550 | 1.0000 | 6,068.00 | 7,416.00 | 1,348.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 10,728.00 | 0.509 | 5,460.55 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 88.76 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,003.19

**TARIKH BACAAN** DAHULU : 01/08/2014
**KOD:** N SEMASA : 01/09/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 5,636.31 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 5,636.31 |
| TUNGGAKAN | : | 0.01 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 5,636.32 |
| PENGGENAPAN | : | 0.02- |
| **JUMLAH PERLU DIBAYAR:** | | **5,636.30** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/10/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 34187555 | 01/09/2014 | **5,636.30** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 33980174 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/07/2014 | 5,286.50 | N | 31/07/2014 | 00001775 |
| BYRN. TERAKHIR | 14/07/2014 | 5,286.50 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 33,159.00 | 44,724.00 | 11,565.00 | KWh |
| M 213503550 | 1.0000 | 4,527.00 | 6,068.00 | 1,541.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 11,365.00 | 0.509 | 5,784.79 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 93.95 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,061.67

**TARIKH BACAAN** DAHULU : 01/07/2014
SEMASA : 01/08/2014
**KOD:** N BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 5,965.74 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 5,965.74 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 5,965.74 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **5,965.75** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/08/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 33980174 | 01/08/2014 | **5,965.75** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

TENAGA NASIONAL BERHAD (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 33774617 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/06/2014 | 12,629.70 | N | 30/06/2014 | 00001775 |
| BYRN. TERAKHIR | 24/06/2014 | 7,397.18 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 3,505.00 | 4,527.00 | 1,022.00 | KVARh |
| M 213503550 | 1.0000 | 22,948.00 | 33,159.00 | 10,211.00 | KWh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 10,011.00 | 0.509 | 5,095.60 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 82.92 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 937.37

**TARIKH BACAAN** DAHULU : 01/06/2014
**KOD:** N SEMASA : 01/07/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 5,265.52 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 20.93 |
| BIL SEMASA | : | 5,286.45 |
| TUNGGAKAN | : | 0.03 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 5,286.48 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **5,286.50** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/07/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 33774617 | 01/07/2014 | **5,286.50** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 33581414 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/05/2014 | 11,416.30 | N | 31/05/2014 | 00001775 |
| BYRN. TERAKHIR | 17/04/2014 | 6,183.79 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 213503550 | 1.0000 | 10,123.00 | 22,948.00 | 12,825.00 | KWh |
| M 213503550 | 1.0000 | 1,525.00 | 3,505.00 | 1,980.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 12,625.00 | 0.509 | 6,426.13 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 104.21 |



SUBSIDI BHN API KER. PERSEKUTUAN RM -1,177.34

**TARIKH BACAAN** DAHULU : 01/05/2014
**KOD:** N SEMASA : 01/06/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 6,617.34 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 779.84 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 7,397.18 |
| TUNGGAKAN | : | 5,232.51 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 12,629.69 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **12,629.70** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/07/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 33581414 | 01/06/2014 | **12,629.70** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

# Bil Elektrik Anda

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

| | |
|---|---|
| No. Akaun | : 03100070634001 |
| Deposit | RM 0.00 (Dikecuali) |
| No. Kontrak | 00151819 |
| No. Bill | 33363873 |
| Kod Tarif | B:021-Perdagangan |

## Jumlah Perlu Bayar : RM 11,416.30

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 6,183.80 | Bayar Segera | |
| Caj Semasa | :RM | 5,232.49 | Bayar Sebelum | 31.05.2014 |
| Penggenapan | :RM | 0.01 | | |
| Jumlah Bil | :RM | 11,416.30 | | |

Tarikh Bil
01.05.2014
Tempoh Bil
01.04.2014 - 01.05.2014 (30 hari)

**Bil dan Pembayaran Terdahulu**

| | | |
|---|---|---|
| Bil Terdahulu (01.04.2014) | RM | 6,183.80 |
| Bayaran Terakhir (19.03.2014) | RM | 6,351.70 |

**Caj Semasa**

| | | |
|---|---|---|
| Penggunaan Semasa | RM | 5,137.81 |
| Debit/Kredit | RM | 12.48 |
| Kumpulan Wang Tenaga Boleh Baharu (1.6%) | RM | 82.20 |

TNBCareline
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Sebarang pertanyaan, sila hubungi pejabat TNB
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax: 06-2835010



Subsidi Bahan Api Dibiayai Kerajaan Persekutuan
RM 929.29
(untuk makluman sahaja)

**Caj Semasa** **RM 5,232.49**

Untuk maklumat terperinci sila rujuk muka surat 2

## MEMAHAMI FUNGSI PENUTUS LITAR (ELCB)

**Peringatan**
- Bekalan elektrik terputus jika penunjuk ELCB terpelantik dari 1 ke 0.

**Punca-punca ELCB terpelantik**
- Kilat • Peralatan elektrik rosak • Pendawaian rumah rosak.

**Berhati-hati**
- Pastikan tangan kering • Pakai kasut/selipar getah

**Cara-cara mengendalikan ELCB**
- Matikan suis utama apabila ELCB terpelantik ke arah 0.
- Matikan semua suis di dalam rumah/kedai dan cabutkan semua plag.
- Pusingkan penunjuk dari 0 ke 1 untuk menghidupkan ELCB.
- Hidupkan suis utama.
- Hidupkan suis satu persatu. Sekiranya ELCB terpelantik bermakna pendawaian itu rosak. Hubungi kontraktor berdaftar untuk pembaikan.
- Sekiranya ELCB tidak terpelantik, pasangkan plag peralatan elektrik dan hidupkan satu persatu. Jika ELCB terpelantik pada masa ini, ia menandakan peralatan itu rosak.

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**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 33171450 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/03/2014 | 6,351.70 | N | 31/03/2014 | 00001775 |
| BYRN. TERAKHIR | 19/03/2014 | 6,351.70 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 27506187 | 1.0000 | 972,714.00 | 984,700.00 | 11,986.00 | KWh |
| M 27506187 | 1.0000 | 96,600.00 | 97,717.00 | 1,117.00 | KVARh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 11,786.00 | 0.509 | 5,999.07 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 97.38 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,100.31

**TARIKH BACAAN** DAHULU : 01/03/2014
**KOD:** N SEMASA : 01/04/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 6,183.45 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.34 |
| BIL SEMASA | : | 6,183.79 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 6,183.79 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **6,183.80** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/05/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 33171450 | 01/04/2014 | **6,183.80** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706348 01 | 00151819 | 0.00 | 32946939 | 021 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/02/2014 | 4,770.80 | N | 28/02/2014 | 00001775 |
| BYRN. TERAKHIR | 27/02/2014 | 4,707.05 | | | |

MUATAN TERTINGGI DICATAT 138.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT |
|---|---|---|---|---|---|
| M 27506187 | 1.0000 | 95,084.00 | 96,600.00 | 1,516.00 | KVARh |
| M 27506187 | 1.0000 | 960,527.00 | 972,714.00 | 12,187.00 | KWh |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consumpt'n tariff B | 200.00 | 0.435 | 87.00 |
| Consumpt'n tariff B | 11,987.00 | 0.509 | 6,101.38 |
| Kumpulan Wang Tenaga Boleh Baharu | 1.6 % | | 99.01 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,118.77

**TARIKH BACAAN** DAHULU : 01/02/2014
**KOD:** N SEMASA : 01/03/2014
BIL HARI: 28 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 6,287.39 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.55 |
| BIL SEMASA | : | 6,287.94 |
| TUNGGAKAN | : | 63.75 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 6,351.69 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **6,351.70** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/03/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706348 01 | 32946939 | 01/03/2014 | **6,351.70** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BLOCK A
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

# Bil Elektrik Dan Invois Cukai

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**No. Akaun** : **03100070634703**
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151736
Kod Tarif C2:040-Universiti

## Jumlah Perlu Bayar : RM 52,019.85

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 25,033.05 | Bayar Segera | |
| Caj Semasa | :RM | 26,986.82 | Bayar Sebelum | 01.12.2015 |
| Penggenapan | :RM | 0.02- | | |
| Jumlah Bil | :RM | 52,019.85 | | |

Tarikh Bil :
01.11.2015
Tempoh Bil :
01.10.2015 - 01.11.2015 (31 hari)
No. Invois Cukai :
37286537

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.10.2015) | RM | 25,033.05 | Bayaran Terakhir (09.09.2015) | RM | 25,184.40 |

TNBCareline
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 53,313.00 | 53,313.00 |
| Kehendak Maksima | kW | 0.00 | 242.90 | 242.90 |
| Kegunaan kWh | RM | 0.00 | 18,094.34 | 18,094.34 |
| Kehendak Maksima | RM | - | 10,954.79 | 10,954.79 |
| ICPT ( RM 0.0225- ) | RM | - | 1,199.54 - | 1,199.54 - |
| Diskaun TNB | RM | - | 2,784.96 - | 2,784.96 - |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **25,064.63** | **25,064.63** |
| 6% GST ( 6% x RM 25,064.63 ) | RM | | | 1,503.88 |
| KWTBB (1.6%) | RM | | | 418.31 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi :
TNB Melaka Barat
JLN BANDA KABA BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Faks: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 6,266.18
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan

**Caj Semasa** **RM 26,986.82**

(Untuk maklumat terperinci sila rujuk muka surat 2)

03100070634703372865370000520198 5

**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
-
76100 DURIAN TUNGGAL MELAKA

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TENAGA NASIONAL BERHAD (200866-W)

# BIL ELEKTRIK DAN INVOIS CUKAI

TENAGA NASIONAL
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TNBCareLine
1 300 88 5454 (Pertanyaan bil & akaun)
15454 (Gangguan bekalan)
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

No. Akaun : 0310 00706347 03
No. Kontrak : 151736
Deposit : RM0.00
No. Invois Cukai : 37069034

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 25,033.05**

**Tarikh Bil : 01.10.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 0.00 | Terima Kasih |
| Caj Semasa | RM | 25,033.04 | 31.10.2015 |
| Penggenapan | RM | 0.01 | |
| Jumlah Bill | RM | 25,033.05 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.09.2015) | RM | 25,184.40 | Bayaran Akhir ( 09.09.2015 ) | RM | 25,184.40 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.09.2015 - 01.10.2015(30 Hari)
Tarif : 040 (C2:Universiti)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| Consump'n Peak C2U | 38,613.43 | 0.365 | 14,093.90 |
| Consump'n OfPeak C2U | 8,833.57 | 0.224 | 1,978.72 |
| Consumption MD | 240.11 | 45.100 | 10,828.96 |
| Jumlah | | | 26,901.58 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 47,447.00 | 47,447.00 |
| Kegunaan kW | kW | 0.00 | 240.11 | 240.11 |
| Kegunaan RM | RM | 0.00 | 16,072.62 | 16,072.62 |
| Consumption MD | RM | - | 10,828.96 | 10,828.96 |
| ICPT ( RM0.0225- ) | RM | - | 1,067.56- | 1,067.56- |
| Diskaun TNB tariff C2U | RM | - | 2,583.40- | 2,583.40- |
| Kegunaan Bulan Semasa | RM | 0.00 | 23,250.62 | 23,250.62 |
| 6% GST ( 6% X RM 23,250.62 ) | RM | | | 1,395.04 |
| KWTBB (1.6%) | RM | | | 387.38 |
| Caj Semasa | RM | | | 25,033.04 |

Muatan Tertinggi Dicatat 360.00 kW

| | No Meter | Faktor Meter | Bacaan Meter Dahulu | Bacaan Meter Semasa | Kegunaan | Unit | |
|---|---|---|---|---|---|---|---|
| M | 908701296 | 1.0000 | 0.00 | 309.00 | 309.00 | KW | P |
| M | 908701296 | 1.0000 | 0.00 | 11,241.00 | 11,241.00 | KVARh | |
| M | 908701296 | 1.0000 | 0.00 | 11,368.00 | 11,368.00 | KWh | O |
| M | 908701296 | 1.0000 | 0.00 | 49,692.00 | 49,692.00 | KWh | P |
| | TENANT | | | | 13,613.00 | KWH | |
| | TENANT | | | | 1,854.00 | KVA | |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA
BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM5,605.31

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)

03100070634703370690340000250330 5

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
# BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

TENAGA NASIONAL
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## BIL ELEKTRIK DAN INVOIS CUKAI

TENAGA NASIONAL
Better. Brighter.

TNBCareLine
1 300 88 5454 (Pertanyaan bil & akaun)
15454 (Gangguan bekalan)
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

No. Akaun : 0310 00706347 03
No. Kontrak : 151736
Deposit : RM0.00
No. Invois Cukai : 36843564

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 25,184.40**

**Tarikh Bil : 01.09.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 1.34- | |
| Caj Semasa | RM | 25,185.73 | 01.10.2015 |
| Penggenapan | RM | 0.01 | |
| Jumlah Bill | RM | 25,184.40 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.08.2015) | RM | 48,806.80 | Bayaran Akhir ( 13.08.2015 ) | RM | 22,879.47 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.08.2015 - 01.09.2015(31 Hari)
Tarif : 040 (C2:Universiti)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| Consump'n Peak C2U | 39,948.00 | 0.365 | 14,581.02 |
| Consump'n OfPeak C2U | 9,636.00 | 0.224 | 2,158.46 |
| Consumption MD | 229.87 | 45.100 | 10,367.14 |
| Jumlah | | | 27,106.62 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 49,584.00 | 49,584.00 |
| Kegunaan kW | kW | 0.00 | 229.87 | 229.87 |
| Kegunaan RM | RM | 0.00 | 16,739.48 | 16,739.48 |
| Consumption MD | RM | - | 10,367.14 | 10,367.14 |
| ICPT ( RM0.0225- ) | RM | - | 1,115.64- | 1,115.64- |
| Diskaun TNB tariff C2U | RM | - | 2,599.10- | 2,599.10- |
| Kegunaan Bulan Semasa | RM | 0.00 | 23,391.88 | 23,391.88 |
| 6% GST ( 6% X RM 23,391.88 ) | RM | | | 1,403.51 |
| KWTBB (1.6%) | RM | | | 390.34 |
| Caj Semasa | RM | | | 25,185.73 |

Muatan Tertinggi Dicatat 360.00 kW

| | No Meter | Faktor Meter | Bacaan Meter Dahulu | Bacaan Meter Semasa | Kegunaan | Unit | |
|---|---|---|---|---|---|---|---|
| M | 908701296 | 1.0000 | 0.00 | 13,689.00 | 13,689.00 | KVARh | |
| M | 908701296 | 1.0000 | 0.00 | 291.00 | 291.00 | KW | P |
| M | 908701296 | 1.0000 | 0.00 | 12,199.00 | 12,199.00 | KWh | O |
| M | 908701296 | 1.0000 | 0.00 | 50,571.00 | 50,571.00 | KWh | P |
| | TENANT | | | | 13,186.00 | KWH | |
| | TENANT | | | | 2,865.00 | KVA | |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA
BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM5,762.29

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)



03100070634703368435640000251844O

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
# BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

No. Akaun : 0310 00706347 03
No. Kontrak : 151736
Deposit : RM0.00
No. Invois Cukai : 36632082

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 48,806.80**

**Tarikh Bil : 01.08.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 25,927.35 | Segera |
| Caj Semasa | RM | 22,879.47 | 31.08.2015 |
| Penggenapan | RM | 0.02- | |
| Jumlah Bill | RM | 48,806.80 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.07.2015) | RM | 54,615.95 | Bayaran Akhir ( 19.06.2015 ) | RM | 28,688.60 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.07.2015 - 01.08.2015(31 Hari)
Tarif : 040 (C2:Universiti)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| Consump'n Peak C2U | 35,061.00 | 0.365 | 12,797.27 |
| Consump'n OfPeak C2U | 10,771.00 | 0.224 | 2,412.70 |
| nsumption MD | 208.95 | 45.100 | 9,423.65 |
| Jumlah | | | 24,633.62 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 45,832.00 | 45,832.00 |
| Kegunaan kW | kW | 0.00 | 208.95 | 208.95 |
| Kegunaan RM | RM | 0.00 | 15,209.97 | 15,209.97 |
| Consumption MD | RM | - | 9,423.65 | 9,423.65 |
| ICPT ( RM0.0225- ) | RM | - | 1,031.22- | 1,031.22- |
| Diskaun TNB tariff C2U | RM | - | 2,360.24- | 2,360.24- |
| Kegunaan Bulan Semasa | RM | 0.00 | 21,242.16 | 21,242.16 |
| 6% GST ( 6% X RM 21,242.16 ) | RM | | | 1,274.53 |
| KWTBB (1.6%) | RM | | | 354.72 |
| Surcaj Lewat Bayar | RM | | | 8.06 |
| Caj Semasa | RM | | | 22,879.47 |

Muatan Tertinggi Dicatat 360.00 kW

| | No Meter | Faktor Meter | Bacaan Meter Dahulu | Bacaan Meter Semasa | Kegunaan | Unit | |
|---|---|---|---|---|---|---|---|
| M | 908701296 | 1.0000 | 0.00 | 44,633.00 | 44,633.00 | KWh | P |
| M | 908701296 | 1.0000 | 0.00 | 13,712.00 | 13,712.00 | KWh | O |
| ' | 908701296 | 1.0000 | 0.00 | 14,044.00 | 14,044.00 | KVARh | |
| .I | 908701296 | 1.0000 | 0.00 | 266.00 | 266.00 | KW | P |
| | TENANT | | | | 12,513.00 | KWH | |
| | TENANT | | | | 2,395.00 | KVA | |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.

tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat

JLN BANDA KABA

75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM5,356.07

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)



03100070634703366320820000488068O

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
# BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

No. Akaun : **03100070634703**
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151736
Kod Tarif C2:040-Universiti

## Jumlah Perlu Bayar : RM 48,806.80

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 25,927.35 | Bayar Segera | |
| Caj Semasa | :RM | 22,879.47 | Bayar Sebelum | 31.08.2015 |
| Penggenapan | :RM | 0.02- | | |
| Jumlah Bil | :RM | 48,806.80 | | |

Tarikh Bil :
01.08.2015
Tempoh Bil :
01.07.2015 - 01.08.2015 (31 hari)
No. Invois Cukai :
36632082

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.07.2015) | RM | 54,615.95 | Bayaran Terakhir (19.06.2015) | RM | 28,688.60 |

TNBCareline
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 45,832.00 | 45,832.00 |
| Kehendak Maksima | kW | 0.00 | 208.95 | 208.95 |
| Kegunaan kWh | RM | 0.00 | 15,209.97 | 15,209.97 |
| Kehendak Maksima | RM | - | 9,423.65 | 9,423.65 |
| ICPT ( RM0.0225- ) | RM | - | 1,031.22- | 1,031.22- |
| Diskaun TNB | RM | - | 2,360.24- | 2,360.24- |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **21,242.16** | **21,242.16** |
| 6% GST ( 6% x RM 21,242.16 ) | RM | | | 1,274.53 |
| KWTBB (1.6%) | RM | | | 354.72 |
| Surcaj Lewat Bayar | RM | | | 8.06 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Faks: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 5,356.07
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan

**Caj Semasa** **RM 22,879.47**

(Untuk maklumat terperinci sila rujuk muka surat 2)



0310007063470336632082000048806 80

**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
# BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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TENAGA NASIONAL BERHAD (200866-W)

# BIL ELEKTRIK DAN INVOIS CUKAI

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15454 (Gangguan bekalan)
tnbcareline@tnb.com.my
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www.facebook.com/tnbcareline

No. Akaun : 0310 00706347 03
No. Kontrak : 151736
Deposit : RM0.00
No. Invois Cukai : 36420748

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL 76100 MELAKA MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 54,615.95**

**Tarikh Bil : 01.07.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 28,687.30 | Segera |
| Caj Semasa | RM | 25,928.67 | 31.07.2015 |
| Penggenapan | RM | 0.02- | |
| Jumlah Bill | RM | 54,615.95 | |

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.06.2015) | RM | 28,688.60 | Bayaran Akhir ( 13.05.2015 ) | RM | 39,508.10 |

Jenis Bacaan Bacaan Sebenar

Tempoh Bil : 01.06.2015 - 01.07.2015(30 Hari)
Tarif : 040 (C2:Universiti)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| nsump'n Peak C2U | 40,512.00 | 0.365 | 14,786.88 |
| onsump'n OfPeak C2U | 11,230.00 | 0.224 | 2,515.52 |
| Consumption MD | 235.46 | 45.100 | 10,619.25 |
| Jumlah | | | 27,921.65 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 51,742.00 | 51,742.00 |
| Kegunaan kW | kW | 0.00 | 235.46 | 235.46 |
| Kegunaan RM | RM | 0.00 | 17,302.40 | 17,302.40 |
| Consumption MD | RM | - | 10,619.25 | 10,619.25 |
| ICPT ( RM0.0225- ) | RM | - | 1,164.20- | 1,164.20- |
| Diskaun TNB tariff C2U | RM | - | 2,675.75- | 2,675.75- |
| Kegunaan Bulan Semasa | RM | 0.00 | 24,081.70 | 24,081.70 |
| 6% GST ( 6% X RM 24,081.70 ) | RM | | | 1,444.90 |
| KWTBB (1.6%) | RM | | | 402.07 |
| Caj Semasa | RM | | | 25,928.67 |

Muatan Tertinggi Dicatat 360.00 kW

| | No Meter | Faktor Meter | Bacaan Meter Dahulu | Bacaan Meter Semasa | Kegunaan | Unit | |
|---|---|---|---|---|---|---|---|
| M | 908701296 | 1.0000 | 0.00 | 302.00 | 302.00 | KW | P |
| 1 | 908701296 | 1.0000 | 0.00 | 13,068.00 | 13,068.00 | KVARh | |
| M | 908701296 | 1.0000 | 0.00 | 14,403.00 | 14,403.00 | KWh | O |
| M | 908701296 | 1.0000 | 0.00 | 51,960.00 | 51,960.00 | KWh | P |
| | TENANT | | | | 14,621.00 | KWH | |
| | TENANT | | | | 1,200.00 | KVA | |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.
tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM6,092.12

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan

TENAGA NASIONAL BERHAD (200866-W)



03100070634703364207480000546159 5

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

No. Akaun : **03100070634703**
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151736
Kod Tarif C2:040-Universiti

## Jumlah Perlu Bayar : RM 28,688.60

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 0.00 | Terima Kasih | |
| Caj Semasa | :RM | 28,688.60 | | |
| Penggenapan | :RM | 0.00 | | |
| Jumlah Bil | :RM | 28,688.60 | Bayar Sebelum | 01.07.2015 |

Tarikh Bil :
01.06.2015
Tempoh Bil
01.05.2015 - 01.06.2015 (31 hari)
No. Invois Cukai :
36207808

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.05.2015) | RM | 39,508.10 | Bayaran Terakhir (13.05.2015) | RM | 39,508.10 |

TNBCareline
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Faks: 06-2835010

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 57,696.00 | 57,696.00 |
| Kehendak Maksima | kW | 0.00 | 254.71 | 254.71 |
| Kegunaan kWh | RM | 0.00 | 19,414.84 | 19,414.84 |
| Kehendak Maksima | RM | - | 11,487.42 | 11,487.42 |
| ICPT ( RM0.0225- ) | RM | - | 1,298.16- | 1,298.16- |
| Diskaun TNB | RM | - | 2,960.41- | 2,960.41- |
| **Kegunaan Bulan Semasa** | **RM** | **0.00** | **26,643.69** | **26,643.69** |
| 6% GST ( 6% x RM 26,643.69 ) | RM | | | 1,598.62 |
| KWTBB (1.6%) | RM | | | 444.99 |
| Surcaj Lewat Bayar | RM | | | 1.30 |

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 6,737.39
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan



**Caj Semasa** **RM 28,688.60**

(Untuk maklumat terperinci sila rujuk muka surat 2)

03100070634703362078080000286886O

**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

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# Bil Elektrik Dan Invois Cukai

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**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**No. Akaun : 03100070634703**
Deposit RM 0.00 (Dikecuali)
No. Kontrak 00151736
Kod Tarif C2:040-Universiti

## Jumlah Perlu Bayar : RM 39,508.10

| | | | | |
|---|---|---|---|---|
| Tunggakan | :RM | 0.00 | Terima Kasih | |
| Caj Semasa | :RM | 39,508.11 | | |
| Penggenapan | :RM | 0.01- | | |
| Jumlah Bil | :RM | 39,508.10 | Bayar Sebelum | 31.05.2015 |

Tarikh Bil
01.05.2015
Tempoh Bil
01.04.2015 - 01.05.2015 (30 hari)
No. Invois Cukai
35965497

**Bil dan Pembayaran Terdahulu**

| | | | | | |
|---|---|---|---|---|---|
| Bil Terdahulu (01.04.2015) | RM | 38,004.35 | Bayaran Terakhir (09.04.2015) | RM | 38,004.35 |

TNBCareLine
1 300 88 5454 (pertanyaan bil & akaun)
15454 ( gangguan bekalan )
tnbcareline@tnb.com.my
www.tnb.com.my
www.facebook.com/tnbcareline

**Caj Semasa**

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 0.00 | 62,909.00 | 62,909.00 |
| Kehendak Maksima | kW | 0.00 | 265.49 | 265.49 |
| Kegunaan kWh | RM | 0.00 | 21,232.28 | 21,232.28 |
| Kehendak Maksima | RM | 0.00 | 11,973.60 | 11,973.60 |
| ICPT ( RM0.0225- ) | RM | 0.00 - | 1,415.45 - | 1,415.45 - |
| Caj Sambungan Beban | RM | 8,701.88 | 0.00 - | 8,701.88 |
| Diskaun TNB | RM | 0.00 - | 3,179.04 - | 3,179.04 - |
| **Kegunaan Bulan Semasa** | **RM** | **8,701.88** | **28,611.39** | **37,313.27** |
| 6% GST ( 6% x RM 28611.39 ) | RM | | | 1,716.68 |
| KWTBB (1.6%) | RM | | | 478.16 |

Untuk maklumat bil dan bayaran terdahulu, sila layari
https://e-services.tnb.com.my/eservices

Untuk pertanyaan, sila hubungi
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax: 06-2835010

Subsidi Bahan Api oleh Kerajaan Persekutuan
RM 7 178.30
(untuk makluman sahaja)

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu
ICPT - Pelepasan Imbangan Kos Penjanaan

**Caj Semasa** **RM 39,508.11**

(Untuk maklumat terperinci sila rujuk muka surat 2)



0310007063470335965497000039508l0

**PENGARAH UNIVERSITI TEKNIKAL MALAYSIA MELAKA**
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

TENAGA NASIONAL
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TENAGA NASIONAL BERHAD (200866-W)

BIL ELEKTRIK DAN INVOIS CUKAI

TENAGA NASIONAL

No. Akaun : 0310 00706347 03
No. Kontrak : 151736
Deposit : RM0.00
No. Invois Cukai : 35757457

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

SALINAN

**Jumlah Perlu Dibayar RM 38,004.35**

**Tarikh Bil : 01.04.2015**

**BIL LPC**

| | | Amaun | Bayar Sebelum |
|---|---|---|---|
| Tunggakan | RM | 0.00 | Terima Kasih |
| Caj Semasa | RM | 38,004.33 | 01.05.2015 |
| Penggenapan | RM | 0.02 | |
| Jumlah Bill | RM | 38,004.35 | |
| Bil Terdahulu (01.03.2015) | RM | 32,894.35 | Bayaran Akhir (09.03.2015) RM 32,894.35 |

Jenis Bacaan Bacaan biasa

Tempoh Bil : 01.03.2015 - 01.04.2015(31 Hari)
Tarif : 040 (C2:Universiti)

| Blok Tarif (kWh/kW) | Kegunaan (kWh/kW) | Kadar (RM) | Amaun (RM) |
|---|---|---|---|
| Consump'n Peak C2U | 50,769.33 | 0.3650 | 18,530.81 |
| Consump'n OfPeak C2U | 12,035.67 | 0.2240 | 2,695.99 |
| Consumption MD | 272.99 | 45.1000 | 12,311.85 |
| Jumlah | | | 33,538.65 |

| Keterangan | | Tidak Kena GST | Kena GST | Jumlah |
|---|---|---|---|---|
| Kegunaan kWh | kWh | 62,805.00 | 0.00 | 62,805.00 |
| Kegunaan kW | kW | 272.99 | 0.00 | 272.99 |
| Kegunaan RM | RM | 21,226.80 | 0.00 | 21,226.80 |
| Consumption MD | RM | 12,311.85 | - | 12,311.85 |
| Connected load chrg | RM | 8,608.38 | - | 8,608.38 |
| ICPT ( RM0.0225- ) | RM | 1,413.11- | - | 1,413.11- |
| Diskaun TNB tariff C2U | RM | 3,212.55- | - | 3,212.55- |
| Kegunaan Bulan Semasa | RM | 37,521.37 | 0.00 | 37,521.37 |
| 6% GST ( 6% X RM 0.00 ) | RM | | | 0.00 |
| KWTBB (1.6%) | RM | | | 482.96 |
| Caj Semasa | RM | | | 38,004.33 |

Muatan Tertinggi Dicatat 360.00 kW

| No Meter | | Faktor Meter | Bacaan Meter | | Kegunaan | Unit | |
|---|---|---|---|---|---|---|---|
| | | | Dahulu | Semasa | | | |
| M | 908701296 | 1.0000 | 0.00 | 63,417.00 | 63,417.00 | KWh | P |
| M | 908701296 | 1.0000 | 0.00 | 15,034.00 | 15,034.00 | KWh | O |
| M | 908701296 | 1.0000 | 0.00 | 16,249.00 | 16,249.00 | KVARh | |
| M | 908701296 | 1.0000 | 0.00 | 341.00 | 341.00 | KW | P |

Untuk maklumat bil dan bayaran terdahulu, sila layari-

https: //e-services.
tnb.com.my/eservices

Untuk pertanyaan, sila hubungi:
TNB Melaka Barat
JLN BANDA KABA
75000 MELAKA MELAKA
Tel: 06-2828544
Fax- 06-2835010

Subsidi Bahan Api Dibiayai Kerajaan Persekutuan RM7,201.80

GST bagi penggunaan domestik 300kWh dan ke bawah berkadar sifar

KWTBB - Kumpulan Wang Tenaga Boleh Baharu

ICPT - Imbalance Cost Pass Through / Pelepasan Imbangan Kos Penjanaan



03100070634703357574570000380043 5

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

TENAGA NASIONAL

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 35546705 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
BIL SALINAN
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/02/2015 | 32,813.85 | N | 28/02/2015 | 00001709 |
| BYRN. TERAKHIR | 12/02/2015 | 32,813.85 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 275.00 | 275.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 11,751.00 | 11,751.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 10,799.00 | 10,799.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 45,290.00 | 45,290.00 | KWh | P |
| TENANT | | | | 9,672.00 | KWH | |
| TENANT | | | | 757.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 37,480.18 | 0.365 | 13,680.27 |
| Consump'n OfPeak C2U | 8,936.82 | 0.224 | 2,001.85 |
| Consump'n MD C2 | 227.58 | 45.100 | 10,263.81 |
| Connected load chrg | 1,078.75 | 8.500 | 9,169.38 |
| TNB disc. tariff C2U | | | 2,594.59- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,148.97

**TARIKH BACAAN** DAHULU : 01/02/2015
**KOD:** N SEMASA : 01/03/2015
BIL HARI: 28 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 32,894.34 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 32,894.34 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 32,894.34 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **32,894.35** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/03/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 35546705 | 01/03/2015 | 32,894.35 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 35336352 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/01/2015 | 35,116.55 | N | 31/01/2015 | 00001709 |
| BYRN. TERAKHIR | 12/01/2015 | 35,116.51 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 258.00 | 258.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 10,332.00 | 10,332.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 11,968.00 | 11,968.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 46,805.00 | 46,805.00 | KWh | P |
| TENANT | | | | 10,670.00 | KWH | |
| TENANT | | | | 722.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 38,307.74 | 0.365 | 13,982.33 |
| Consump'n OfPeak C2U | 9,795.26 | 0.224 | 2,194.14 |
| Consump'n MD C2 | 211.16 | 45.100 | 9,523.37 |
| Connected load chrg | 1,095.75 | 8.500 | 9,313.88 |
| TNB disc. tariff C2U | | | 2,569.98- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,395.36

**TARIKH BACAAN** DAHULU : 01/01/2015
**KOD:** N SEMASA : 01/02/2015
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 32,813.82 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 32,813.82 |
| TUNGGAKAN | : | 0.04 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 32,813.86 |
| PENGGENAPAN | : | 0.01- |
| **JUMLAH PERLU DIBAYAR:** | | **32,813.85** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 03/03/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 35336352 | 01/02/2015 | 32,813.85 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 35175890 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/12/2014 | 35,434.05 | N | 31/12/2014 | 00001709 |
| BYRN. TERAKHIR | 24/12/2014 | 35,434.02 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 307.00 | 307.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 10,941.00 | 10,941.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 14,538.00 | 14,538.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 51,586.00 | 51,586.00 | KWh | P |
| TENANT | | | | 13,356.00 | KWH | |
| TENANT | | | | 1,476.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 41,166.45 | 0.365 | 15,025.75 |
| Consump'n OfPeak C2U | 11,601.55 | 0.224 | 2,598.75 |
| Consump'n MD C2 | 244.99 | 45.100 | 11,049.09 |
| Connected load chrg | 1,046.75 | 8.500 | 8,897.38 |
| TNB disc. tariff C2U | | | 2,867.36- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 6,070.18

**TARIKH BACAAN** DAHULU : 01/12/2014
**KOD:** N SEMASA : 01/01/2015
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 35,116.51 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 35,116.51 |
| TUNGGAKAN | : | 0.03 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 35,116.54 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **35,116.55** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/01/2015
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 35175890 | 01/01/2015 | **35,116.55** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 34810995 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/11/2014 | 35,514.95 | N | 30/11/2014 | 00001709 |
| BYRN. TERAKHIR | 11/11/2014 | 35,514.94 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 53,915.00 | 53,915.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 15,017.00 | 15,017.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 16,300.00 | 16,300.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 293.00 | 293.00 | KW | P |
| TENANT | | | | 14,005.00 | KWH | |
| TENANT | | | | 4,082.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 42,961.02 | 0.365 | 15,680.77 |
| Consump'n OfPeak C2U | 11,965.98 | 0.224 | 2,680.38 |
| Consump'n MD C2 | 233.47 | 45.100 | 10,529.53 |
| Connected load chrg | 1,060.75 | 8.500 | 9,016.38 |
| TNB disc. tariff C2U | | | 2,889.07- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 6,327.96

**TARIKH BACAAN** DAHULU : 01/11/2014
**KOD:** N SEMASA : 01/12/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 35,434.02 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 35,434.02 |
| TUNGGAKAN | : | 0.01 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 35,434.03 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **35,434.05** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/12/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 34810995 | 01/12/2014 | **35,434.05** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 34628039 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/10/2014 | 34,579.70 | N | 01/11/2014 | 00001709 |
| BYRN. TERAKHIR | 15/10/2014 | 34,579.67 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 288.00 | 288.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 11,712.00 | 11,712.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 16,357.00 | 16,357.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 55,314.00 | 55,314.00 | KWh | P |
| TENANT | | | | 15,387.00 | KWH | |
| TENANT | | | | 1,861.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 43,438.67 | 0.365 | 15,855.11 |
| Consump'n OfPeak C2U | 12,845.33 | 0.224 | 2,877.35 |
| Consump'n MD C2 | 226.17 | 45.100 | 10,200.24 |
| Connected load chrg | 1,065.75 | 8.500 | 9,058.88 |
| TNB disc. tariff C2U | | | 2,893.27- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 6,579.40

**TARIKH BACAAN** DAHULU : 01/10/2014
**KOD:** N SEMASA : 01/11/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 35,514.94 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 35,514.94 |
| TUNGGAKAN | : | 0.03 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 35,514.97 |
| PENGGENAPAN | : | 0.02- |
| **JUMLAH PERLU DIBAYAR:** | | **35,514.95** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/12/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 34628039 | 01/11/2014 | **35,514.95** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 34407861 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

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**********
BIL SALINAN
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/09/2014 | 35,337.80 | N | 01/10/2014 | 00001709 |
| BYRN. TERAKHIR | 19/09/2014 | 35,337.78 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 51,710.00 | 51,710.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 15,533.00 | 15,533.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 10,495.00 | 10,495.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 287.00 | 287.00 | KW | P |
| TENANT | | | | 14,091.00 | KWH | |
| TENANT | | | | 1,521.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 40,873.99 | 0.365 | 14,919.01 |
| Consump'n OfPeak C2U | 12,278.01 | 0.224 | 2,750.27 |
| Consump'n MD C2 | 226.86 | 45.100 | 10,231.30 |
| Connected load chrg | 1,066.75 | 8.500 | 9,067.38 |
| TNB disc. tariff C2U | | | 2,790.06- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 6,172.91

**TARIKH BACAAN** DAHULU : 01/09/2014
**KOD**: N SEMASA : 01/10/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 34,579.67 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 34,579.67 |
| TUNGGAKAN | : | 0.02 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 34,579.69 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **34,579.70** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/10/2014
**DI**: TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 34407861 | 01/10/2014 | **34,579.70** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 34236929 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/08/2014 | 33,211.90 | N | 31/08/2014 | 00001709 |
| BYRN. TERAKHIR | 18/08/2014 | 33,211.90 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 289.00 | 289.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 10,769.00 | 10,769.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 15,731.00 | 15,731.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 53,250.00 | 53,250.00 | KWh | P |
| TENANT | | | | 13,886.00 | KWH | |
| TENANT | | | | 1,397.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 42,530.68 | 0.365 | 15,523.70 |
| Consump'n OfPeak C2U | 12,564.32 | 0.224 | 2,814.41 |
| Consump'n MD C2 | 230.82 | 45.100 | 10,410.15 |
| Connected load chrg | 1,064.75 | 8.500 | 9,050.38 |
| TNB disc. tariff C2U | | | 2,874.83- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 6,332.46

**TARIKH BACAAN** DAHULU : 01/08/2014
**KOD:** N SEMASA : 01/09/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 35,337.78 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 35,337.78 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 35,337.78 |
| PENGGENAPAN | : | 0.02 |
| **JUMLAH PERLU DIBAYAR:** | | **35,337.80** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/10/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 34236929 | 01/09/2014 | 35,337.80 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 34017066 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/07/2014 | 33,604.55 | N | 04/08/2014 | 00001709 |
| BYRN. TERAKHIR | 14/07/2014 | 33,604.55 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 48,036.00 | 48,036.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 16,411.00 | 16,411.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 281.00 | 281.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 11,142.00 | 11,142.00 | KVARh | |
| TENANT | | | | 14,329.00 | KWH | |
| TENANT | | | | 1,556.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 37,355.78 | 0.365 | 13,634.86 |
| Consump'n OfPeak C2U | 12,762.22 | 0.224 | 2,858.74 |
| Consump'n MD C2 | 218.52 | 45.100 | 9,855.39 |
| Connected load chrg | 1,072.75 | 8.500 | 9,118.38 |
| TNB disc. tariff C2U | | | 2,634.90- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,916.23

**TARIKH BACAAN** DAHULU : 01/07/2014
**KOD:** N SEMASA : 01/08/2014
BIL HARI: 31 HARI

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 33,211.90 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 33,211.90 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 33,211.90 |
| PENGGENAPAN | : | 0.00 |
| **JUMLAH PERLU DIBAYAR:** | | **33,211.90** |

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/08/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 34017066 | 01/08/2014 | **33,211.90** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 33775189 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/06/2014 | 75,912.70 | N | 30/06/2014 | 00001709 |
| BYRN. TERAKHIR | 24/06/2014 | 38,099.29 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 49,476.00 | 49,476.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 15,505.00 | 15,505.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 10,729.00 | 10,729.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 256.00 | 256.00 | KW | P |
| TENANT | | | | 13,156.00 | KWH | |
| TENANT | | | | 1,035.00 | KVA | |

***C A J***

| KETERANGAN | KEGUNAAN | KADAR | JUMLAH |
|---|---|---|---|
| Consump'n Peak C2U | 39,459.13 | 0.365 | 14,402.58 |
| Consump'n OfPeak C2U | 12,365.87 | 0.224 | 2,769.95 |
| Consump'n MD C2 | 204.17 | 45.100 | 9,208.09 |
| Connected load chrg | 1,097.75 | 8.500 | 9,330.88 |
| TNB disc. tariff C2U | | | 2,638.06- |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,965.26

**TARIKH BACAAN** DAHULU : 01/06/2014
**KOD:** N SEMASA : 01/07/2014
BIL HARI: 30 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 33,453.32 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 151.25 |
| BIL SEMASA | : | 33,604.57 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 33,604.57 |
| PENGGENAPAN | : | 0.02- |
| **JUMLAH PERLU DIBAYAR:** | | **33,604.55** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/07/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 33775189 | 01/07/2014 | **33,604.55** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 33568340 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/05/2014 | 75,260.50 | N | 31/05/2014 | 00001709 |
| BYRN. TERAKHIR | 17/04/2014 | 37,447.09 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 62,773.00 | 62,773.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 320.00 | 320.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 14,591.00 | 14,591.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 17,416.00 | 17,416.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 14,005.00 | 14,005.00 | KWh | P |
| S 908703482 | 1.0000 | 0.00 | 3,853.00 | 3,853.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 2,143.00 | 2,143.00 | KVARh | |
| S 908703482 | 1.0000 | 0.00 | 86.00 | 86.00 | KW | P |

| | | | |
|---|---|---|---|
| Consump'n Peak C2U | 48,768.00 | 0.365 | 17,800.32 |
| Consump'n OfPeak C2U | 13,563.00 | 0.224 | 3,038.11 |
| Consump'n MD C2 | 248.74 | 45.100 | 11,218.01 |
| Connected load chrg | 1,033.75 | 8.500 | 8,786.88 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,721.99

**TARIKH BACAAN** DAHULU : 01/05/2014
**KOD:** N SEMASA : 01/06/2014
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 38,099.29 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 38,099.29 |
| TUNGGAKAN | : | 37,813.41 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 75,912.70 |
| PENGGENAPAN | : | 0.00 |
| **JUMLAH PERLU DIBAYAR:** | | **75,912.70** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/07/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 33568340 | 01/06/2014 | 75,912.70 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 33362340 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
BIL SALINAN
**********
BIL LPC MUKA : 1

*S E J A R A H*

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/04/2014 | 37,447.10 | N | 30/04/2014 | 00001709 |
| BYRN. TERAKHIR | 19/03/2014 | 33,778.55 | | | |

MUATAN TERTINGGI DICATAT 360.00

*B A C A A N*

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| S 908703482 | 1.0000 | 0.00 | 2,047.00 | 2,047.00 | KVARh | |
| S 908703482 | 1.0000 | 0.00 | 3,815.00 | 3,815.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 13,419.00 | 13,419.00 | KWh | P |
| S 908703482 | 1.0000 | 0.00 | 86.00 | 86.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 13,935.00 | 13,935.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 16,106.00 | 16,106.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 62,027.00 | 62,027.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 320.00 | 320.00 | KW | P |

| | | | |
|---|---|---|---|
| Consump'n Peak C2U | 48,608.00 | 0.365 | 17,741.92 |
| Consump'n OfPeak C2U | 12,291.00 | 0.224 | 2,753.18 |
| Consump'n MD C2 | 249.42 | 45.100 | 11,248.70 |
| Connected load chrg | 1,033.75 | 8.500 | 8,786.88 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,590.53

**TARIKH BACAAN** DAHULU : 01/04/2014
SEMASA : 01/05/2014
**KOD:** N BIL HARI: 30 HARI

*J U M L A H K E C I L*

| | | |
|---|---|---|
| NO TEL ADUAN | : 15454 | |
| NO TEL PERTANYAAN AM | : 1300885454 | |
| PEJABAT | : 06-2828544 | |
| NO TIANG | : | |
| JUMLAH CAJ | : | 37,813.41 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 37,813.41 |
| TUNGGAKAN | : | 37,447.10 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 75,260.51 |
| PENGGENAPAN | : | 0.01- |
| **JUMLAH PERLU DIBAYAR:** | | **75,260.50** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/05/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 33362340 | 01/05/2014 | **75,260.50** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 33158523 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/03/2014 | 33,778.55 | N | 31/03/2014 | 00001709 |
| BYRN. TERAKHIR | 19/03/2014 | 33,778.55 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| S 908703482 | 1.0000 | 0.00 | 16,582.00 | 16,582.00 | KWh | P |
| S 908703482 | 1.0000 | 0.00 | 4,920.00 | 4,920.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 4,453.00 | 4,453.00 | KVARh | |
| S 908703482 | 1.0000 | 0.00 | 92.00 | 92.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 65,701.00 | 65,701.00 | KWh | P |
| M 908701296 | 1.0000 | 0.00 | 17,467.00 | 17,467.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 20,208.00 | 20,208.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 316.00 | 316.00 | KW | P |

| | | | |
|---|---|---|---|
| Consump'n Peak C2U | 49,119.00 | 0.365 | 17,928.44 |
| Consump'n OfPeak C2U | 12,547.00 | 0.224 | 2,810.53 |
| Consump'n MD C2 | 234.30 | 45.100 | 10,567.03 |
| Connected load chrg | 1,037.75 | 8.500 | 8,820.88 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 5,660.94

**TARIKH BACAAN** DAHULU : 01/03/2014
SEMASA : 01/04/2014
**KOD:** N BIL HARI: 31 HARI

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 37,447.09 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 37,447.09 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 37,447.09 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **37,447.10** |

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 01/05/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA



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| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 33158523 | 01/04/2014 | **37,447.10** |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
BENGKEL KUTKM 3 - BLOCK B
JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 32954091 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/02/2014 | 31,633.25 | N | 28/02/2014 | 00001709 |
| BYRN. TERAKHIR | 25/02/2014 | 31,633.25 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| S 908703482 | 1.0000 | 0.00 | 12,568.00 | 12,568.00 | KWh | P |
| S 908703482 | 1.0000 | 0.00 | 3,809.00 | 3,809.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 1,779.00 | 1,779.00 | KVARh | |
| S 908703482 | 1.0000 | 0.00 | 83.00 | 83.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 290.00 | 290.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 13,233.00 | 13,233.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 14,378.00 | 14,378.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 53,066.00 | 53,066.00 | KWh | P |

| | | | |
|---|---|---|---|
| Consump'n Peak C2U | 40,498.00 | 0.365 | 14,781.77 |
| Consump'n OfPeak C2U | 10,569.00 | 0.224 | 2,367.46 |
| Consump'n MD C2 | 219.58 | 45.100 | 9,903.11 |
| Connected load chrg | 1,063.75 | 8.500 | 9,041.88 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 4,687.95

**TARIKH BACAAN** DAHULU : 01/02/2014
**KOD:** N SEMASA : 01/03/2014
BIL HARI: 28 HARI

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 33,778.54 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 33,778.54 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 33,778.54 |
| PENGGENAPAN | : | 0.01 |
| **JUMLAH PERLU DIBAYAR:** | | **33,778.55** |

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 31/03/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 32954091 | 01/03/2014 | **33,778.55** |

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JLN KESANG
76100 DURIAN TUNGGAL MELAKA

**TENAGA NASIONAL BERHAD** (200866-W)

| NO AKAUN PENGGUNA. | NO. KONT. | JUMLAH CAGARAN. | NO. BIL | TARIF |
|---|---|---|---|---|
| 0310 00706347 03 | 00151736 | 0.00 | 32789530 | 040 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
- PEJABAT PEMBANGUNAN UTEM
JALAN KESANG
DURIAN TUNGGAL
76100 MELAKA MELAKA

**********
**BIL SALINAN**
**********
BIL LPC MUKA : 1

***S E J A R A H***

| | TARIKH | JUMLAH | KOD | TARIKH KEMASKINI | UNIT BACAAN |
|---|---|---|---|---|---|
| BIL TERAKHIR | 01/01/2014 | 30,921.20 | N | 31/01/2014 | 00001709 |
| BYRN. TERAKHIR | 28/01/2014 | 30,921.20 | | | |

MUATAN TERTINGGI DICATAT 360.00

***B A C A A N***

| NO. JANGKA | FJ | BACAAN DAHULU | BACAAN SEMASA | KEGUNAAN | UNIT | |
|---|---|---|---|---|---|---|
| M 908701296 | 1.0000 | 0.00 | 244.00 | 244.00 | KW | P |
| M 908701296 | 1.0000 | 0.00 | 10,838.00 | 10,838.00 | KVARh | |
| M 908701296 | 1.0000 | 0.00 | 14,319.00 | 14,319.00 | KWh | O |
| M 908701296 | 1.0000 | 0.00 | 45,402.00 | 45,402.00 | KWh | P |
| S 908703482 | 1.0000 | 0.00 | 49.00 | 49.00 | KW | P |
| S 908703482 | 1.0000 | 0.00 | 665.00 | 665.00 | KVARh | |
| S 908703482 | 1.0000 | 0.00 | 3,459.00 | 3,459.00 | KWh | O |
| S 908703482 | 1.0000 | 0.00 | 9,272.00 | 9,272.00 | KWh | P |

| | | | |
|---|---|---|---|
| Consump'n Peak C2U | 36,130.00 | 0.365 | 13,187.45 |
| Consump'n OfPeak C2U | 10,860.00 | 0.224 | 2,432.64 |
| Consump'n MD C2 | 191.99 | 45.100 | 8,658.54 |
| Connected load chrg | 1,109.75 | 8.500 | 9,432.88 |

SUBSIDI BHN API KER. PERSEKUTUAN RM 4,313.68

**TARIKH BACAAN** DAHULU : 01/01/2014
SEMASA : 01/02/2014
**KOD:** N BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 06-2828544
NO TIANG :

***J U M L A H K E C I L***

| | | |
|---|---|---|
| JUMLAH CAJ | : | 31,633.26 |
| PELARASAN ANGGARAN | : | 0.00- |
| PELBAGAI | : | 0.00 |
| PENALTI | : | 0.00 |
| BIL SEMASA | : | 31,633.26 |
| TUNGGAKAN | : | 0.00 |
| CAGARAN TAMBAHAN | : | 0.00 |
| JUMLAH BIL | : | 31,633.26 |
| PENGGENAPAN | : | 0.01- |
| **JUMLAH PERLU DIBAYAR:** | | **31,633.25** |

**UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK**
SILA BAYAR SEBELUM: 03/03/2014
**DI:** TNB Melaka Barat

JLN BANDA KABA
75000 MELAKA MELAKA

---

| NO AKAUN PENGGUNA | NO BIL | TARIKH BIL | JUMLAH PERLU DIBAYAR |
|---|---|---|---|
| 0310 00706347 03 | 32789530 | 01/02/2014 | 31,633.25 |

Pengarah UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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# Impact of Routine Adjustment and Static Factor for Commercial Building

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