



SAVE ENERGY PROGRAMME

SAVE AND SWITCH TO ENERGY EFFICIENT APPLIANCES

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“IN THIS ISSUE OF TENAGA LINK WE TOUCH ON TWO TOPICS THAT MAY APPEAR VERY DIFFERENT – ONE BEING ON ENERGY EFFICIENCY WHILE THE OTHER PERTINENT SUBJECT MATTER IS ON THE ALARMING INCREASE IN METER INSTALLATION TAMPERING - BUT SHARE SOMETHING THAT IS MORE IN COMMON AND THAT IS BOTH CAN RESULT IN SIGNIFICANT SAVINGS IN ELECTRICITY CONSUMPTION IF PROPERLY APPROACHED”

Energy efficient appliances today can bring about significant savings in terms of electricity usage and similarly, the technology available today permits both domestic and commercial users the ability to track and manage their own electricity consumption more efficiently without having to resort to theft in order to generate savings.

Improving the energy efficiency of your home or work place can save you money and at the same time contribute towards helping the environment by way of conserving energy and natural resources. The use of these appliances also means you pay less in terms of electricity.

As you prepare to invest in energy-efficient equipment and appliances, the best is to focus on upgrades that will have the highest impact and in the case of domestic consumers this would mean items like the refrigerator and air-conditioning system. In a move to promote the use of energy efficient appliances, the Government has embarked on what is known as the *SAVE or Sustainability Achieved via Energy Efficiency* programme whereby

eligible consumers are entitled of up to RM200 rebates for the purchase of energy efficient 5-Star rated refrigerators and 5-Star rated air conditioners. Find out more about SAVE inside and how you can be on your way into becoming a more energy efficient consumer.

On the subject of meter installation tampering, we at TNB would like to call on all consumers to refrain from engaging in the illegal extraction of electricity. Rather than steal, consumers can actively participate in the national effort to spearhead greater energy efficiency in Malaysia. Contribute by reducing energy consumption and this can be as simple as switching off the lights of a room or an appliance when not being used.

Conservation of energy and the use of more energy efficient equipment in both households and commercial establishments can result in greater productivity while at the same time still being capable of generating significant savings. You do not have to resort to tampering the meter installation which in turn can have severe consequences.

What is required is the understanding of the benefits of energy efficiency and to be willing to take that first important step and make a change for the better. ■

UNDERSTANDING AND TAKING ADVANTAGE OF THE BENEFITS OF ENERGY EFFICIENCY

SAVE or *Sustainability Achieved via Energy Efficiency*, is a programme spearheaded by the Ministry of Energy, Green Technology and Water, to improve energy efficiency in Malaysia through five initiatives. The pilot initiative to stimulate sales of energy-efficient appliances by providing rebates for refrigerators, air-conditioners and chillers to qualified consumers, is a fully Government-funded initiative which costs RM50.2 million in 2011 and is expected to generate RM5.1 billion in Gross National Income (GNI) by 2020. SAVE is also among the initiatives undertaken as part of the National Key Economic Area (NKEA).

Introduced in July 2011, the SAVE programme targets domestic and household consumers and provides rebates of up to RM200 for the purchase of 5-Star rated energy efficient air-conditioners and refrigerators. It also provides rebates to commercial building owners who purchase energy efficient chillers to replace old chillers aged more than 15 years for private companies.

"Since consumers are using a lot of energy, we want to make sure than they use energy efficient appliances. This has led to the introduction of energy efficiency labeling which accords appliances with different star ratings based on its energy efficiency performance and will be followed by the introduction of minimum energy performance standards (MEPS) in the future," said Mr. Zaini Abdul Wahab, Head of Entry Point Project 9 (Energy Efficiency) at the Ministry of Energy, Green Technology and Water.

The SAVE programme introduced Zaini added, was no different than what has been implemented in other countries worldwide to promote education and awareness before such a policy is turned into a regulation.



Zaini Abdul Wahab
Head of Entry Point Project 9 (Energy Efficiency)
Ministry of Energy, Green Technology and Water





“What is required at the moment is education and awareness of energy efficiency and this is where an individual can play his or her role whether as a father, mother, a worker or an employer in bringing about greater understanding of its benefits”

“While the energy performance of products have not yet been regulated in Malaysia, moving forward the Government will make it compulsory for all electrical appliances. This is also to prevent Malaysia from becoming a dumping ground for energy inefficient products from other countries which if goes unchecked, can be detrimental to our own energy conservation efforts and place greater pressure on the use of natural resources.”

Zaini elaborated that the Ministry was also currently in the process of drafting the Energy Efficiency and Conservation Act which is scheduled to be implemented in 2014.

The objective of the SAVE programme Zaini said was two fold: one to encourage consumers to use more energy efficient appliances which would in turn enable them to enjoy savings in terms of electricity usage and secondly, to encourage manufacturers as well as importers to make available more energy efficient products in the local market at more competitive prices.

On the argument that Malaysia's electricity tariffs were still relatively cheap compared to that in other countries, he said: “Yes we may be cheap but just to give it a better perspective, it is cheap because electricity in Malaysia remains subsidised by the Government and it is not because we are energy efficient.”

Zaini went on to add that being energy efficient also did not mean Malaysians must compromise on their quality of life but on the contrary, this defines an improvement in energy performance and output which results in the direct benefit to consumers.

“The best way for consumers to practice energy efficiency is to start small and to start at home. What is important is a change in mindset in the way we use our appliances. For example it is ironic how consumers set the temperature on an air-conditioner at its lowest thus requiring them to use a blanket when they could've just set the temperature a little higher and in the process enjoy savings in terms of electricity consumption.”■



SAVE AND SWITCH TO ENERGY EFFICIENT APPLIANCES

In July 2011, the Government via the Ministry of Energy, Green Technology and Water introduced the SAVE or *Sustainability Achieved via Energy Efficiency* programme which is designed to spearhead energy efficiency in Malaysia.

Under the programme which is being facilitated by Tenaga Nasional Berhad (TNB), 100,000 rebate vouchers for 5-Star rated refrigerators, and 65,000 vouchers for 5-Star rated air conditioners are allocated to states across Malaysia which entitles consumers to rebates for the purchase of energy efficient appliances.

The rebates are awarded on a first-come, first-served basis to qualified domestic consumers who consume an average of between 300 to 400kw of electricity per month, for the purchase of 5-Star rated refrigerators, air conditioners or chillers from participating retailers.

There are currently more than 4,000 retail outlets nationwide registered with the Ministry under the SAVE Rebate Programme offering 12 different brands.



Mr. Nirinder Singh Johl
General Manager (Customer Service & Marketing Department)



“The campaign is about encouraging people to switch to energy efficient appliances. Public awareness about energy efficiency will enable consumers to enjoy long term benefits in terms of savings and contribute significantly towards reduction in energy consumption.”

The use of an energy efficient and 5-star rated air-conditioning unit for example, can save consumers a minimum of 25% in terms of electricity usage per hour.

Nirinder added that one of the most important challenges faced is for retailers to educate consumers on green technology and the benefits it offers.

"As the appliances become energy inefficient, this is reflected in an increase in power consumption and subsequently an increase in their electricity bill."

“What needs to be understood is the fact that the longer an appliance is in use, the more energy inefficient it becomes and this is something that has not been thoroughly explained to customers who may be holding on to the belief that appliances are built for life”



Of the 7.6 million TNB customers, Nirinder said some 80% accounted for domestic customers (households).

With the inevitability of electricity tariffs increasing due to the escalating prices of raw materials, natural resources and the removal of Government subsidies, Nirinder said it is in the best interest of consumers to learn how to save while using their appliances. In some cases, this can be achieved by being aware of what is the best time to use such appliances whereby certain hours of the day offered lower tariffs.

The simple act of switching off the lights when not in use can go a long way towards conserving the use of energy, which in turns translates into alleviating increasing demands on natural resources.

To apply for the rebate, eligible consumers can log on to www.saveenergy.gov.my or visit the TNB website for more information.

Each individual is only entitled to the purchase of one unit of air-conditioner and one unit of refrigerator. The application can be made online.

Simply key in your details such as TNB account number, name, NRIC and telephone number and check your eligibility. Those who are eligible can print the rebate vouchers to be presented or redeemed at any participating retail outlets nationwide. The website also provides consumers with a list of energy efficient appliances to choose from.

The rebate vouchers are awarded on a first-come, first-served basis and cannot be issued for appliances purchased before or after the rebate offer period of the SAVE programme, which lasts until the rebate vouchers are exhausted. ■



METER INSTALLATION TAMPERING AN ALARMING SOCIAL ILL

Meter installation tampering is a growing social ill, menace and a serious moral problem that is becoming more rampant involving not only domestic consumers but also commercial/ industrial establishments.

The most common form of meter installation tampering is to tamper with the meter that is installed at the premises by Tenaga Nasional Berhad (TNB).

This year alone has revealed a three-fold increase in meter installation tampering cases compared to the past two years. From 8,871 and 9,350 cases of meter installation tampering detected in 2009 and 2010, the figure in 2011 shot up to 24,659 cases. The increase was detected following more systematic and structured approach and effort and also new technology. In fact TNB has estimated losses amounting to millions of Ringgit annually.

"The illegal extraction of electricity is prohibited by law. Just because electricity is not something tangible and can be physically seen it does not mean that the act of doing so (extracting it illegally) is not theft. A more precise definition of this act is that it is more of a social ill that is alarmingly increasing in numbers," said TNB Chief Operating Officer Dato' Ir. Azman Mohd.

Ir. Azman said the meter installation tampering has become so sophisticated that there are even syndicates today offering "consultancy" services to both household and commercial/ industrial customers.



Dato' Ir. Azman Mohd
TNB Chief Operating Officer/Executive Director

“A more precise definition of this act is that it is more of a social ill that is alarmingly increasing in numbers”



“We are of the stand that detecting and educating is better than having to prosecute people for meter tampering and thus we would like to discourage consumers from committing this selfish act”

“Some people and establishments go to great lengths to tap illegal electricity as to them there is always something to gain. Some have been found using non-permanent tampering gadgets and devices which cause a drop in electricity consumption and can be removed quickly in the event TNB conducts a surprise inspection on the premises.”

“There are even syndicates offering to train the employees of an establishment to tamper with the meter when required, and some who go to the extent of offering legal advice to those who are caught tapping illegal electricity as well as protection services.”

Under Section 37 of the Electricity Supply Act, those found guilty of electricity theft can be slapped with a maximum penalty of RM100,000 or three years’ jail by the Energy Commission. In addition, TNB is also permitted to file a civil case to recover its losses.

Dato’ Ir. Azman said part of the efforts undertaken by TNB to discourage leakage is in replacing old meters with those with more security and high-tech features. Meters in general have a 15-year life span and it is prudent utility practices worldwide to replace meters periodically for accurate reading.

All electricity meters installed by Tenaga Nasional Berhad (TNB) are tested and calibrated by the Department of Standards Malaysia which is a Government agency under the Ministry of Science, Technology and Innovation (MOSTI).

Standards Malaysia accredits testing and calibration laboratories of all electromechanical and electronic electricity meter manufacturers used by TNB in residential, industrial and commercial properties based on the MS ISQ/IEC 17025 standards. These meters are then certified by SIRIM QAS International Sdn Bhd (SIRIM) although it is not compulsory for the meters to carry a SIRIM sticker.

In the interest of ensuring the accuracy of the meters, TNB also performs on-site meter verification based on prudent utility practices. Equipments used for meter calibration and verification are traceable to the National Metrology Laboratory (NML- SIRIM Berhad).



The use of sophisticated systems with artificial intelligence such as remote meter reading for instance, also enables TNB to track and profile the electricity consumption of a particular establishment. Any abnormality in the meter reading will immediately trigger an alarm and raise cause for further investigation.

The same system Dato’ Ir. Azman said, also allows both domestic and commercial customers to track and manage their own electricity consumption.

“It is essentially beneficial in allowing customers to better manage their use of electricity. For instance if a factory finds that one of its processes consumes a higher amount of electricity at a particular time of the day, the information provided by the load profiling system can advise them to shift and conduct the same process at a different time of the day when the tariff charges are lower thus resulting in savings.”

In an effort to further combat electricity theft and meter tampering, TNB has also strengthened its enforcement to 450 people who are also known as members of its Special Engagement Against Losses or SEAL team. TNB is also intensifying raids on suspected premises with the co-operation of the Energy Commission, the police and Malaysian Anti-Corruption Agency.

“What is important to note is that TNB’s statutory responsibility is to provide electricity and it is not to catch people (who illegally extract electricity).

As a responsible utility company, TNB also actively engages the public on meter tampering by way of holding discussions and in publishing advertisements and advertorials educating consumers on meter and billing information. In addition, TNB also offers rewards to genuine informants on cases relating to meter installation tampering. ■

TNB Won Global Leadership Awards for Energy Sector 2011

TNB won the Global Leadership Awards for Energy Sector at the Global Leadership Awards 2011 organised by The Leaders International. The award was presented to Dato' Sri Che Khalib Mohamad Noh, President/Chief Executive Officer of TNB at the Gala Dinner held in July 2011 at the Grand Ballroom, Kuala Lumpur Convention Centre (KLCC).

The function was graced by YB. Dato' Seri Rais Yatim, Minister of Information, Communication and Culture and YB Datuk Seri Shahrizat Abdul Jalil, Minister of Woman, Family and Community Development.

Representatives from TNB present included Suhaimi Ali Hanafiah, Senior General Manager (Asset Development), Generation Division, Mohd Seth Alias, Head (Talent Development), Group Human Resource Division, Zubir Haji Hashim, Chief Engineer, (Kuala Lumpur), Distribution Division, Haji Sabar Hashim, Senior Manager (Management and Regulatory Relations), Corporate Affairs Division and several officers from the Corporate Communications Department.

The Global Leadership Awards 2011 was held in appreciation of GLC companies in the energy sector and has directly strengthened the networking among all GLC companies. ■



TNB Remaco signed Agreement with Laraib Energy Ltd. of Pakistan

TNB Remaco Sdn. Bhd., a wholly-owned subsidiary of TNB has signed an agreement with Laraib Energy Ltd., of Pakistan for the operations and maintenance services contract for the Bong Escape Hydroelectric Power Complex owned by Laraib Energy Ltd in Pakistan. The contract is worth RM42.7 million.

Dato' Sri Che Khalib Mohammad Noh, President and Chief Executive Officer of Tenaga Nasional Berhad signed the agreement on behalf of TNB while Laraib Energy Ltd. was represented by its Chief Executive Officer, Mr. Hasnain Haider. Also present were Dato' Ir. Mohd Nazri Shahrudin, TNB's Vice President (Generation) and Haji Nor Azmi Ramli, TNB's Chief Procurement Officer.

Dato' Sri Che Khalib Mohamad Noh, who is also Chairman of TNB Remaco said the company will provide operations and maintenance services for five years with an option for an extension of seven years. He added, that TNB Remaco will mobilise technical and highly-skilled personnel to provide the agreed services. The mobilisation period of 15 months commenced in August 2011.

The agreement involving the cooperation between TNB Remaco and HUB Power Company (principal shareholder of Laraib Energy Ltd.) is the first for the 213.6 MW diesel-powered generation plant in Punjab Pakistan. ■



TNB SPONSORS 50 PARTICIPANTS TO THE NATIONAL WORKSHOP ON SMART GRID: TRACKING THE VISION OF SUSTAINABLE FUTURE



A National Workshop On Smart Grid - Tracking The Vision Of Sustainable Future was held from 21 to 22 July 2011 at the Kuala Lumpur Convention Centre, in conjunction with the ASEAN ELENEC 2011. The Workshop was jointly organised by CIRED, TNB, CIGRE and Power & Energy Society (PES) Malaysia.

The objective of the workshop was to provide a platform for consumers to exchange views and experiences on matters relating to Smart Grid.

The Workshop was officiated by Y.B. Dato' Sri Peter Chin Fah Kui, Minister of Energy, Green Technology and Water. Also present were Tan Sri Tajudin Ali, Chairman of the Energy Commission, Hj Hussin Othman, TNB's Vice President (Distribution) dan Ms Adelina Iskandar, TNB's Vice President (Corporate Affairs).

TNB had sponsored 50 participants to the Workshop at a cost of RM800.00 per participant.

The sponsored participants were from the Ministry of Energy, Green Technology and Water (KETTHA), the Economic Planning Unit (EPU), the Energy Commission (EC), the Malaysian Industrial Development Authority (MIDA), LPC consumers and industry leaders who represented 21 industrial organisations. Each of these institutions sent two representatives to the workshop.

The sponsorship is a gesture of goodwill as well as to achieve one of the strategies under TNB's Gemilang 2015 which gives priority to customers by strengthening relationships and helping to enhance their knowledge in the electricity energy business. It is hoped that this sponsorship would enable consumers, particularly those from the industry as well as stakeholders to exchange views and opinions as well as sharing experiences and skills with other participants on relevant aspects of electricity supply. ■



An Afternoon with **PRIME** CUSTOMERS

In line with the objective of giving priority to the customers, TNB's Customer Services and Marketing Department in collaboration with the Regional Customer Services and Marketing organised a *Prime Hi-Tea* to treat PRIME Customers in Kuala Lumpur.



Some 43 Kuala Lumpur PRIME Customers attended the function which was held at the Imperial Chakri Palace Restaurant, KLCC.

Among the PRIME guests present were representatives from Malaysian Sheet Glass, Astro, CIMB, AEON Berhad (Jusco), Indah Water Konsortium, Maybank, Rapid KL and several other companies. TNB Kuala Lumpur was represented by the host, Ir. Kamaliah binti Abdul Kadir, General Manager (Kuala Lumpur). Representing the Head Office at the function were Mr. Abdul Haris bin Abdul Karim, TNB's General Manager (Consumer & Commercial Services – Regional Operations 1) and Ir. Nirinder Singh Johl, General Manager (Customer Service & Marketing).

The highlight of this year's Kuala Lumpur PRIME Customers event was the launching of TNB KL PRIME News by Ir. Kamaliah binti Abdul Kadir and Mr. Muzafaramir bin Mohd Bedu, Senior Manager (Consumer Services & Marketing) Kuala Lumpur who is now officially the custodian of the said bulletin.

The bulletin serves as the axis of communication to be deployed by TNB Kuala Lumpur for the interaction and sharing of information with its PRIME Customers. The bulletin will be produced and emailed to PRIME Customers once every three months.



To add to the excitement of the PRIME Hi-Tea, a lucky draw was also held in which five lucky guests received shopping vouchers from the host, Ir. Kamaliah binti Abdul Kadir. ■

SHANGRI-LA HOTEL KUALA LUMPUR

“As one of the Kuala Lumpur hotels nestled amidst lush gardens in the heart of the city, the newly renovated Shangri-La Hotel, Kuala Lumpur sits just 45 minutes from the international airport and just moments from key business and shopping areas. The Shangri-La also offers an outstanding choice of cosmopolitan cuisines from its award-winning restaurants”

The Hotel's 662 newly-renovated guestrooms, including 101 luxuriously-appointed suites, are appointed with modern amenities to offer only the very best in comfort, making the Shangri-La Hotel, Kuala Lumpur as the hotel in the city to have the most number of suites.

The hotel's Horizon Club serves frequent business travellers who require the highest quality accommodation and personalised service. Comprehensive business services along with all-day beverage service are available in the Horizon Club Lounge.

The Shangri-La Hotel also features impressive selection of international, award winning restaurants, including the award-winning Restaurant Lafite, which serves the finest Western cuisine. The wide selection of dining options makes the hotel a central location for travellers who enjoy fine cuisine, and also makes the hotel an excellent location for conferences and business meetings. ■



Lothar Nessman
Vice President/General Manager

AMBank (M) BERHAD

Established in August 1975, AmBank Group is the sixth largest banking group in Malaysia and comprises AMMB Holdings Berhad and its subsidiaries AmInvestment Group Berhad, AmBank (M) Berhad, AmIslamic Bank and AmAssurance, consisting of AmG Insurance Berhad and AmLife Insurance Berhad.

The Group provides a wide range of investment banking, commercial banking, retail financing and related financial services, which also include Islamic banking, underwriting of general and life insurance, stock, share and futures broking, investment advisory as well as asset, property and unit trust management.

AmBank Group's core philosophy incorporates a deep-seated commitment to the satisfaction of its wide range of customers, with numerous customer-driven initiatives woven into all forms of communication and interaction with all customer groups. The Group is committed to providing new and innovative products and services to its customers with its partnership with Australia and New Zealand Banking Group (ANZ), one of Australia's leading banks. ■

Cheah Tek Kuang
Chief Executive Officer



PLUS EXPRESSWAYS BERHAD

PLUS Expressways Berhad is the largest toll expressway operator in South East Asia and one of the largest in the world in terms of market capitalisation.

Incorporated in Malaysia on 29 January 2002, PLUS Expressways Berhad (PLUS Expressways) made its debut on the Main Board of Bursa Malaysia on 17 July 2002.

PLUS Expressways is involved in investment holding and the provision of expressway operation services. PLUS Expressways wholly owns Projek Lebuhraya Utara-Selatan Berhad, Expressway Lingkaran Tengah Sdn Bhd, Linkedua (Malaysia) Berhad, Konsortium Lebuhraya Butterworth-Kulim ("KLBK") Sdn Bhd and is a substantial shareholder of PLUS BKSP Toll Limited, PT Lintas Marga Sedaya and PT Cimanggis Cibitung Tollways.

Companies under PLUS Expressways Berhad:

Domestic

- 100% Projek Lebuhraya Utara-Selatan Berhad ("PLUS")
- 100% Expressway Lingkaran Tengah Sdn Bhd ("ELITE")
- 100% Linkedua (Malaysia) Berhad ("LINKEDUA")
- 100% Konsortium Lebuhraya Butterworth-Kulim (KLBK) Sdn Bhd ("KLBK") ■



Dato' Noorizah Hj. Abd. Hamid
Managing Director



Dr. Ir. Mohamed Fuad Faisal
 Technical Expert
 (Power Quality & Energy Efficiency)
 Asset Management Dept, Distribution
 Division of TNB

Understanding Energy Efficiency and Energy Saving Devices

What is Electrical Energy?

Electricity is the flow of electrical power or charge. It is both a basic part of nature and one of our most widely used forms of energy. Electricity is actually a secondary energy source, also referred to as an energy carrier. That means that we get electricity from the conversion of other sources of energy, such as coal, nuclear, or solar energy. These are called primary sources. The energy sources we use to make electricity can be renewable or non-renewable, but electricity itself is neither renewable or non-renewable.

Before electricity became available over 60 years ago, houses in Malaysia were lit with kerosene lamps, food was cooked by wood-burning or coal-burning stoves and clothes were manually washed. There was no electrical lighting, rice cookers or washing machines. Despite its great importance in our daily lives, few of us probably stop to think what life would be like without electricity. Like air and water, we tend to take electricity for granted. But we use electricity to do many jobs for us every day, from lighting, heating, and cooling our homes to powering our televisions and computers.

In Peninsular Malaysia, electrical power is generated (partially), transmitted and distributed by Tenaga Nasional Berhad (TNB) to customers. TNB constructs power plants, transmission networks, underground cables, overhead lines and substations to ensure electrical power is delivered to customers.



Fig.1 TNB Substation



Fig.2 Example of an energy meter

Understanding Energy Cost

At the end of every month, the amount of electrical energy consumed by the customer is recorded by energy meters. An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, industry or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meter establish billing cycles and energy consumed during a cycle. The cost of energy consumption is then determined based on the existing energy tariff. This cost is also termed as the energy cost. This cost is applicable for all categories of customers. The term kilowatt-hour (kWh) refers to the energy consumed by customers.

$$\begin{aligned} \text{Electrical energy (kWh)} &= \text{Electrical power (kW)} \times \text{duration (hours)} & (1) \\ \text{Energy cost (RM)} &= \text{Electrical energy (kWh)} \times \text{Cost per unit} & (2) \end{aligned}$$

Example:

kWh consumption	100 kWh
Cost per kWh	RM0.23/kWh
Energy cost	100 kWh x RM0.23/kWh = RM23.00

There are also other costs i.e. demand cost and power factor surcharges that will not be discussed in this article. And it is also important to note that this definition of energy based only on kWh is only applicable in Malaysia and some parts of the world. Some countries define energy based on total apparent energy or kVAh. The equation that shows the relationship between all the electrical power components is shown in Equation (3).

$$kVA = \sqrt{(kW^2 + kVar^2)} \quad (3)$$

Note:

kVA = Apparent Power, kW = Active or True Power and $kVar$ = Reactive Power

Understanding Energy Efficiency

Efficient energy use, sometimes simply called energy efficiency, is the goal of efforts to reduce the amount of energy required to provide the **same products and services**. For example, installing fluorescent lights or natural skylights reduces the amount of energy required to attain the same level of illumination compared to using traditional incandescent light bulbs. Compact fluorescent lights use less energy than incandescent lights. Improvements in energy efficiency are most often achieved by enhancing the awareness of the users, improvement in maintenance procedures and adopting a more efficient technology.

There are various motivations to improve energy efficiency. Reducing energy use reduces energy costs and may result in a financial cost saving to consumers if the energy savings offset any additional costs of implementing an energy efficient technology. Reducing energy use is also seen as a key solution to the problem of reducing emissions. According to one international study, improved energy efficiency in buildings, industrial processes and transportation could reduce the world's energy needs in 2050 by one third, and help control global emissions of greenhouse gases [1].



Fig.3 Incandescent lamp



Fig.4 Fluorescent lamp

Look around your house. There are simple things you can do to save money on your electricity bill. Choosing energy efficient products is one of the smartest ways consumers can reduce energy use and help prevent greenhouse gas emissions. A household that buys energy efficient equipment instead of standard new equipment can substantially reduce carbon dioxide emissions over the lifetime of the products.

Energy efficient products also save money. When we receive our monthly electricity bill from TNB, many of us think there is little we can do to reduce monthly costs, besides adjusting our air conditioners. But this is not true! The products you select can significantly affect that monthly bill. You can reduce your energy bill by about 10 to 20% when you purchase energy efficient products. Common labels for energy efficiencies are shown in Figure 5.



Fig.5 Labels for electrical energy efficiency for household products

And lastly, the most simple action plan to achieve energy efficiency and energy saving is just simply switching off the electrical appliances whenever they are not needed. Some equipment still consumed electricity whilst in sleep or standby modes for example computers, television decoders, DVD players etc.



Fig.6 Sample ads to remind users to switch off the lights when not in used

Discussion on Energy Saving Devices

Recently, there are many products defined as Energy Saving Devices (ESD) or Black Boxes available for homeowners. Many advertisements for such devices were posted at some rest areas (R & R) along highways and selected shopping complexes. An example is shown in Figure 7. Examples of two units of 'ESD' are shown in Figure 8.



Fig.7 Example of a misleading advertisement on Energy Saving Device

These “energy-saving” devices are marketed under various names. They are simple to use, because you just insert the device at the power socket as shown in Figure 8b where a Brand Y ESD is inserted at a power socket. And presto these devices are assumed capable to reduce your electricity bill (as claimed by the advertisement).

Overall, there are two basic designs for these energy saving devices, neither of which has proven to provide a cost savings when used under normal conditions.



Fig.8 Two example of 'ESDs'

ESD type A. (application of a capacitor unit)

The first type of ESD is designed to correct the lagging power factor that gets introduced when an inductive load i.e. motor, is placed on the power supply (See Figure 9). In Figure 9, the current lags the voltage. Power factor is calculated based on Equation 4. The ESD device will then provides reactive power, a means of correcting that lagging power factor.

$$\text{Power Factor} = \cos\phi = \frac{kW}{\sqrt{(kW)^2 + (kVar)^2}} \quad (4)$$

Unfortunately, many of us assume that Power (kilowatt) = Volts x Amps. That's not the real story when you're dealing with alternating current (AC), where kilowatt = Volts x Amps x Power Factor. The capacitance provided by the ESD actually increases that power factor, even though the current goes down. So, the number of kilowatts being used remains almost unchanged. Figure 10 shows the power triangle which depicts the relationship of power components in Equation 3. Adding capacitor will reduce the reactive power (VAR) and improve the power factor. However, the true power or Watts remains the same. Therefore, the net RM savings (based on kWh) is negligible, as proven in tests done by TNB.

All the 'ESDs' shown in Figure 8 are termed as ESD Type A. Examples of tests done by TNB on these devices are shown in Figure 11.

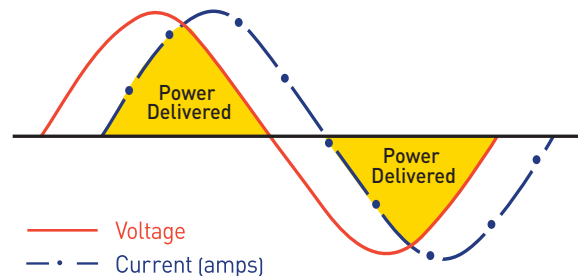


Fig.9 Current lags voltage

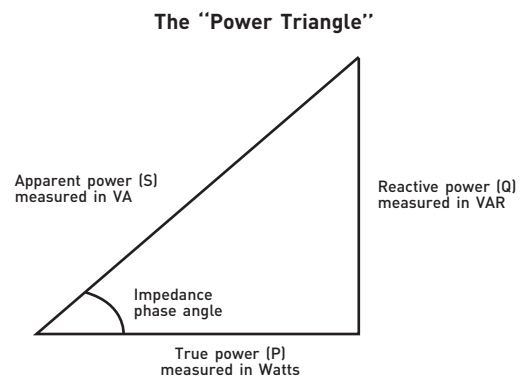


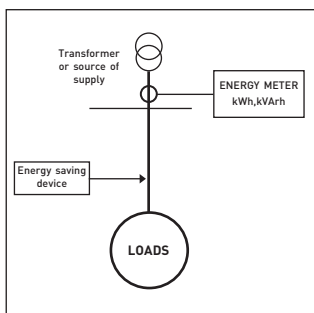
Fig.10 Power Triangle



a) Capacitance test for 3 phase ESD



b) Current injection test



c) Energy saving test



d) Capacitance test for 1 phase ESD

Fig.11 Sample test for ESDs

ESD type B (based on voltage minimisation technique)

The second type of 'ESD' operates by switching the incoming power on and off very quickly, reducing the average effective voltage (i.e., it decreases the effective height of the sine wave (See Figure 9). So, instead of the standard 230 volts being supplied from the power outlet, fewer volts actually arrive at the equipment terminals. While less power is truly being consumed during a **fixed time interval**, the appliance is not receiving the amount of power it was designed and intended to receive. To compensate for the fact that it has been "short-changed", the appliance must often simply run longer to perform its intended task. A good example is to imagine a window fan that is being suddenly forced to run at medium speed, instead of high speed: it simply will not cool a room as well. So once again, the net savings for motors running at normal load is negligible. Minimal savings may occur for some appliances if their motors are being greatly underutilised, such as a refrigerator that is opened only once a week. Lamps would also be slightly dimmed when applied with this type of 'ESD'.

Based on the testing performed on these 'ESDs' have revealed that all of these devices do not promote energy (kWh) savings. Conceptually, the principles behind these devices make sense, but the reality of a controlled test environment has proven they are generally not worth the investment.

A Practical Guide on Energy Efficiency

There are a few good guidelines on implementing practical Energy Efficiency programs. For commercial and industrial customers, it is recommended that they refer to the Code of Practice for Energy Efficiency of Electrical Installations developed in Hong Kong.

This guideline aims to set out the minimum requirements on energy efficiency of electrical installations. It forms a part of a set of comprehensive Building Energy Codes that address energy efficiency requirements on building services installations. Designers are encouraged to adopt a proactive approach to exceed these minimum requirements.



Summary

The intention of this article is to provide basic information related to energy efficiency and energy saving devices (ESD). One of the biggest reasons that the ESDs sell simply boils down to consumers. Most consumers have insufficient working knowledge on electricity. Some ESDs with a simple voltage reduction technique can save partial energy but have limited application since there is usually a reduction in output such as lower lighting levels or less shaft horsepower. These devices typically chop the voltage sine wave to achieve a voltage reduction. Other devices only reduce reactive power but not watts. Since customers pay for watts or kilowatt-hours, there may be little or no RM savings. Reducing reactive power also helps to improve power factor but does reduce kWh and therefore does not minimise your energy cost. ■

References

- [1] Sophie Hebden (22-6-2006). "Invest in clean technology says IEA report". Scidev.net.

Tenaga Nasional Berhad (TNB) currently has 7.6 million customers in Peninsular Malaysia. To ensure accurate meter readings, aged electricity meters should be replaced.

Why should aged electricity meters be replaced?

Electromechanical meters that are more than 15 years should be replaced to ensure accurate consumption of electricity is recorded.

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- Relocating meters (e.g. to another wall within the compound of the premises) gives the users privacy and allows meter readings to be conducted if the users are not at home. This can also avoid TNB from issuing prolonged bill estimates as a result of inaccessible meters.



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