

Towards A World-Class Energy Sector

Energy

Suruhanjaya Tenaga
Energy Commission

Malaysia

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Prioritising the Public

Protecting the Interests
of Energy Consumers

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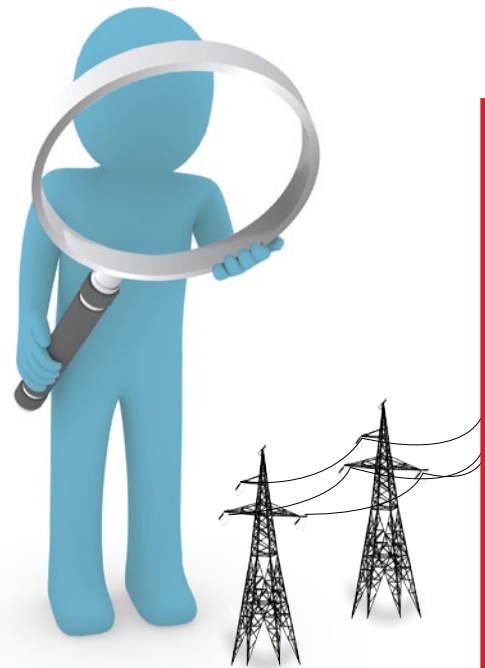
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Towards A World-Class Energy Sector **Energy** Malaysia

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"The Energy Commission is vigilant in monitoring the industry, as well as drafting and enforcing regulations and guidelines to ensure fairness, safety and efficiency."

Safeguarding the Public's Interest

As the regulatory agency for the power sector, the Energy Commission emphasises that all stakeholders conduct and perform according to principles that will continually enhance the performance of the industry. This encompasses players such as government decision-makers, power producers and energy utilities, as well as manufacturers, importers and retailers of electrical equipment, professionals such as engineers and workmen, and of course, consumers.

Ultimately, each and every one of us is an energy consumer. In a world-class energy sector where the system is safe, reliable and efficient, the main priority has to be the interest of consumers.

Alongside this primary objective, it is also our responsibility to ensure that electricity network losses are minimised and thefts are checked to ensure our natural resources are utilised fairly and optimally.

Another aspect of safety that we look at is the regulation of the competency of people working with electricity plants and equipment, and of the quality of electrical appliances. The lack of both these safety control elements has been observed to cause accidents that led to injuries and even death in certain cases.

The Energy Commission is vigilant in monitoring the industry, from the formulation of regulations and guidelines to ensure

fairness, safety and efficiency, right down to the enforcement and imposition of penalties as necessary.

However, the Energy Commission can only regulate and facilitate the implementation, but this task must begin with the awareness of all players and consumers alike. Everyone has a role to play in the responsible use of energy – power producers should strive to ensure that their plants are efficient to give consumers the best quality of electricity possible. Industry players should be honest and not give in to the temptation to siphon power or tamper with meters. As for consumers, we can play our part by only buying approved electrical equipment, and only commissioning certified professionals to work on electrical installations, while exercising prudent consumption behaviours to take charge ourselves.

As we aspire to become responsible consumers, the Energy Commission will continue to formulate and implement the necessary regulations and rules relating to the various segments of supply. This is necessary to ensure fair and reasonable control over the safety, efficiency and quality of service that is provided to the public. All of us can proudly enjoy the benefits of this system while ensuring its continued sustainability.

Dato' Abdul Razak Abdul Majid
Energy Commission

Roping in the Private Sector

The Malaysian government is intensifying its efforts to promote the adoption of energy saving measures to the private sector, following their success in the public sector, which resulted in energy reduction and savings of 5.6%, equivalent to 14,758,218 kWh, in 2014.



Reflecting this, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan said that conservation of energy should be a goal for all stakeholders in the nation, namely the government, corporations, and members of the public.

Among the energy saving methods highlighted by Datuk Ir Ahmad Fauzi, is the usage of energy efficient appliances. As the regulatory agency for the electricity sector, the Energy Commission has implemented the Minimum Energy Performance Standards (MEPS) which mandates that electrical appliances meet efficiency standards and are labelled accordingly before they are allowed into the Malaysian market.

Other initiatives for energy saving implemented include industry capacity building, monitoring of energy management practices in industries and government buildings, as well as promoting simple energy-efficient practices among the public such as eliminating wastage by turning off lights and other electrical appliances when not in use.



Top: Energy Commission CEO Datuk Ir Ahmad Fauzi (inset) has called for energy saving measures to be adopted by all parties in Malaysia. In 2014, government offices, such as the Prime Minister's Office in Putrajaya, successfully cut energy usage by at least 5%.

Landmark Emissions Drop

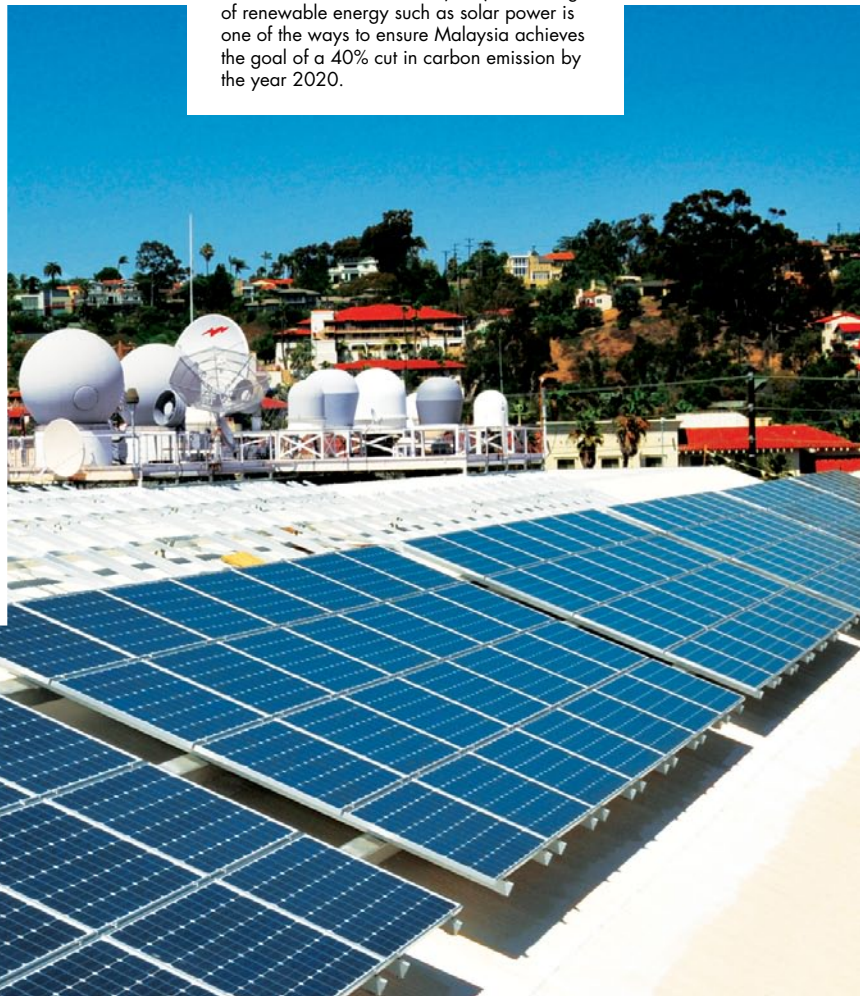
As reported by the Deputy Minister of Energy, Green Technology and Water Datuk Seri Mahdzir Khalid, by early December last year, Malaysia has cut its carbon emission intensity by 33%. This milestone means that the country is on track to meet our pledge of achieving a 40% cut in carbon emission intensity by the year 2020, as committed by Prime Minister Datuk Seri Najib Tun Razak in Copenhagen in 2009.

Calling the remaining time “critical”, Datuk Seri Mahdzir also said that the target will be “achievable once we can generate cleaner electricity from renewable sources, conserve energy and encourage sustainable clean transport and grow green industries.”

Illustrating the government’s commitment to this is the Malaysian Green Technology Corporation, which has been tasked with formulating a master plan for green technology, for use by the public and private sectors in order to reach the emission reduction target.



Left: According to the Deputy Minister of Energy, Green Technology and Water – Datuk Seri Mahdzir Khalid (inset) – the usage of renewable energy such as solar power is one of the ways to ensure Malaysia achieves the goal of a 40% cut in carbon emission by the year 2020.



Safe Gas Usage for Households

With the majority of homes in Malaysia depending on gas for cooking through central piping or cylinders, and considering the chemical volatility of the commodity, safety should always be considered a priority for domestic consumers. As such, **Energy Malaysia** highlights some tips for home owners.

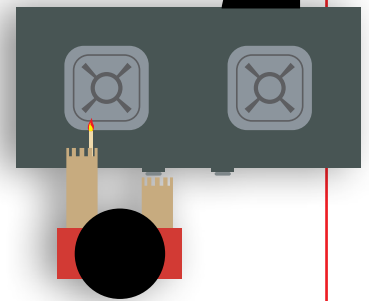
1



Before lighting the stove, ensure that combustible materials are kept away. Additionally, food and oil spills – which could be flammable – should be cleaned immediately.

2

To properly light a stove, ignite a match and direct the flame close to the burner before slowly opening the gas valve. Ensure that the area is well-ventilated to enable complete combustion, never leave the burner unsupervised, and always close the gas valve after use.



3

Do not use liquefied petroleum gas for stoves designed specifically for natural gas – check the labels on the stove and tank. If uncertain, consult a gas licensee authorised by the Energy Commission.



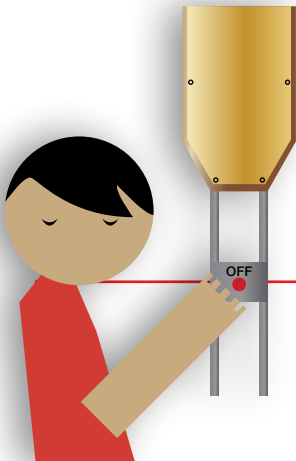
4

The gas hoses used should also be certified and approved by the Energy Commission. In addition, they should regularly be checked and serviced by a certified gas-competent person who is attached to a gas contractor registered with the Energy Commission, to ensure that there are no leaks.



5

Consumers should never attempt to connect gas piping themselves or undertake excavation work close to gas pipes. In the event of a suspected gas leak, ensure that all gas valves are closed, and all doors and windows are opened, before notifying the gas dealer or gas licensee authorised by the Energy Commission. In the meanwhile, do not switch any electrical appliances on or off.





Safety First

Smarter Consumers, Safer Electrical Appliances

Under the *Electricity Supply Act 1990*, the Energy Commission has been tasked with a number of functions, including “to prescribe the minimum standards and specifications, and appraise and approve where necessary any electrical installation or equipment.” As such, it works closely with the Standards and Industrial Research Institute of Malaysia (SIRIM) – the national certification body for standards and quality, which tests electrical appliances to ensure that they meet preset standards.

Presently, there are 34 categories of electrical and electronic (E&E) equipment that are regulated by the Energy Commission. Thus, the manufacture and/or importation and retail of these appliances need to meet the strict standards laid out by the Commission, and those intending to do so have to apply for a Certificate of Approval (COA), which entails testing by either SIRIM or another recognised foreign laboratory. Upon completion, the product in question will receive permission to be manufactured, imported, advertised and sold in Malaysia, and be affixed with a label jointly released by SIRIM and the Energy Commission.

SOUND RESULTS

These efforts help protect E&E consumers in Malaysia as the appliances are stringently tested to safeguard against hazards such as current leakage. Owing to the Energy Commission’s efforts, incidents of electrical accidents – both fatal and non-fatal – have dropped over the years. For example, in 2013, cases of electrical accidents in Malaysia dropped by 16.4% to 46 from 55 in 2012. In addition, the number of fatal accidents per one million consumers dropped from 3.48 in 2012 to 2.36 in 2013, a decline of 31.89%. During the same time period, there was a 1.7% increase in the

number of electricity users, from 8.33 million households in 2012 to 8.43 million in 2013.

The reduction in the number of fatal accidents is also reflective of how the Energy Commission has made public awareness of safety a major priority. This was achieved through several avenues, including a mass media public service advertisement campaign to teach consumers how to test the circuit breaker in their homes, and the publication of guidebooks on electrical safety and the treatment of electric shocks. Furthermore, the regulatory agency also carried out nationwide talks and seminars on these topics.

continued on page 10

REGULATED APPLIANCES

The *Electricity Regulations 1994* stipulate that low-voltage electrical equipment which is produced for domestic use, sold to the general public, or does not require specific skills to operate, must be approved by the Energy Commission before it can be manufactured, imported, displayed or sold. While there were approximately 25 types of approved appliances when the act was first established, the list has been updated following regular reviews, resulting in the 34 categories we see today. These updates are provided to the Royal Malaysian Customs Department and SIRIM.

Energy Malaysia reproduces the list below, while the full record can be downloaded at the Energy Commission's website at www.st.gov.my.



1. Plug top/Plug (15A and below)



2. Switch and Dimmer



3. Socket Outlet (15A and below)

4. Fluorescent Lampholder/ Starter Holder

5. Ceiling Rose



6. Bayonet Cap and Multiways Adaptor



7. Lamp Fitting

8. Capacitor for Fluorescent Lamp

9. Ballast/Control Gear/ Driver for Lamp

10. Circuit Breaker, including AC Current Operated Earth Leakage Circuit Breaker and Miniature Circuit Breaker

11. Portable Luminaire Lamp



12. Kettle, including Heating Elements if supplied separately

13. Kitchen Machine



14. Toaster/Oven



15. Rice Cooker

16. Refrigerator

17. Immersion Water Heater

18. Water Heater, including Heating Elements if supplied separately



19. Washing Machine

20. Fan

21. Hand Operated Hair Dryer

22. Iron

23. Shaver

24. Vaporiser

25. Vacuum Cleaner

26. Hi-Fidelity Set

27. Video and Visual Display Unit

28. Audio and Video Player Unit

29. Massager



30. Air-conditioner (up to 32K Btu/hr)



31. Christmas Lights

32. Domestic Power Tools (portable type)

33. Adaptor/Charger

34. Wire/Cable/Cord (non-armoured) 0.5mm² to 35mm²

PROCEDURE FOR IMPORTING ELECTRICAL & ELECTRONIC EQUIPMENT

Applicant applies for a Certificate of Approval (COA)

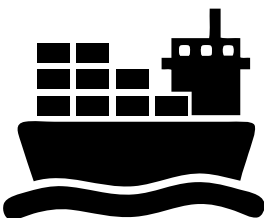
The application must include the name, brand and model type of the equipment, and a test report/CB certificate.



Energy Commission issues the COA



The equipment is imported



Once tested and
verified, safety
labels are issued



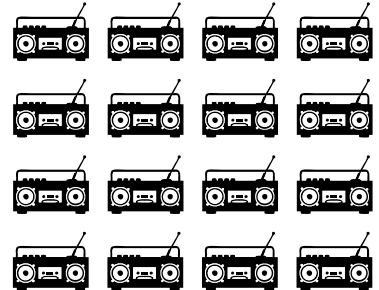
A sample of the
equipment is sent to
SIRIM, to determine
compliance with IEC
standards and national
deviation (voltage,
frequency & plug top
configuration)
requirements



Applicant affixes labels on the equipment



Equipment can be placed on the market





TESTING PERFORMANCE

While the Energy Commission sets the standards regarding regulated appliances, SIRIM carries out tests to ensure that these specifications are met. Two types of tests are performed:

Full Type Test

Products manufactured locally are subjected to this test. Electric appliances are sent to SIRIM to ensure they meet the preset requirements of the Certificate of Approval (COA).

Consignment Test

Imported products would be issued a COA if they were tested in a recognised laboratory in their home country and comply with International Electrotechnical Commission (IEC) standards. Once these items reach Malaysian shores, they are sent to SIRIM for consignment tests, which verify their adherence to the specifications they came with. SIRIM also ensures they are compatible with Malaysia's deviation requirements before these products can be sold locally.

During these tests, appliances undergo certain examinations to ensure they are safe to use in a Malaysian environment (considering the humidity and temperature), in addition to standard procedures such as determining hazardous live parts, and ensuring that they are insulated and resistant to impact.

There is a need to be vigilant, and the Energy Commission works with the Royal Malaysian Customs Department to keep an eye out for these specific imports, in order to ensure that only safe products reach Malaysian consumers.

Right: In order to ensure the safety of electricity flow, home owners are encouraged to regularly test their circuit breakers by pressing the button labelled 'T'. If the circuit breaker is working properly, electricity supply will be temporarily interrupted.



Continued from page 6

EMPOWERING CONSUMERS

These efforts are in line with the Energy Commission’s goal of nurturing smart and empowered consumers who are attuned to the safe handling and usage of electrical goods and equipment. The urgency with which the Commission has approached this task was also because a 2013 report showed that many Malaysians were unaware of the need for proper safety measures when using electrical home appliances, in particular water heaters.

Although water heaters already come with an in-built 15mA (milliampere) circuit breaker, regulations require that households with a water heater also install an additional residual-current circuit breaker (RCCB) with a 10mA leakage sensitivity. This is because the built-in RCCB may not be able to detect minute leakages which could cause serious injuries.

Even so, the Energy Commission discovered that nearly 80% of households have yet to install this potentially life-saving device.

This resulted in tragedy for a Japanese expatriate family in September 2013, in a shower electrocution incident. Even more recently, in August this year, a Malaysian woman was electrocuted while in the shower.

Before this second tragedy, the Energy Commission had already leapt into action. For instance, it announced that water heaters installed in new residential buildings and hotels must have the latest safety features. Developers who violate the rule will face a fine of not more than RM5,000.

By ensuring that electrical equipment and consumer goods entering the country meet the strictest standards, the Energy Commission is playing its part in safeguarding the safety and interests of electricity consumers. At the same time, its outreach and public advocacy measures are also empowering consumers with the knowledge they need to protect themselves, and in doing so, setting the stage for a world-class electrical consumer goods sector.



Certifying Competency

Enhancing Skills and Knowledge in Malaysia's Electricity Sector

One of the functions of the Energy Commission is to certify the competency of skilled professionals in the electricity and piped gas industries, in order to ensure that work carried out in these areas is performed by those who have met the requirements to do so. Through this, the Commission contributes to the development of human capital in these sectors

Presently, six professions in the electricity industry are subject to certification by the Energy Commission – namely electrical engineers, electrical services engineers, electrical supervisors, chargemen, wiremen and cable jointers. The Commission achieves this by accrediting training centres that offer courses in these skills, thus ensuring that those seeking to work in the aforementioned occupations are able to meet stringent criteria needed to perform the tasks expected of them.

The certification process is also in line with the *Electricity Supply Act 1990*, which states that “no installation

or electrical plant equipment other than those owned or managed by a supply authority shall be worked or operated except by or under the control of persons possessing such qualifications and holding such certificates as may be prescribed.”

In order to deter uncertified individuals from performing such tasks, the *Electricity Supply Act* also mandates a fine of not more than RM10,000 for any violation, and if the contravention is continued, a fine of not more than RM1,000 for each day or part of a day the violation continues after the initial conviction.

The strict regulation of competent persons in the electricity sector is one of the Energy Commission's main means of safeguarding the safety and interest of consumers, as sub-standard work may not only be costly but also hazardous. In addition, the Commission also has a feature on its website which allows visitors to search for and ascertain whether or not their electrical workman has been registered and certified.

Securing Skilled Workers



Conceptualised and managed by the Energy Commission of Malaysia, the Certificate of Competency ensures that electricity workmen, such as electrical engineers, wiremen and cable joiners – are able to safely and reliably handle the tasks required in their profession. Ir Abdul Rahim Ibrahim, Director of Electrical Safety Regulation at the Energy Commission, explains.

Q: Please tell us about the certification of competency and how the Energy Commission issues them.

A: “There are currently six professions where certification of competency is offered. Each of these professions has a different scope of responsibility, which covers all sectors of industrial activity, including generation, transmission, distribution and end-user.

There are presently 130 training institutions which are accredited by the Energy Commission to provide training and certification. These institutes have all been vetted by our Competency Examination Committee, which is chaired by the CEO, and we conduct an assessment on the training facility and their readiness to run our programmes.”

Q: What are the standards that these institutions have to meet before being accredited?

A: “Among the criteria we appraise are the number of competent trainers, testing equipment and the ratio of student to equipment. In addition, the course must also follow the syllabus and number of hours determined by the Energy Commission. Once all requirements are in place, the committee will approve the certificate of accreditation. The training centres are also audited regularly, with 15 centres undergoing full audits every year.”

Q: What other role do the centres play?

A: “The training centres are required to set up an Examination Committee with our endorsement. Prior to examinations, the centres will submit the questions to the Energy Commission committee for approval.

Every institution may have different starting years and specifications, so it is not easy to synchronise the papers for the examinations. However, we vet the papers and ensure that they are in line with the standards set, and the end-result being that the students will have the knowledge of how to carry out electrical work safely.

I should also mention that there are provisions under the *Electricity Regulations 1994* to allow the temporary registration of foreign experts. Those recognised by their home country and with the necessary qualifications and skills required to work in Malaysia may be issued a renewable certificate valid for 12 months.”

Q: How has the Energy Commission’s certification of competency been received outside of Malaysia?

A: “As a result of the high standards Malaysia has set for workers handling voltage, several certificate holders outside Malaysia such as in the Middle East and Australia have provided unofficial feedback, and informed us that many companies recognise their qualifications. There is also potential for the certificate to be recognised by Asean member states.”

Electrocution and the Human Body

As dangerous as it is useful, electricity can cause various levels of damage to people, ranging from mild discomfort to death. Thus it is important to ensure that only registered and competent professionals work on electrical projects, as often shoddy workmanship is responsible for electricity-related injuries and fatalities.

ELECTRIC CURRENT (1 SECOND AFTER CONTACT)	PHYSIOLOGICAL EFFECT
1mA	A tingling sensation (Nerve cells communicate through transmission of electrical signals, and these impulses may be overridden by the small current.)
5mA	Accepted as maximum harmless current.
10 - 20mA	Beginning of sustained muscular contraction, may lead to being unable to let go of items held.
100 - 300mA	Ventricular fibrillation (heart stops), may lead to death. Respiratory function continues.
6A	Sustained entricular contraction followed by normal heart rhythm. Temporary respiratory paralysis, and burns.

Source: http://www.hsa.ie/eng/Topics/Electricity/Dangers_of_Electricity

Energy Malaysia presents a quick overview of the requirements for obtaining a certification of competency. Further details are available on the Energy Commission's website at www.st.gov.my.

Registered Electrical Competent Person

Name of Competent Person :

Competency Certificate :

Competency : JURUTERA ELEKTRIK KOMPETEN

Category :

Regional Office : PEJABAT KAWASAN N. SELANGOR & WP (KL & PUTRAJAYA)

Organization Name :

SSM Reg. No :

Voltage : 1 kV

20 Last Update : 20/01/2015

Areas of Competency

PROFESSION



**ELECTRICAL
ENGINEER**


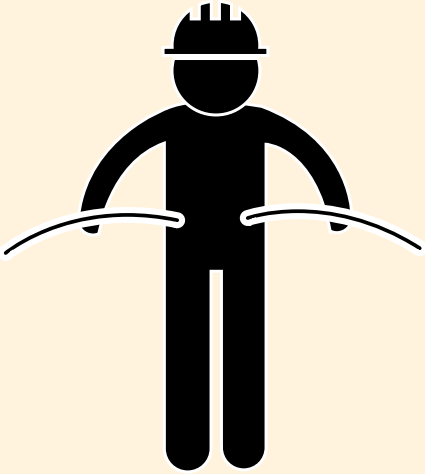



**ELECTRICAL
SERVICES
ENGINEER**



**ELECTRICAL
SUPERVISOR**

MAXIMUM VOLTAGE HANDLING (kV)	DESCRIPTION	CRITERIA
1kV, 11kV, 33kV, 132kV, 275kV, 500kV	Electrical Services Engineers are at the highest level of competency	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ has a Certificate of Competency as an Electrical Engineer ○ has experience in carrying out work related to maintenance and repair, overhaul and servicing, calibration, testing and fitting, and detecting damaged cables ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations
1kV, 11kV, 33kV, 132kV, 275kV, 500kV	Electrical Competent Engineers	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ has a degree or equivalent in electrical engineering from a recognised university or institute, or ○ is a professional electrical engineer registered under the Board of Engineers Malaysia, or ○ has work experience of not less than five (5) years in an environment where there is electrical equipment operating and have had the experience of controlling the equipment life ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge about the practices of modern electrical engineering ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations
1kV	Supervises installations	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ has a diploma or equivalent in electrical engineering from institutions ○ is recognised by the Public Service Department or accredited by the Malaysian Qualification Agency, or ○ has no less than 5 years experience in voltage restrictions up to 1kV in electrical installation operation and at least one of the following categories: <ul style="list-style-type: none"> a) Maintenance work b) Works design c) Supervision d) Commissioning of electrical installation ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge about the practices of modern electrical engineering ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations

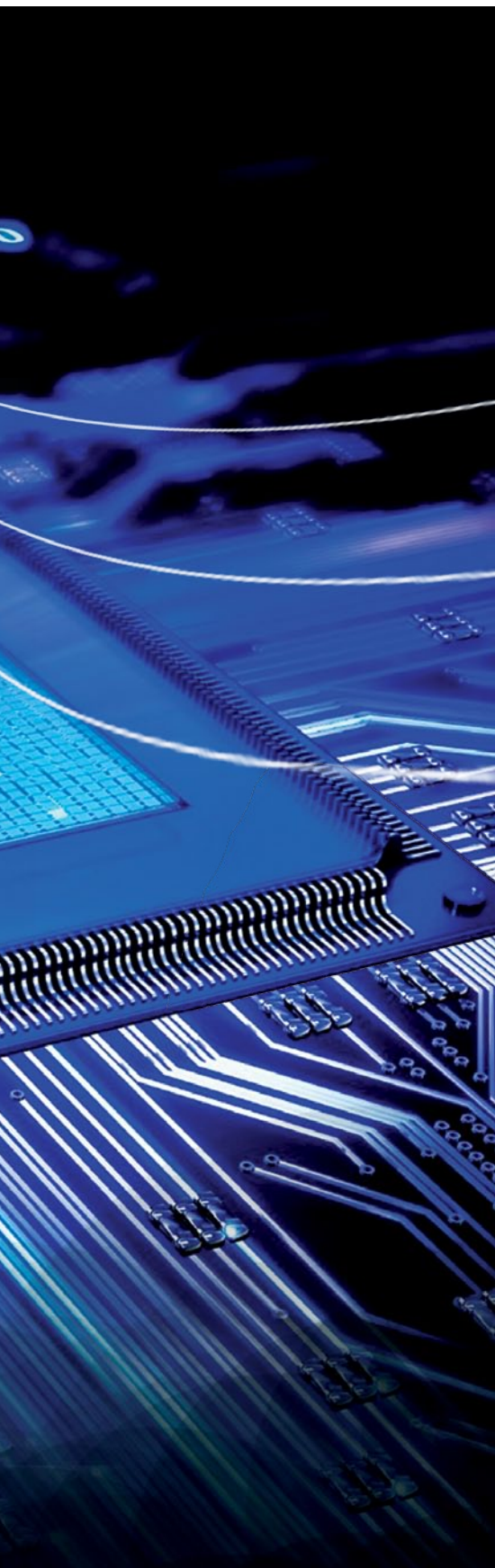
PROFESSION	MAXIMUM VOLTAGE HANDLING (kV)
 <p>CHARGEMEN</p>	1kV, 11kV, 33kV
 <p>CABLE JOINTERS</p>	1kV, 11kV, 33kV, 132kV, 275kV, 500kV
 <p>WIREMEN</p>	Low voltage

DESCRIPTION	CRITERIA
<p>In charge of day to day operations and maintenance, maintains switchboards and makes sure a plant's electrical system is in order</p>	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ is not less than 20 years old ○ has a minimum of Form Five education ○ has no less than 3 years working experience in an environment requiring the operation of electrical equipment and has experience in controlling such equipment ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge of electrical equipment and can operate and fix them without danger ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations
<p>Specialises in joining cable, such as underground cables</p>	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ is not less than 20 years old ○ has a minimum of Form Five education ○ has no less than 3 years working experience in cable jointing, connecting and termination of various types of cables ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations
<p>Manages all wiring systems, does not deal with power supply systems</p>	<ul style="list-style-type: none"> • Fill out and submit form ST (PE) 1 in. 4/2006 to the Energy Commission. • Must be a Malaysian citizen who <ul style="list-style-type: none"> ○ is not less than 18 years old ○ has a minimum of Form Five education ○ has no less than 2 years working experience in electrical wiring with an electrical contractor or private wiring unit registered with the Energy Commission ○ is proficient in Bahasa Malaysia ○ has sufficient knowledge and skill of wiring for any installation ○ has sufficient knowledge of first aid and treatment of electric shocks ○ has sufficient knowledge of the <i>Electricity Supply Act 1990</i> and other regulations

The IT Factor

Using Information Technology to Enhance Energy Sector Service Delivery

In today's connected world, almost every organisation utilises ICT – from using computers to make their operations run more efficiently, to having a social media page in order to better reach out to stakeholders. The Energy Commission has embraced ICT which has helped it improve processes and efficiency, as well as provide energy consumers with a broad range of services to enhance their experience.



ACCESSIBILITY ACHIEVED

The Energy Commission's online presence is manifested in two ways – internally and externally. Through its Intranet connection, the Commission's headquarters and nine regional offices are able to link-up with one another and exchange/access necessary information and documents.

For members of the public, their first experience of the Energy Commission's IT services is most likely the website. Located at www.st.gov.my and available in both Malay and English, the Energy Commission website is a one-stop hub for both consumers and industry players to gain information about the electricity and piped gas sectors in Malaysia, as well as the Commission's role as the regulator of these two industries.

Due to its simple layout, visitors – which number more than 3.6 million at the time of writing – are able to quickly identify and locate the information they require. For instance, if someone wants to refer to a law such as the *Electricity Supply Act 1990*, they are able to easily navigate to the page or search for it via the built-in search engine. In addition, the no-frills set up means that demands on bandwidth will not be high, thus ensuring faster surfing.

EMPOWERING COMPLIANCE

The website also demonstrates the Commission's emphasis on enhancing consumers' awareness and knowledge of their rights and responsibilities. For example, under the section titled 'Consumers', users will find a comprehensive list of information and services for electricity and piped gas users.

As mentioned in *Certifying Competency* which can be read on page 13, those carrying out electrical work need to

have a certificate of competency from the Energy Commission. So what should a home or business owner, who is having electrical work done in the home or office, do if there is doubt about the workman's status?

This is where the website comes into play, as there is an additional search engine (in Malay) which allows users to ascertain the validity and status of a workman's competency certificate. Similarly, users can also search for electrical contractors, electrical energy managers, competent gas workers and contractors, as well as find out if their electrical and gas equipment meet the standards set out by the Commission.

ENCOURAGING PROACTIVE CONSUMERS

By giving consumers access to such information, the Energy Commission is enabling people to be more proactive in the usage and management of electricity and gas. It also aids in efficiency as it takes less time to make a search on the website than it does to phone the Commission, thus allowing home and business owners as well as managers of such buildings to devote more time to other matters.

Another feature of the Energy Commission website is that it gives consumers the ability to file complaints and reports online. All complaints are stored on the Energy Commission's eAduan portal (<http://aduan.st.gov.my>) and users are given a file number against which they can refer to check up on the status of the matter. For those who do not have access to the internet or prefer to use their mobile phones, reports can also be lodged via SMS.

On average, the eAduan portal receives 50 complaints every

month, making it one of the most used parts of the website. Aside from giving consumers an avenue to make complaints, it also enables the Commission to monitor the performance of customer service representatives and ensure that they respond to complaints in as fast a time as possible.

ALL THE ENERGY INFORMATION

While not as interactive as the aforementioned, the inclusion of safety and efficiency tips as well as guidelines on the website has proven to be extremely useful for both the Commission and users. By doing so,

the Energy Commission is not only fulfilling its mandate to promote safety and efficiency, it is also allowing consumers, at a time when internet connection is widespread, to access these extremely useful and important pieces of information at the click of a mouse.

It should also be mentioned that all news articles, press releases, media reports, regulations, laws and circulars related to the Commission and its work, as well as about the electricity and gas sectors in Malaysia, are available online. In fact, **Energy Malaysia** itself can be downloaded from the website.

Not only is the placing of information on the website useful for consumers and service providers, it also enables staff at the Energy Commission to access the necessary answers to queries from the public. This means that enquiries can be handled with speed and efficiency.

It would be remiss to talk of the Energy Commission's usage of IT without mentioning the Malaysia Energy Information Hub (MEIH) at *st.meih.gov.my*. The most detailed and comprehensive database of Malaysia's energy statistics, it is the digital version of the National Energy Balance report, and is supplied with data from 75 providers.

The screenshot displays the homepage of the Energy Commission website. The browser address bar shows 'www.st.gov.my'. The page features a blue and white color scheme. On the left, a vertical navigation menu lists various sections: HOME, ABOUT US, POLICIES, APPLICATIONS, CONSUMER (highlighted with a red circle), INDUSTRY, MEDIA, FAQs, CAREERS, and CONTACT US. Below the menu, there are language options (Bahasa Malaysia, English), a search bar, and links to News, Tender, Downloads, and Gallery. The main content area includes a large banner with the text 'WELCOME TO THE ENERGY COMMISSION' and 'Suruhanjaya Tenaga' (Energy Commission). Below the banner, there are sections for 'Highlights' (including ATD application updates and LED Lamps COA guidelines), 'Publications' (listing Energy Malaysia volumes and safety reports), and 'Events' (listing seminars and workshops). On the right side, there are several service buttons: MEIH MALAYSIAN ENERGY INFORMATION HUB, GRID SYSTEM OPERATION SUMMARY, COMPETITIVE BIDDING FOR POWER PLANT, e-Aduan, and ONLINE SERVICES (including eSAS, ePermit, OLRC, EDK, and eCOS). At the bottom right, there are links for 'Certification Listing', 'Energy Malaysia' magazine, and 'Garis Panduan Persempadanan Pengurusan dan Penyenggaraan Sistem'.

These comprise government agencies, utilities, power producers, and other players in the energy industry. Thanks to the MEIH, decision-makers have a better understanding of the situation when planning out energy policy.

PARTNER TO PROFESSIONALS

Aside from the end-users of electricity and piped gas, individuals and organisations in the two industries are also able to access vital services

on the Energy Commission website. For example, those who wish to register as an electrical or gas competent person or contractor can do so online.

Set up in 2001, the Energy Commission Operational System (ECOS) has undergone several improvements since then. It is used for a number of tasks, among which are processing applications for licences to

generate electricity of less than 5MW, and registering as an electrical competent person, or to take the examination that will certify individuals as such.

By upgrading the system, the Energy Commission aims to simplify and speed-up the application and approval procedure, as well as enable online payment for those services that require a fee. In addition, rather than having to provide supporting documentation, applicants need to declare that they comply with the necessary requirements. While documentation may still be requested by the Commission, this new system makes it easier for people, particularly those who do not have a digital copy of their certificates and other relevant files.

The Energy Commission website (left) is one of the most comprehensive around, and among the information available on it are details for consumers on how to properly handle electrical products (below).



One other service available online is E-Kelengkapan (<http://ekelengkapan.st.gov.my>), which is used to register for a permit to manufacture/import/sell electrical goods in Malaysia. As explained in *The Application of Safety*, the Energy Commission works closely with SIRIM and the Royal Malaysian Customs Department to ensure that electrical goods sold in the country meet certain standards of safety. Through E-Kelengkapan, the process is made simpler and faster.

It is also important to bear in mind that the Energy Commission also oversees the piped gas sector, and it comes as no surprise that it has placed many vital services for the gas industry online. These include gas utility registration, issuance of licences and registration to be a contractor. Known as the Online Application System (OAS) and located at <http://oas.st.gov.my>, it is the one-stop centre for piped gas needs.

The many interactive features and forms on the Energy Commission's websites empower consumers by giving them ease of access to tools that allow them to look out for their best interests when it comes to the energy sector. The Commission will also introduce a dedicated online payment platform on the 1st of March, making things easier for consumers and industry players to make payment online.

Domestic Connections

Safe and Reliable Wiring Systems for the Home

In 2008, the Energy Commission produced and released the *Guidelines for Electrical Wiring in Residential Buildings*, in an effort to ensure that electrical wiring works are carried out in accordance with established safety procedures and regulations. Aside from improving compliance with the *Electricity Supply Act 1990* and the *Electricity Regulations 1994*, these measures also serve to minimise the occurrence of avoidable accidents that could result in injury to individuals or harm to property.

Diverse Components

Broadly speaking, every electrical wiring system is comprised of various electrical equipment, including cables, switch boards, main switches, fuses or miniature circuit breakers (MCB), residual current devices (RCD), lighting points, power points and lightning arrestors, among others.

Safeguarding Methods

Control and protection systems are needed in each electrical installation to facilitate isolation and switching, by manually interrupting supply in a specific circuit without interfering other circuits. This means that they are also able to minimise the risk of electrical shocks during maintenance, testing, troubleshooting and repair works.

Components that provide isolation and switching capabilities include switches, power plugs, socket outlets and circuit breakers.

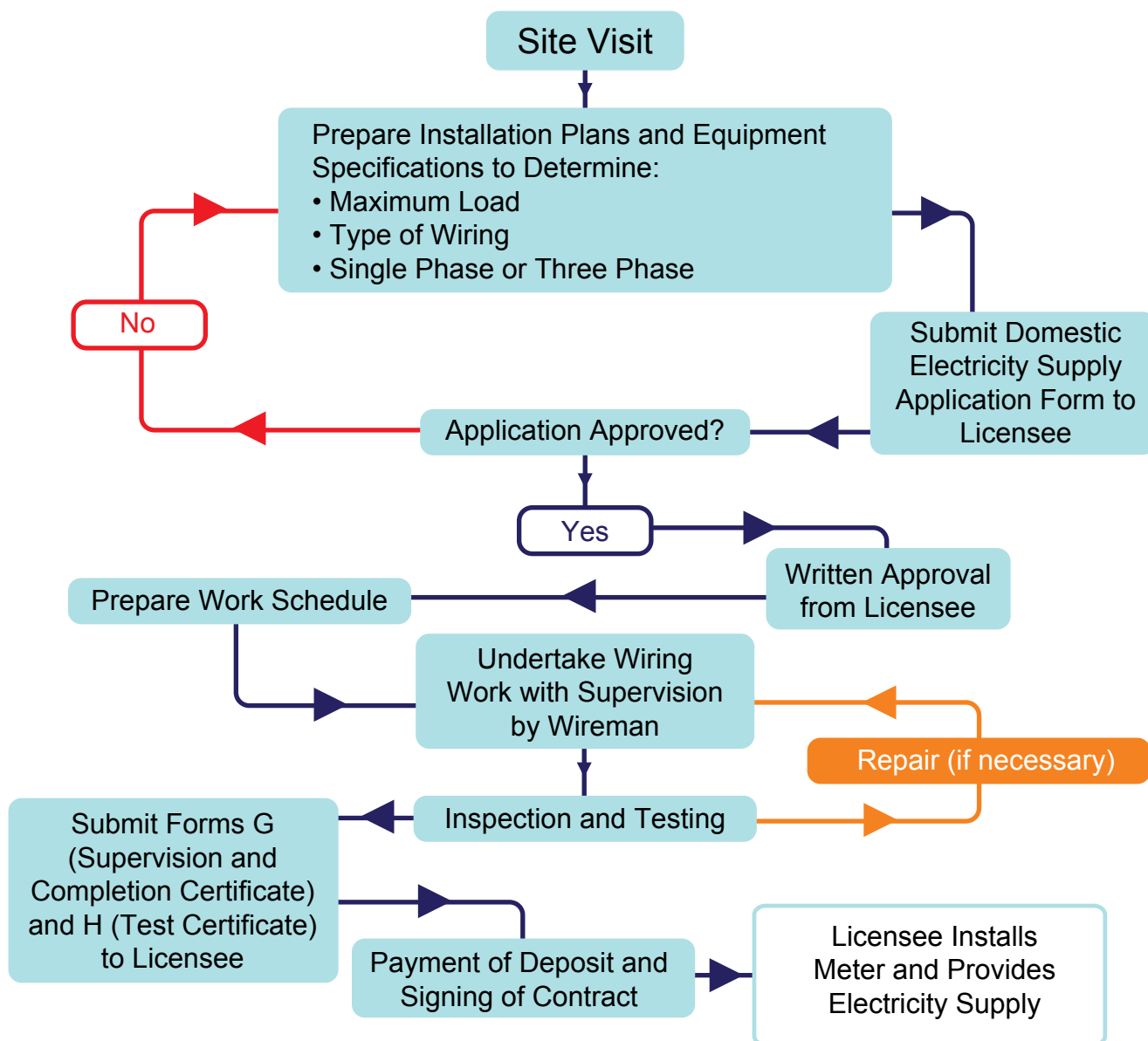
These equipment provide protection from hazardous and potentially harmful events such as overcurrent surges (including overloads and short circuits) and earth current leakages, as well as lightning surges and other significant overvoltage surges.

Capable Cables

Various criteria determining the types and sizes of cables used have been outlined by the Commission, broadly requiring that;

- | | | | | |
|--|--|---|---|--|
| 1. All wiring cables use copper conductors and are insulated with PVC. | 2. Cables used in swimming pools are insulated with water resistant polyethylene (PE). | 3. Selected cables must be able to deliver electrical energy efficiently. | 4. The cable size allows it to carry the required current without heating the cable. | 5. The drop in voltage caused by the cable must not exceed 4% of the supply voltage. |
| | 6. The type of cable insulation used must suit surrounding conditions, including factors such as temperature and the ability to provide mechanical protection. | | 7. Damage to the cable insulation must be prevented by protecting each conductor in the installation with overcurrent protection devices. | |

Procedure for Installing Single Phase and Three Phase Electrical Wiring Systems



To assist wiremen and electrical contractors, the Energy Commission has prepared a simple and straightforward procedure that should be followed during the installation of electrical wiring systems.

Aside from helping guarantee compliance with the relevant laws and regulations, the Energy Commission's *Guidelines for Electrical Wiring in Residential Buildings* assists professionals in ensuring that all electrical installations are completed in a manner that is neat, timely and safe. To accomplish this, the publication highlights areas of concern that may pose a threat to people and property, in addition to explaining best practice approaches.

Cheaper Power for All

Malaysia Approves Electricity Tariff Reductions

To ensure that Malaysia remains on the path of stable growth in order to achieve its development goals by the year 2020, maintaining reasonable and affordable electrical supply is imperative to all sectors of the economy. In recent times, continuing fluctuations in global fuel prices and the cost of generation have prompted the Ministry of Energy, Green Technology and Water (KeTTHA) to initiate a review of electricity tariff rates, as prescribed by the Imbalance Cost Pass-Through (ICPT) mechanism implemented in January 2014.



“Domestic consumers using below 300 kWh of electricity a month are not affected by the [tariff review] decision.”

– **Datuk Seri Dr Maximus Ongkili**
Energy, Green Technology
and Water Minister



DYNAMIC REVISIONS

The most recent electricity price increase took effect on the 1st of January, 2014, affecting Peninsular Malaysia, Sabah and Labuan. Specifically, Peninsular Malaysia saw a 14.89% rise in the average electricity tariff, which equates to 4.99 sen/kWh and a rate of 38.53 sen/kWh. In Sabah and the Federal Territory of Labuan, a 17% tariff increment was implemented, resulting in an increase of 5 sen/kWh, to 34.52 sen/kWh.

It was at this point that the ICPT system was also introduced in Peninsular Malaysia, as part of the Incentive-Based Regulation (IBR) framework – which revamped tariff calculation by factoring in utilities’ average costs and revenue requirements. The ICPT mechanism enables fluctuations in fuel and generation costs to be clearly reflected in electricity tariffs within six months.

Following a Cabinet meeting held on the 31st of October 2014 in response to global fuel price fluctuations, a statement issued by KeTTHA announced that existing tariff rates would be maintained until June 2015. The Ministry advised that in spite of fuel price changes which warranted a tariff hike of 1.62 sen/kWh under the ICPT system, these additional costs

would be absorbed by the government at a cost of RM1.683 billion. This decision was reiterated during Prime Minister Datuk Seri Najib Tun Abdul Razak’s Budget 2015 revision speech on the 20th of January 2015.

SHARED SAVINGS

However, the persisting trend of falling global fuel prices has since spurred KeTTHA and the Energy Commission to jointly carry out a review of the fuel and other generation costs currently being faced by energy utilities operating in Malaysia. In addition to taking into account the principles of the ICPT mechanism, this procedure also involved an examination of the actual performance of power

plants and cost of fuel sources – encompassing piped gas, liquefied natural gas (LNG) and coal.

Upon concluding this analysis, the Ministry announced that the cost savings which were identified in this review and can be passed on to consumers through a lower electricity tariff amounts to a total of RM726.99 million. This figure is partly attributable to the widening utilisation of coal – compared to alternative fuel sources such as medium fuel oil (MFO) and distillates – as well as improvements to the efficiency and performance of coal-fired power plants.

In light of these factors, the savings resulting from the latest tariff review

Understanding the Rate Cut

Working examples of how the 2.25 sen/kWh savings derived from the Imbalance Cost Pass-Through (ICPT) mechanism affects domestic consumers in Peninsular Malaysia.

Usage Category (kWh/month)	Rate (sen/kWh)	Usage of 600 kWh/month	Usage of 800 kWh/month	Usage of 1,000 kWh/month	Usage of 1,500 kWh/month	Usage of 2,000 kWh/month
0-200	21.8	200 43.60	200 43.60	200 43.60	200 43.60	200 43.60
201-300	33.4	100 33.40	100 33.40	100 33.40	100 33.40	100 33.40
301-600	51.6	300 154.80	300 154.80	300 154.80	300 154.80	300 154.80
601-900	54.6	- -	200 109.20	200 109.20	200 109.20	200 109.20
≥901	57.1	- -	- -	200 114.20	700 399.70	1200 685.20
Electricity Bill before Tariff Review (RM)		231.80	341.00	455.20	740.70	1,026.20
ICPT SAVINGS		-13.50	-18.00	-22.50	-33.75	-45.00
Electricity Bill after Tariff Review (RM)		218.30	323.00	432.70	706.95	981.20

Note: The above calculation does not account for Feed-in-Tariff charges (1.6%)

Source: Ministry of Energy, Green Technology and Water (KeTTHA)

translate to a 5.8% reduction in electricity prices in Peninsular Malaysia, which is equivalent to 2.25 sen/kWh. Meanwhile, KeTTHA also proposed a tariff reduction of 3.5% for Sabah and Labuan, which corresponds with a total of 1.20 sen/kWh.

BALANCED FOCUS

The decision to implement this reduction in electricity tariffs was reached at a subsequent Cabinet meeting held on the 11th of February 2015, during which it was also decided that the new rates would take effect on the 1st of March 2015 and remain in place until the 30th of June 2015. The reduced electricity tariff applies to domestic consumers who utilise more than 300 kWh of electricity per month, and all consumers under non-domestic

“The savings [realised] will depend on the amount of [electricity] usage.”

– Datuk Seri Dr Maximus Ongkili
Energy, Green Technology and Water Minister

categories, including those in the commercial and industrial sectors.

While the latest tariff review does not apply to domestic consumers who utilise less than 300 kWh of electricity per month, this segment already benefits from numerous other

provisions made by the government. For instance, the tariff for the ‘Lifeline Band’ – comprising consumption of up to 200 kWh per month – has been maintained at the rate of 21.8 sen/kWh since 1997, while the tariff rate applying to consumption of 201 kWh to 300 kWh has been maintained at 33.4 sen/kWh since 2009.

Additionally, the energy costs for approximately 1 million of Tenaga Nasional Berhad’s (TNB) domestic customers – comprising those in the ‘Lifeline Band’ with monthly bills amounting to RM20 or less – will continue to be borne by the government. When viewed together, these factors combine to effectively provide domestic consumers utilising less than 300 kWh of electricity per month with lower energy prices as opposed to other groups.

While maintaining its emphasis on improving the productivity and competitiveness of the Malaysian economy in relation to other regional nations, the government acknowledges the importance of balancing these interest against popular concerns over the affordability of energy. Demonstrating its commitment to ensuring that tariff reductions such as this can be realised and sustained, it also recently announced that current fuel subsidy levels would be maintained, at an estimated annual cost of RM260 million.



Keeping Watch

Protecting Electricity Consumers through Monitoring and Enforcement

To ensure that illicit acts such as electricity theft and shoddy electrical installation and wiring work do not occur, it is essential for electricity regulatory agencies to oversee consumer behaviour. In Malaysia, the *Electricity Supply Act 1990 (ESA)* and the *Electricity Regulations 1994 (ER)* empower the Energy Commission to do this.

It is the task of the Enforcement and Regional Coordination Department to combat violations of the ESA and ER. This mandate is derived from the ESA, which states that the Energy Commission has the power to inspect suspected violations of the Act, subject to the approval of the Minister of Energy, Green Technology and Water.

In cases of electricity theft, enforcement officers usually face several obstacles. For instance, the efforts of violators to conceal their activities can be quite complex. These include using underground cables to create an illegal connection from the supply pillar to the premise. In such situations, enforcement officers have to use excavators to dig up the ground to find the connection.

Sometimes, the legal and illegal supply might be linked via a switch, which can be turned on and off. So, during a raid, the operator

of the premise can disconnect the illegal flow thus resulting in readings showing that the electricity supply is from a legitimate source.

Thus, it is vital that prompt action is taken. This is why, enforcement officers can enter a building without a warrant and seize relevant evidence, if there is reason to believe that the time to apply for one will result in the removal of evidence from the scene.

When asked what drives offenders to employ such complicated and expensive methods just to pilfer electricity, the Director of Regional Operations and Enforcement's answer was a simple one – "Greed".

"Industrial and commercial power consumers can consume electricity totalling hundreds of thousands to millions of ringgit each month. By stealing electricity, they only pay a fraction of what they really owe," he explained.

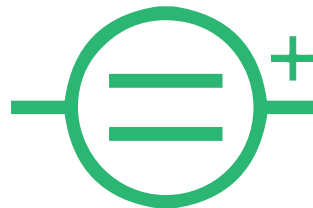


ELECTRICITY THEFT METHODS



Meters:

- Tampering with meters and seals
- By-passing the meters
- Damaging or removing meters



Transformers:

- Illegal terminal taps of overhead lines on the low side of the transformer



Wires/ Cables

- Illegal tapping to bare wires or underground cables

Among the tasks of the Energy Commission's monitoring and enforcement team is to investigate cases of electricity theft, which could be committed through the various methods listed in the illustration.



“Under the Incentive-Based Regulation (IBR) system, electricity tariffs are calculated by measuring the amount produced against the income received from electricity bills. So in cases of electricity theft, the usage is there, but it is not paid for. So, electricity tariffs may go up to meet that shortfall.”

- Ir Othman Omar
Director of Enforcement and
Regional Coordination,
Energy Commission

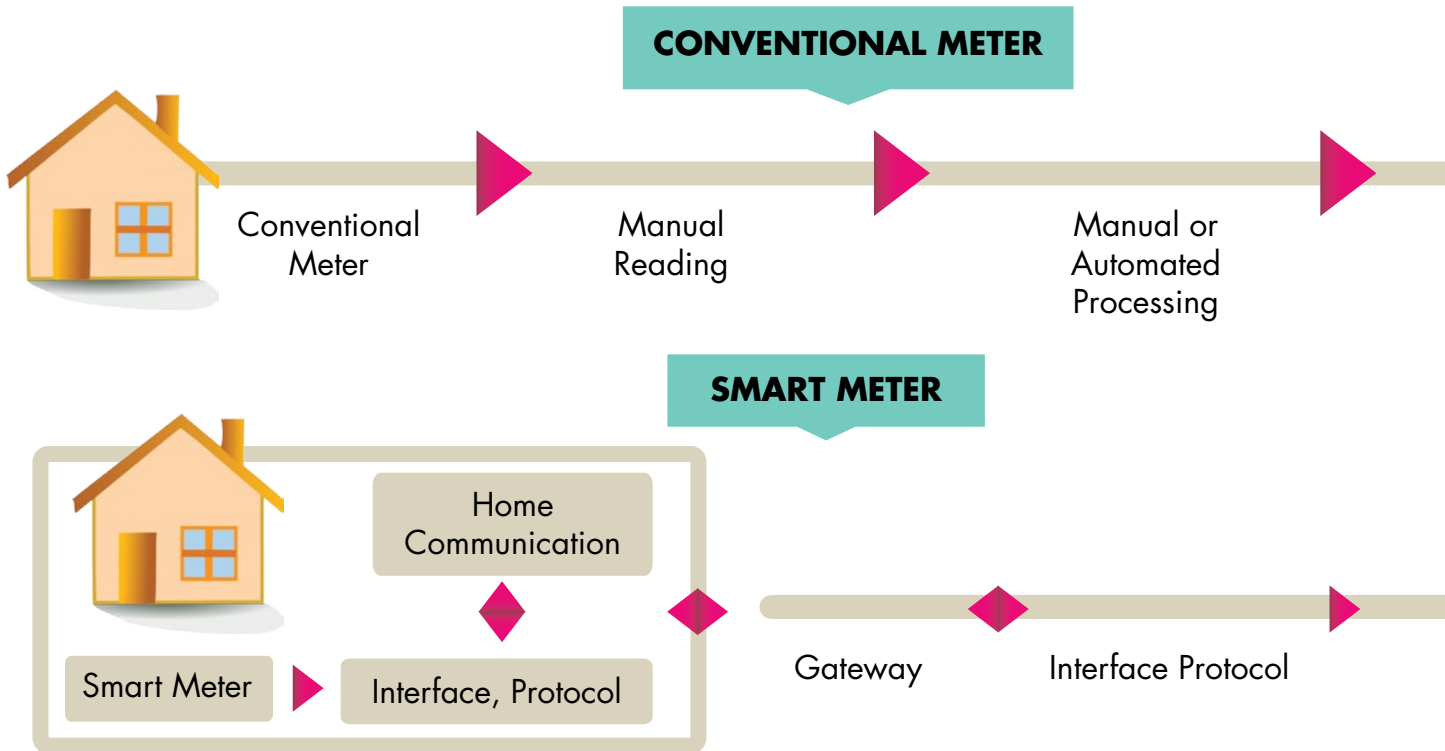
THE COST OF ELECTRICITY FRAUD

Unlike other forms of theft such as burglary or robbery, the seriousness of electricity theft might not be fully appreciated by the public at large, as the stolen ‘item’ does not have a tangible physical presence. Nevertheless, whether it is through siphoning supply or meter tampering, its effects are more damaging than popularly thought.

For instance, the financial cost can be astronomical. As related by Enforcement and Regional Coordination Director Ir Othman Omar, in Peninsular Malaysia alone, the utility – Tenaga Nasional Berhad (TNB) – loses tens to hundreds of millions of ringgit annually as a result

of such fraud. In one case, which as at time of writing is still being heard in court, TNB is pursuing damages amounting to RM14 million for lost revenue owing to electricity theft.

It should be noted that it is not just the utility that has to bear the cost. In fact, those who steal electricity also cause problems for honest consumers. As Ir Othman explained, “Under the Incentive-Based Regulation (IBR) system, electricity tariffs are calculated by measuring the amount produced against the income received from electricity bills. So in cases of electricity theft, the usage is there, but it is not paid for. So, electricity tariffs may go up to meet that shortfall.”



VIOLATIONS AND PENALTIES

- 1.** Tampering with or adjusting any installation; as well as manufacturing, importing, or selling any equipment with the intention or which is likely to cause danger to life and limb, property or installation may be, upon conviction, punished by a fine of up to RM100,000 or a jail term of up to five years or both.
- 2.** Acting rashly or negligently, or failing to act when needed, in the handling of any electrical equipment or installation, which leads to damage to any person or property may be, upon conviction, punished by a fine of up to RM50,000 or a jail term of up to three years or both.
- 3.** Siphoning, consuming or using electricity in a dishonest manner, or altering the index of an electricity meter or preventing a meter from properly or accurately measuring electricity use may be, upon conviction, punished by a fine of up to RM100,000 or a jail term of up to three years or both.



Database

According to Ir Othman Omar, the portfolios of electricity thieves differ between Peninsular Malaysia and Sabah. For instance, in West Malaysia, most offenders are already account holders who siphon electricity because they are unable or unwilling to pay the bills. However, in Sabah, many cases of electricity theft are by people living in makeshift villages who take it from nearby electricity poles.

Database

Top: Through the use of smart meters, energy regulators and utilities can obtain real-time information about electricity use which will alert them when a discrepancy occurs, such as a spike in demand without a corresponding increase in the meter reading.

Below: Enforcement officers from the Energy Commission testing electricity meters at a premise to verify that they are in proper working order.



From an environmental point of view, electricity theft is also detrimental as 1.6% from our electricity bills is distributed to the Sustainable Energy Development Authority of Malaysia (SEDA) to manage the Renewable Energy Fund, which is used to finance the feed-in-tariff (FiT) system for renewable energy generation. Therefore, those who steal electricity are either not contributing, or contributing less than they should, to sustainability.

STRICT ENFORCEMENT

Stopping electricity theft is therefore crucial. Technology plays an important role in this, as demonstrated by smart meters which – according to Ir Othman – enable the utility and the regulator to better monitor electricity usage. Thus any deviation such as a sudden drop in consumption during what are normally peak hours will result in the sounding of the proverbial alarm.

Another method is to carry out an energy audit. The Energy Commission's enforcement team conducted one recently at an ice factory in Penang. As Ir Othman

explained, "Through this audit, we were able to determine how much power such factories consume, and we can use that as a benchmark when inspecting other ice factories."

However, one challenge is the severity of the penalties imposed on violators. Although the law provides for a fine or a jail term, as far as Ir Othman knows, no one has ever been fined the full amount, while jail terms have yet to be imposed for electricity theft.

"Most of the time, perpetrators are fined around RM80,000. But when you have managed to save up to a few million ringgit by stealing electricity, even a few hundred thousand ringgit is nothing to them," he observed.

The solution he advances is to increase the penalty, and this is what is in store, as a proposed amendment to the law will see the fine for first-time industrial offenders increased from RM100,000 to RM1 million, while subsequent violations will see violators face penalties as high as RM5 million.

A well-regulated energy sector is one where enforcement is effective, and which ensures safety, security and fairness for all stakeholders, particularly consumers. By carrying out their dedicated roles, the members of the Energy Commission's Enforcement and Regional Coordination Department execute this responsibility and play their part in bringing about a world-class energy sector.

Cent-sible Stats

Watching Energy Costs and Prices

0 3 1 5 4 0 2

To promote and improve public awareness in relation to the reliability and affordability of electrical supply in the nation, the Energy Commission regularly analyses the quality and efficiency of the industry. One of the Commission's most recent publications relating to this area is the report entitled *Performance and Statistical Information on Electricity Supply Industry in Malaysia 2013*, which contains insightful information on the average selling price and generation costs of energy utilities, both in Malaysia and abroad.

A REGIONAL RECKONING

Primarily, the information highlights the average selling price of electricity (in Malaysian sen/kWh) among a number of key energy utility companies from around East and Southeast Asia. In addition to this, the statistics also outline the average selling price that is applied to energy consumers in a range of sectors.

In broad terms, these categories encompass domestic, commercial and industrial consumers, as well as public lighting, agriculture and the overall average selling price that is imposed. The energy utility companies that are included are Tenaga Nasional Berhad (TNB), Sabah Electricity Sdn Bhd (SESB) and Sarawak Energy Berhad (SEB), each of which service specific regions of Malaysia.

Aside from these local utility firms, large power companies from

overseas were also included, such as Perusahaan Listrik Negara (PLN) from Indonesia, Taipower from Taiwan, the Electricity Generating Authority of Thailand (EGAT), the China Light & Power Company (CLP) from Hong Kong, Meralco from the Philippines, the Tokyo Electric Power Company (TEPCO) from Japan, Singapore Power, and the Korea Electric Power Corporation (KEPCO) from South Korea.

Statistics illustrate that energy utility companies in Malaysia provide electricity at some of the most affordable and competitive rates among their international counterparts.

Average Electricity Selling Price (sen/kWh)
of Selected Power Utility Companies in 2013

Power Utility Companies	Domestic	Commercial	Industry	Public Lighting	Agriculture	Total
TNB, Malaysia	29.18	40.86	30.96	21.54	39.44	33.88
SESB, Malaysia	25.08	32.98	28.13	18.51	n/a	29.12
SEB, Malaysia	31.25	31.95	25.07	47.09	n/a	29.87
PLN, Indonesia	21.06	32.41	23.70	26.97	n/a	24.34
Taipower, Taiwan	29.86	35.93	28.22	13.59	n/a	30.19
EGAT, Thailand	38.90	36.04	n/a	n/a	32.82	37.52
CLP, Hong Kong	n/a	n/a	n/a	n/a	n/a	39.29
Meralco, Philippines	81.43	72.01	57.26	8.54	n/a	70.40
TEPCO, Japan	78.86	86.88	n/a	n/a	n/a	79.60
KEPCO, Korea	34.85	31.75	26.31	27.76	12.71	28.05
Singapore Power	57.50	52.62	49.75	n/a	n/a	56.89

Source: Energy Commission

THE PRICE OF POWER

In general, the figures presented illustrate that energy utility companies in Malaysia provide electricity at the most affordable and competitive rates, as compared to their international counterparts. For instance, all of Malaysia's utilities are in the top-five when it comes to supplying electricity to residences. While the average selling price for domestic customers set by Indonesia's PLN is the cheapest at 21.06 sen/kWh, this is closely followed by

SESB, TNB and SEB, which provide service at 25.08 senb/kWh, 29.18 sen/kWh and 31.25 sen/kWh respectively.

In terms of the provision of electricity to commercial premises, Malaysian utilities also perform strongly. Specifically, SEB and SESB have recorded the second and fourth most affordable rates at 31.95 sen/kWh and 32.98 sen/kWh respectively, behind only to KEPCO (which supplies at 31.75 sen/kWh) and PLN (at 32.14 sen/kWh).

Utility companies from both Malaysia and abroad perform similarly in relation to industrial supply, with SEB and SESB claiming the second and fourth spots at 25.07 sen/kWh and 28.13 sen/kWh respectively, behind PLN and KEPCO, which provide electricity at 23.70 sen/kWh and 26.31 sen/kWh respectively.

Malaysian utilities also perform strongly in relation to average selling prices for public lighting and agricultural applications. Specifically, SESB and TNB have

Generation Costs of Major Power Utility Companies

Tenaga Nasional Berhad (TNB) (sen/kWh)

	2008	2009	2010	2011	2012	2013
(a) Own Generation	13.22	17.65	16.16	18.22	20.28	20.13
(b) Energy Purchased	17.50	23.01	21.99	24.68	25.05	22.80
(c) Overall Cost - (a) & (b)	16.29	21.58	20.42	23.08	23.95	23.03

Sabah Electricity Sdn Bhd (SESB) (sen/kWh)

	2008	2009	2010	2011	2012	2013
(a) Own Generation	12.80	15.23	17.42	24.30	16.16	17.84
(b) Energy Purchased	17.80	16.44	22.33	25.80	17.90	20.04
(c) Overall Cost - (a) & (b)	16.00	16.15	21.21	25.20	17.40	19.38

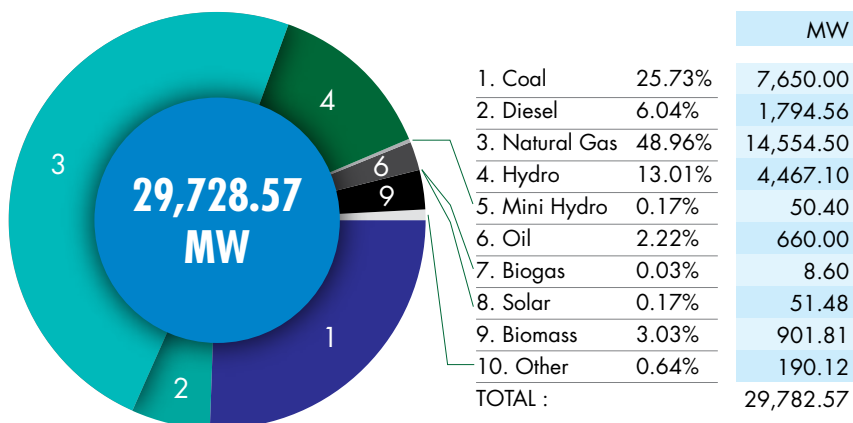
Sarawak Energy Berhad (SEB) (sen/kWh)

	2008	2009	2010	2011	2012	2013
(a) Own Generation	19.2	15.6	14.6	21.8	25.89	11.58
(b) Energy Purchased	13.6	15.4	14.2	13.2	11.72	10.75
(c) Overall Cost - (a) & (b)	16.2	15.5	14.3	15.4	14.15	10.85

Notes: Cost (capacity, energy) / Total Units Generated (for IPP, based on condition stipulated in PPA/SLA)
Due to restructuring of SEB in 2011, SEB's generation cost takes into account the generation cost of Sejangkat Power Corporation, Sarawak Power Corporation, PPLS Power Generation and Mukah Power Generation

Source: Energy Commission

2013 Installed Generation Capacity in Malaysia by Fuel Type



Both the generation cost faced by power companies and the average electricity prices they impose are determined by the fuel used and the underlying cost attached to it.

Source: Energy Commission

recorded the third and fourth most affordable rates for public lighting at 18.51 sen/kWh and 21.54 sen/kWh respectively, led by Meralco from the Philippines – at 8.54 sen/kWh – and Taipower from Taiwan – at 13.59 sen/kWh. Meanwhile, TNB offers the third most affordable rate for agricultural consumers among the utilities with available data, at 39.44 sen/kWh, as compared to KEPCO and EGAT, which offer rates of 12.71 sen/kWh and 32.82 sen/kWh respectively.

In terms of the overall average selling prices imposed by the energy utility companies mentioned, Malaysian service providers SESB and SEB offer the third and fourth most affordable rates at 29.12 sen/kWh and 29.87 sen/kWh respectively – led only by Indonesia's PLN at 24.34 sen/kWh and South Korea's KEPCO at 28.05 sen/kWh.

SUSTAINING PRODUCTION

Aside from the statistics relating to average selling price mentioned,

the information provided in the *Performance and Statistical Information on Electricity Supply Industry in Malaysia 2013* also encompasses the cost of electricity generation faced by major energy utility companies operating in Malaysia. Utility providers include TNB, SESB and SEB.

Notably, the report includes differentiations between the cost associated with electricity generated internally by the utility, energy that is produced by other Independent Power Producers (IPPs) and purchased by the utility, as well as overall totals integrating both of the former cost centres. In addition, this information relating to the average cost of electricity generation is based on calculations that take into consideration the total number of units generated.

For TNB, which operates and supplies electricity to energy consumers in Peninsular Malaysia, the average cost applying to all three categories recorded a drop in 2013. Specifically,

the cost of internally-generated electricity fell from 20.28 sen/kWh to 20.13 sen/kWh, while the cost of electricity purchased from IPPs dropped from 25.05 sen/kWh to 22.80 sen/kWh. As a result, the overall cost of production reduced from 23.95 sen/kWh to 23.03 sen/kWh.

SEB, which operates in Sarawak, also achieved reductions in the cost associated with each of the three sectors in 2013. The cost of electricity generated internally recorded a significant drop from 25.89 sen/kWh to 11.58 sen/kWh, while purchased electricity was also more affordable, a drop from 11.72 sen/kWh to 10.75 sen/kWh. Consequently, electricity production cost fell from 14.15 sen/kWh to 10.85 sen/kWh.

On the other hand, energy utility SESB, serving consumers in Sabah, faced a rise in all three areas during the same period. While the cost of electricity generated internally rose from 16.16 sen/kWh to 17.84 sen/kWh, the cost of purchased electricity also increased from 17.90 sen/kWh to 20.04 sen/kWh, causing the overall cost of production to climb from 17.40 sen/kWh to 19.38 sen/kWh.

Through the *Performance and Statistical Information on Electricity Supply Industry in Malaysia 2013*, the Malaysian public is provided with updates on the latest progress achieved by the electricity industry in the country. While this edition of the report indicates varying changes in the cost efficiency of energy utilities operating in the country, it is important to note that the standard of service they provide remains among the best in the region, particularly in terms of the affordability of supply.

Outstanding Performance

Celebrating Industrial Achievements and Innovation

In collaboration with its agencies, the Ministry of Energy, Green Technology and Water (KeTTHA) organised the KeTTHA Industry Awards 2013 (KIA2013) to recognise excellent local industry players in the fields under the Ministry's purview. The awards ceremony of the inaugural KIA marked several milestones and achievements within the relevant industries, highlighting outstanding performers that have contributed to driving Malaysia's economy forward, and strengthened industry relations.

TAKING THE LEED

Among the most prestigious awards presented during KIA2013 – which took place at the Marriott Hotel Putrajaya on the 21st of November – was the *Energy Efficiency Management Excellence Award (Industry)*, won by Intel Technology Malaysia. The sustainable systems utilised by Intel Malaysia's plants resulted in a reduction of electricity consumption by 7.5GWh annually, as well as a reduction in CO₂ emission by 5.5 thousand tonnes. In addition to this award, Intel Malaysia also received a *Gold Certification in Leadership in Energy and Environmental Design (LEED)*, which was certified under the Green rating system for existing buildings.

Politeknik Merlimau, in Malacca, won the similar *Energy Efficiency Management Excellence Award (Building)*. The government building had undertaken Energy Performance Contracting,





and was also a recipient of the *One Star – Gold Standard ASEAN Energy Management Scheme (AEMAS)* from the ASEAN Centre of Energy (ACE). AEMAS is the world's first regional certification system for energy managers and end-users, and is being implemented in government buildings to reduce energy wastage.

CULTIVATING CAPABILITY

In addition to energy efficiency, awards were also presented to educational institutes aiding the electricity and gas sectors. Institut Kemahiran MARA Lumut, in Perak, received the *Training Institution Excellence Award (Electrical)* for its incubator system, which has proven effective in training electrical contractors, while UTM-MPRC Institute for Oil and Gas won the *Training Institution Excellence Award (Gas)* for training competent engineers and supervisors for the gas sector. Together, these institutes have built a network of specialists for the energy sector in Malaysia.

While educational institutes provide guidance on skills, safety is an important issue contractors must always aim to improve. The winner of the *ASEAN Federation of Electrical Engineering Contractors (AFEEC) Best Electrical Contractor Safety Award* and TNB's *5-Star Performance*, Infrakomas, was also accorded KIA's *Contractor Excellence Award (Electrical)*, for its work in ensuring safety when electrical works are undertaken. The gas category award was won by Misi Setia Oil & Gas, which implemented safe and systematic work procedures to enhance both worker and consumer health by reducing risk.

IMPROVEMENTS IN EFFICIENCY

KeTTHA also presented awards to power producers who have made outstanding and significant contributions



to the energy industry. There were three categories for the *Power Producer Excellence Award* – one each for the Combined Cycle Power Plant, Open Cycle Power Plant and Coal Power Plant. All three were awarded on the basis of increasing plant efficiency and reducing unscheduled downtime.

The NTPC Power Station in Perlis achieved 44.6% thermal efficiency and also saw a drop in unscheduled

downtime to 1%, earning it the award for the Combined Cycle Power Plant category, while the prize for the Open Cycle Power Plant Category went to Port Dickson Power Station for further improving its thermal efficiency to 27.9%, and reducing unscheduled downtime to 0.05%. The SEB Power Station in Sejingkat, Sarawak, achieved a thermal efficiency of 30.7%, resulting in it being awarded the *Power Producer Excellence Award (Coal Power Plant)*.



Considering that energy constitutes one of the most major inputs for the processes undertaken at Intel Technology Malaysia, it should come as no surprise that the company has sought to drastically reduce consumption in recent times.

THE WINNING EDGE



Intel Technology Malaysia

Achievement of LEED Gold certification, and reduction of electricity consumption and CO₂ emissions by 7.5GWh and 5.5 thousand tonnes, respectively.



Politeknik Merlimau, Melaka

Achievement of *One Star – Gold Standard ASEAN Energy Management Scheme (AEMAS)* from the ASEAN Centre of Energy (ACE) and pioneering Energy Performance Contracting (EPC).



Institut Kemahiran MARA Lumut

Incubator system to help train electrical contractors.

UTM-MPRC Institute for Oil and Gas

Successful training of competent persons, including gas engineers and supervisors.



Infrakomas

Received the *ASEAN Federation of Electrical Engineering Contractors (AFEEC) Best Electrical Contractor Safety Award* and awarded *5-Star Performance* by TNB.



Misi Setia Oil & Gas

Successful institution of safe and systematic work procedures.



NTPC Power Station, Perlis

Achievement of thermal efficiency of 44.6% and drop in unscheduled downtime to 1%.

Port Dickson Power Station

Achievement of thermal efficiency of 27.9% and drop in unscheduled downtime to 0.05%.

SEB Power Station, Sejingkat

Achievement of thermal efficiency of 30.7%.

In addition to improvements in the efficiency for both consumers and producers, the sector has seen great achievements in various areas of the energy industry. The awards will motivate players in these industries to continue innovating and providing excellent services in the coming year, and the continued development will undoubtedly bring Malaysia's energy industry to greater heights.

How to Lodge Complaints

A Step-by-Step Guide

As implied in various regulations, such as the Guaranteed Service Levels, energy consumers in Malaysia are assured of safe, efficient and reasonably priced supply of electricity and piped gas. However, there are cases where dissatisfaction may occur owing to problems such as disputes regarding billing, the performance of meters, disruption of supply, or poor standard of work by electricity contractors.

In any instance where service is less than satisfactory, consumers may file a complaint to the Energy Commission through several platforms as highlighted in the following page.



By leveraging modern Information and Communication Technologies (ICT) such as the internet, the Energy Commission is making it easier for consumers to ensure that their energy services remain top-notch.

Remote Assistance

The Energy Commission offers the **eAduan System** for placing complaints, and energy consumers may register their grievances on its website or through SMS.



The Commission also undertakes that

- All complainants will receive acknowledgement of their reports within 1 working day.
- They will also receive a status report within 15 working days.
- For those who require more comprehensive investigation, follow-up status reports are sent periodically.



How to Use eAduan

Complainants need to visit the Energy Commission's website at www.st.gov.my and click on the link titled eAduan which can be found in the sidebar under the heading Consumers.

The following information is needed to facilitate the investigation of the complaint:

- Name, mailing and email address of person making the report
- Name, mailing and email address, telephone number and website address of the company involved
- Specific remarks on the grievance

The status of reports may be viewed on the website. Users are advised to take note of the reference number provided by the portal, together with the supporting documentation they used to submit the complaint (IC number, email address or mobile phone number).



1. Type **ST ADUAN** <followed by your complaint>
2. Send the message to 15888
3. A Reference Number will be sent shortly after for use when making a follow-up report
4. To check your status report, type **ST SEMAK** <Reference Number> and send to 15888

*Please Note: A service charge of 15 cents for every sent message and 20 cents for every received message applies when you use **SMS eAduan**.*

For further assistance and clarification on eAduan Service, members of the public may visit the Energy Commission website or contact the External Relations and Consumer Affairs Unit at 03 8870 8674/8870 8632, Monday to Friday from 9:00 am – 5:00 pm. Please note that the calls will be recorded for monitoring purposes.

The Challenges of Energy Efficiency

A Seminar on EPC Implementation in Government Buildings

To promote the sharing of information on Energy Performance Contracting (EPC), the Energy Commission organised a gathering of public sector energy management professionals on the 18th of December 2014, at Hotel Bangi-Putrajaya in Bandar Baru Bangi, Selangor.





Right: During his welcoming remarks, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan explained that through the EE Challenge 2014, participating schools had dropped their energy use by 4.7 to 5.7%.

Below: The *EE Challenge 2014 Award Ceremony and Seminar on EPC Implementation in Government Buildings* was attended by an estimated 250 representatives from government ministries, departments and agencies, as well as the schools participating in the competition.



In addition, the meeting – which carried the title *EE Challenge 2014 Award Ceremony and Seminar on EPC Implementation in Government Buildings* – provided the opportunity for the Commission to recognise the energy-saving achievements of secondary schools from Selangor and Kuala Lumpur, which participated in the recent EE Challenge 2014.

The event comprised an entire day of illuminating talks on various aspects related to the implementation of EPC in the government sector, with a welcoming address delivered by Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan. During the seminar, presenters ranged from private and public sector energy management experts, to those from academic and multilateral institutions as well.

The first session was conducted by Sustainable Energy (Energy Sector) Undersecretary at the Ministry of Energy, Green Technology and Water, Jaya Singam Rajoo, centring on government undertakings that have been implemented to spur energy efficiency (EE). These include the National Energy Efficiency Policy (NEEAP) and various building sector EE initiatives, which promote solutions such as Green construction,

energy auditing and the retrofitting of EE features, among others.

Following this, Zulkiflee Umar, Head of the Energy Commission's Demand Side Management Unit, presented a talk on various concerns for government building facility managers, including the need for Registered Electrical Energy Managers (REEMs) and training services offered via the ASEAN Energy Manager Accreditation Scheme (AEMAS) and the Malaysia Association of Energy Service Companies (MAESCO).

Next, Mohd Nazri Ismail, Head of the Electrical Engineering Program at Politeknik Merlimau Melaka, provided insight into the institution's implementation of EPC, as well as the successes that have been achieved. Aside from explaining the scope and procedure of the vocational school's process, Mohd Nazri revealed that it has since been able to reduce energy use by up to 17% annually, thanks to the EPC programme.

Meanwhile, Universiti Teknologi Malaysia (UTM) Process Systems Engineering Centre Director Assoc Prof Ir Dr Sharifah Rafidah Wan Datu Alwi shed light on the national university's Sustainable Energy



Above: Building Sector Energy Efficiency Project (BSEEP) National Project Manager Kevin Hor drew attention to relevant standards and procedures that should be practiced when carrying out EPC projects in government buildings.

Right: Connecsys Director Zaini Abdul Wahab shared some of the company's experiences in implementing EPC projects, having been in the business for over a decade.



Management (SEM) system, which improves the likelihood of success for EPC projects. Not only can the SEM help disrupt existing consumption trends, but she said that it also assists in creating the right foundations to establish and progressively enhance sustained improvements in efficiency.

Following an intermission, students from Sekolah Menengah Kebangsaan Cheras Jaya – which took the top spot in the EE Challenge 2014 – explained the sustainable measures that had been taken to reduce energy use at the school. Aside from selling recyclable materials such as old newspapers and used cooking oil to fund the programme, they highlighted behaviour change efforts – such as using announcements and stickers to remind students to turn off appliances when not in use – which enabled a 5.7% reduction in energy consumption.

Expanding on practical considerations, Zaini Abdul Wahab, the Director of Connecsys – an Energy Service Company (ESCO) which provides

energy optimisation solutions – outlined the scope of services that should be supplied by ESCOs in carrying out EPC projects. He also detailed the procedure for implementing a typical EPC project, and listed some of the most appealing areas for energy-saving measures, such as lighting, cooling and pump systems.

Subsequently, Kevin Hor, National Project Manager of the Building Sector Energy Efficiency Project (BSEEP) under the United Nations Development Programme (UNDP), considered important factors relating to the development and suitability of EPC projects for government buildings. In addition, he highlighted

the BSEEP's relevant nationwide trainings and revealed that Malaysia's Public Works Department (JKR) is considering the implementation of hybrid contracts to combine facility management and EPC efforts.

In the final presentation, Malaysia Debt Ventures (MDV) Corporate Planning & Communication Manager Zaid Jamalluddin explained MDV's role as a leading financier of Green technology undertakings, including EPC projects. Aside from expanding on the areas of funding provided by the lender, Zaid also clarified MDV's criteria for evaluating the eligibility of applications and touched on government-funded avenues such as the Green Technology Financing Scheme (GTFS).

Apart from inciting thought-provoking discussions on the way forward for the implementation of EPC projects in government buildings, another highlight of the event was the launching of the Energy Commission's latest publication, entitled the *Guideline on No-Cost and Low-Cost Measures for the Efficient Use of Electricity in Buildings*.

The Energy Efficiency Challenge Award Ceremony

Considering that the early years are often the best time to inculcate positive habits and principles, the Energy Commission recently organised the *Energy Efficiency Challenge 2014* for schools in the Klang Valley, in collaboration with the Ministry of Education and various relevant State Education Departments.



Above: During the competition's official launch at each participating school, environmental talks and energy saving tips were shared among students.

Inset: Various schools also held internal poster design competitions, to further promote awareness on energy efficiency.

Specifically, the competition was open to secondary schools in the state of Selangor and the Federal Territories of Kuala Lumpur and Putrajaya, and was held from the 1st of August to the 31st of October, 2014. Through the contest, the Commission sought to nurture an awareness of the importance of energy conservation and advocate a more efficient lifestyle among the younger generation,

thus ensuring optimal utilisation of resources in the future.

The participating schools were assessed based on the percentage of energy savings achieved (in kWh), according to their monthly electricity bills received from the energy utility. When applying to take part in the competition, school administrators were required to

submit copies of their electricity bills for the months of May, June and July 2014, in order to establish their baseline energy usage for later comparison.

These bills indicated overall energy consumption, encompassing all of the schools' facilities, including academic buildings, teachers' offices, laboratories, assembly halls and other areas. Calculating consumption reductions in accordance with monthly electricity bills in this manner also ensured that the competition's impact returns tangible benefits to the schools and students involved, as reducing the monthly cost of electricity allows the saved resources to be utilised for other important areas.

Aside from this, the consistency with which electricity consumption was reduced throughout the competition period was also taken into account when assessing the performance of each competing school. Finally, the thoroughness with which energy-saving measures were implemented was also evaluated. To facilitate this process, each participating school was given one month following the competition period to prepare and submit detailed reports related to the energy-saving initiatives that were undertaken, in addition to copies of their electricity bills for the months of August, September and October.

Among the top-performing schools whose efforts were recognised are Sekolah Menengah Kebangsaan Methodist, Telok Datok, Banting, which earned the Bronze Award for third place, Sekolah Menengah Kebangsaan Putrajaya Presint 11 (1),

which secured second place and the Silver Award, and Sekolah Menengah Kebangsaan Cheras Jaya, which took the top spot to claim the competition's Gold Award.

Announcing the winners of the competition during the *EE Challenge 2014 Award Ceremony and Seminar on EPC Implementation in Government Buildings*, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan revealed that upon reviewing and analysing the submitted reports, "the Commission found that the competing schools encouragingly demonstrated the initiative to carry out a variety of energy-saving efforts." Among these initiatives were the launch of energy-saving campaigns, relevant lectures and presentations, and daily reminders on energy conservation, as well as regular monitoring on electricity use in each classroom.

In addition, a number of schools involved also produced and distributed stickers that encourage energy conservation, as well as survey questionnaires that assess the level of student awareness on the topic. Notably, there were also certain schools which undertook the sale of recyclable materials, in order to raise adequate capital to implement the necessary energy-saving measures.

Through the comprehensive efforts that were undertaken during the three

months of the competition, a number of schools were able to achieve an energy saving of as much as 4.7 to 5.7%, compared to the three months preceding the competition period. Additionally, the reports submitted by each participating school also indicated that the large majority of initiatives that were carried out comprise low-cost and no-cost measures, demonstrating that efficiency enhancements need not be costly.

While the competition officially concluded at the end of October, 2014 and the winning school has been crowned, the Energy Commission maintains the hope that the energy-saving activities that have been undertaken are sustained. This is not only so that the schools involved can continue to enjoy the resulting benefits in the form of reduced energy costs, but also to provide an important example for other schools throughout the country to emulate, in order to help ensure that vital resources are conserved and properly managed in the long term.

Below: Representatives from Sekolah Menengah Kebangsaan Cheras Jaya – which took first place with energy savings of 5.7% – delivered a presentation on the initiatives undertaken at their school, during the *EE Challenge 2014 Award Ceremony and Seminar on EPC Implementation in Government Buildings*.



Singapore International Energy Week

Held at the Sands Expo and Convention Centre at the prestigious Marina Bay Sands Resort in Singapore from the 27th to the 31st of October 2014, the Singapore International Energy Week (SIEW) marked a gathering of over 10,000 policymakers and leaders in the spheres of business, academia and industry, from more than 60 countries across the globe.

Organised as an annual fixture since 2008, the event provides a platform for energy sector professionals, policymakers and commentators to discuss and share information on cutting-edge best practices and solutions. Aiming to facilitate the exchange of ideas to spur the next phase of urban development and economic progress, SIEW also features a showcase of innovative products and solutions, while creating opportunities for companies to network and forge new partnerships.

As part of the event, a series of SIEW Thinktank Roundtable sessions were held, with Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan participating as a speaker during a discussion on electricity market reform organised by the Institute of Energy Economics, Japan (IEEJ). Moderated by experienced energy sector professionals, these roundtable sessions are designed to engage

participants in incisive debates and discussions, while providing the ideal venue to meet industry peers and share targeted feedback.

Centring on the challenges faced in countries where state-owned utilities dominate, the panel of speakers – which also included Singapore Energy Market Authority Market Development & Surveillance Department Director Soh Sai Bor, GE Power & Water Asia-Pacific Marketing Director Kazunari Fukui and Energy Studies Institute (ESI) Principal Fellow and Head of Energy Economics Prof Anthony Owen – considered the ways in which affordable electricity prices could be maintained during the course of market liberalisation.

Malaysian Energy, Green Technology and Water Minister Datuk Seri Dr Maximus Ongkili (second from right) addresses the audience during the Singapore Energy Summit, which was held during the first day of the Singapore International Energy Week (SIEW) 2014.



Welcoming the Nepalese Delegation

On the 26th of January, a delegation from Nepal comprising senior officials from various ministries and led by its Minister of Urban Development Dr Narayan Khadka, paid a visit to the Diamond Building – the Energy Commission’s headquarters in Putrajaya.



Datuk Ir Ahmad Fauzi Hasan explaining a point to Dr Narayan Khadka at the rooftop of the Energy Commission’s Diamond Building. Looking on are Prof Dr Govind Raj Pokhrel, Dato’ Abdul Razak Abdul Majid, and Administration and Facilities Management Head Hamidah Abdul Rashid, who led the tour.

Welcoming the contingent, Commission Chairman Dato’ Abdul Razak Abdul Majid gave a short introduction about Malaysia’s energy regulator and its head office, which he explained was conceptualised to symbolise the transparency and integrity of the Energy Commission and its mission to encourage energy efficiency and sustainability.

Following the welcome address, the guests were shown a video detailing the unique aspects of the Diamond Building. These include its use of energy saving methods such as using natural light to partially illuminate the interior, keeping the building airtight to prevent cool air from escaping, and using solar panels to offset electricity costs.

Since the best testimony is the building itself, members of the delegation were taken on a tour of the headquarters,

and then to the roof top where they were given an explanation of how processes and technologies such as floor slab radiant cooling, rainwater harvesting, and solar photovoltaic cells work.

Speaking to **Energy Malaysia**, Dr Narayan Khadka explained that the delegation – which was in Malaysia to highlight opportunities in Nepal to local investors – decided to visit the Diamond Building as Nepal is also focused on being energy efficient. Calling the visit informative, he expressed hope of further cooperation in this area between his nation and Malaysia.

WE WOULD LIKE TO HEAR FROM YOU!



Energy Malaysia welcomes your questions, comments and suggestions to help the Energy Commission of Malaysia work better at safeguarding your interest.

Where to lodge complaints and how to get in touch with the Energy Commission?

Send in your feedback and questions at energymalaysia@st.gov.my or call our toll free number: **1-800-2222-78** or fax: **+603 8888-8637**

Where to get more energy-related data and statistics?

Log onto our official website: www.st.gov.my for the latest updates and news.
Or visit the Malaysia Energy Information Hub, our national energy database:
<http://meih.st.gov.my/>

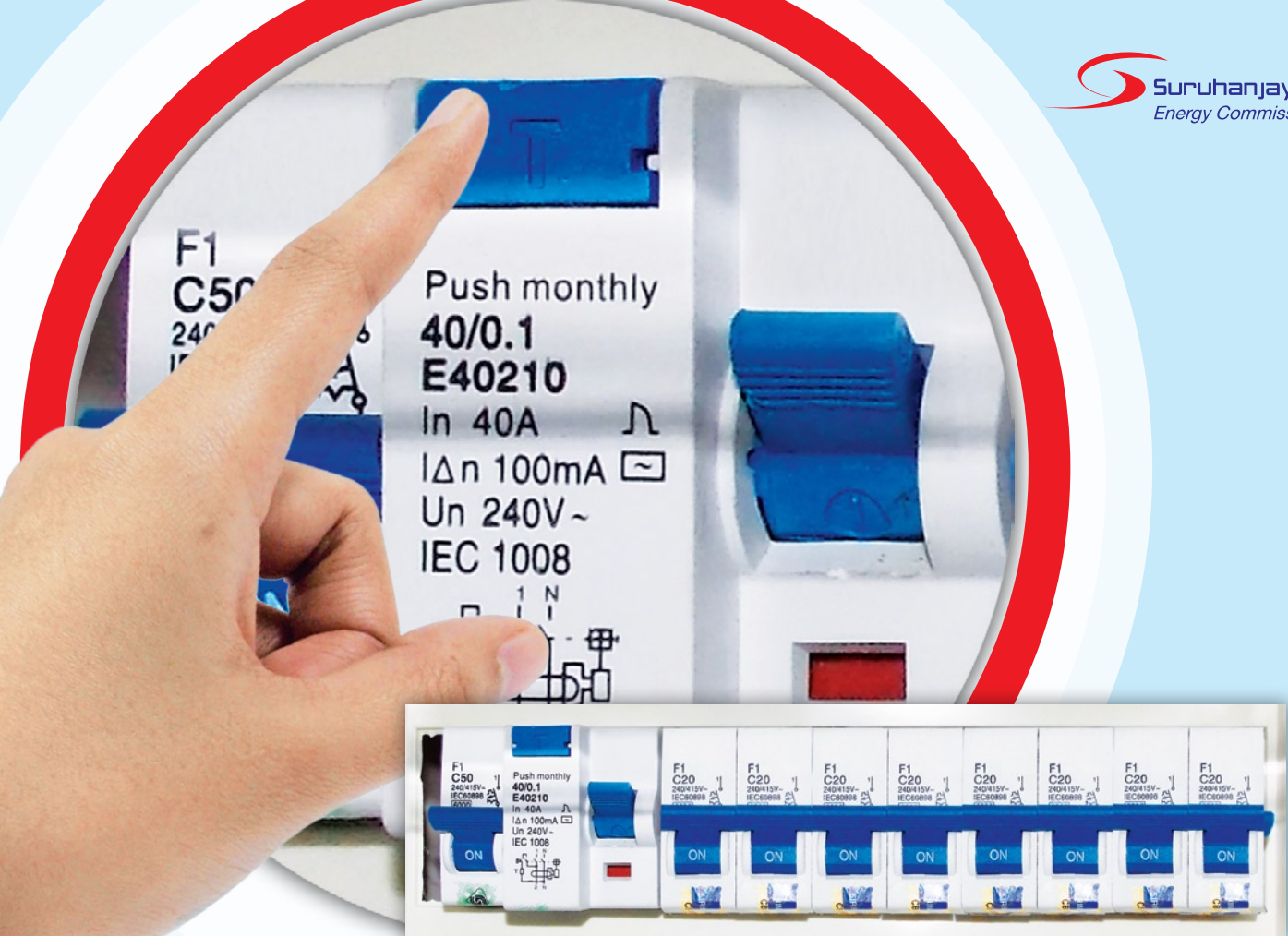
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If you are using an **electric water heater** in the bathroom, make sure that the automatic circuit breaker switch with a sensitivity of not exceeding **10 mA or 0.01 A** is installed in the water heater circuit.

VALUE OUR LIVES. AVOID ACCIDENTS AND WASTAGE!

PRACTISE EFFICIENT WAYS OF USING ELECTRICITY

Switch off electricity when not in use. The more you waste, the more you pay.

Use energy-efficient electrical appliances such as refrigerators, fans, TV, lights and air-conditioners with energy efficiency labels.

Use electrical appliances at moderate speed, temperature and load.

Use natural lighting and ventilation to reduce the use of electrical appliances.

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