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Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga
Energy Commission

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Energy Smart

Empowering Consumers, Enhancing Energy Delivery

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Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga Energy Commission

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Partnerships for Power

In order for the Energy Commission to successfully carry out its responsibilities of ensuring energy security and efficiency, as well as safety in the electricity and gas industries, it is important that all stakeholders in the ecosystem play their part. While measures and initiatives have been introduced to better manage the generation, distribution and transmission of energy, it is not enough for those on the supply-side to be the only ones concerned.

Just as it takes two hands to clap, true energy security, efficiency and safety is only possible if both the supply and the demand sides work together to achieve results. It is vital that energy consumers – whether they are individuals or institutional – understand that they need not, and should not, be passive participants.

We do this through publishing various guidelines, running public service advertisements, and holding talks and seminars – either by ourselves or in partnership with other stakeholders in the energy sector. This complements the various regulations enacted by the Energy Commission to ensure reliability and quality, and encourages consumers to be more proactive in safeguarding their interests.

For instance, under the Guaranteed Service Levels, the electricity utility is required to meet certain standards of service quality. If this is breached then the consumers are entitled to a rebate on their electricity bills, depending on the scope of violation.

Every little bit counts, from purchasing and using energy efficient appliances to turning off the lights when not in use, and even to setting the temperature of the air conditioning. Ensuring energy efficiency is a team effort, and we are in this together.

Dato' Abdul Razak Abdul Majid
Energy Commission of Malaysia

"We believe that knowledge is power, and by instilling it in consumers, we are empowering them to be more involved in their management of energy usage."

Engaging with Industry

In order to create a platform for the Ministry of Energy, Green Technology and Water (KeTTHA) to interact with practitioners in the energy, green technology and water industries and obtain feedback directly, the KeTTHA Industry Dialogue 2014 was held on the 14th of August.

In addition to the Minister of Energy, Green Technology and Water, Datuk Seri Panglima Dr Maximus Johnity Ongkili (left), his predecessor Tan Sri Peter Chin Fah Kui (right) also attended the KeTTHA Industry Dialogue 2014, to share his expertise with participants.

Taking place at Putrajaya International Convention Centre, the event was attended by the Minister of Energy, Green Technology and Water, Datuk Seri Panglima Dr Maximus Johnity Ongkili, his Deputy Dato' Seri Mahdzir Khalid, and representatives from public bodies such as the Energy Commission, National Water Services Commission (SPAN), the Sustainable Energy Development Authority (SEDA) and GreenTech Malaysia.

Over 250 participants from government agencies and departments as well as private enterprises took part in the discussions. Issues canvassed centred on new policies and initiatives that have been introduced to empower the growth of the three industries mentioned, which have been identified as essential to national development.

Taming The Tariff

Following concerns about the welfare of the people during subsidy rationalisation and fluctuating fuel prices worldwide, the Ministry of Energy, Green Technology and Water (KeTTHA) has announced that the current electricity tariff will be maintained until June 2015.

SMART SAVINGS

To ensure the tariff can be maintained, the government will use the savings generated through the renegotiated Power Purchase Agreements (PPA) with Independent Power Producers, and also by maintaining the current price of piped gas supplied by Petronas to the Electricity Sector.

In January 2014, Peninsular Malaysia implemented the Imbalance Cost Pass Through (ICPT) mechanism and the Incentive-Based Regulation (IBR) framework to determine the electricity tariff, and allow the government to review the tariff every six months. The ICPT system, which is based on similar ones adopted by developed and developing countries such as Australia, the United Kingdom and Singapore, allows a tariff to reflect the true cost of electricity in a transparent manner.

SUPERVISING ENERGY

ICPT tracks the changes in the price of generation costs, including piped gas, coal, liquefied natural gas and medium fuel oil, as well as the taking into account

Minister for Energy, Green Technology and Water Datuk Seri Dr Maximus Ongkili, who is in charge of determining electricity prices, has revealed that the power tariff will not rise until June 2015.

the displaced cost from renewable energy and the cost of importing electricity.

Based on this system, the ICPT cost between January and June 2014 was analysed to be RM465.93 million, while the cost for July to December 2014 will be RM382.03 million, implying an increase in tariff by 1.62 sen/kWh from the previous year. The total fuel and generation cost is expected to be worth RM1.683 billion.

SAFEGUARDING WELL-BEING

While this increase in tariff will be absorbed by the government, the savings from the new PPA is insufficient for future ICPT costs. Additionally, the decision to delay increasing the price of piped gas will cause Petronas to lose RM836 million in revenue for the period between July 2014 and June 2015.

"The government's decision to maintain the tariff rate is to reduce its impact on the people, but is not sustainable in the long term because it will adversely impact the country's economic growth and development," shares Datuk Seri Dr Maximus Ongkili, Minister for Energy, Green Technology and Water. "Meanwhile, we urge the public to use electricity efficiently and reduce wastage."

Additionally, the minister also hopes that utility providers will further improve the provision of efficient, sufficient, reliable and cost-effective electricity supply to benefit the *rakyat*.

Secretary General of the Ministry of Energy, Green Technology and Water Datuk Loo Took Gee hopes that utility providers and consumers will work towards increasing energy efficiency and reduce waste.

ELECTRICITY TARIFF IN PENINSULAR MALAYSIA

UNIT	2013		2014	
	Rate	Total (RM)	Rate	Total (RM)
Increment	+electricity tariff		14.89% +electricity tariff	
200 kWh	0.218 **	43.60	0.218 **	43.60
100 kWh	0.334 **	33.40	0.334 **	33.40
100 kWh	0.400	40.00	0.516	51.60
100 kWh	0.402	40.20	0.516	51.60
100 kWh	0.416	41.60	0.516	51.60
100 kWh	0.426	42.60	0.546	54.60
100 kWh	0.437	43.70	0.546	54.60
100 kWh	0.453	45.30	0.546	54.60
128 kWh	0.454	58.11	0.571	73.09
Estimated Bill at 1,028 kWh		**388.51 ***		**468.69 ***
Increased by		**0**		**80.18**

Source: Energy Commission

The increase in power tariff in 2013 placed a strain on the finances of Malaysians, but this year the government has introduced measures to temporarily prevent a hike in price and ease this burden in the short term.

Notes:

* Subject to 1.6% FiT Charge to the monthly electricity bill.

** Exempted from 1.6% FiT collection.

Sufficient Electricity until 2030

Peninsular Malaysia has electrical energy generation capacity reserve of 24%. Deputy Minister of Energy, Green Technology and Water, Datuk Seri Mahdzir Khalid said that the government, through various ministries and agencies, regularly reviews and plans electrical energy capacity levels, so that the continuous supply to homes, businesses and industries is guaranteed.

According to Datuk Seri Mahdzir Khalid, the reserve power that can be generated for the needs of Peninsular Malaysia, Sabah and Sarawak are at a comfortable level. "Meeting energy demand is an area of national importance because it supports our daily lives and economic growth. Government is always monitoring both the current and long-term needs," he told reporters after opening the *ASEAN Power Week 2014* on the 10th of September in PWTC.

Malaysia currently has a capacity of 20,944 Megawatts (MW) of electricity, with recorded peak demand of 16,901MW, leaving a surplus of 4,043MW. Energy sources include coal, piped gas, LNG and hydro, while MFO and distillate are being used in contingency situations.

Datuk Seri Mahdzir Khalid said the country's current power reserve is adequate to meet demand.

A New Solar Dawn

Marking a new phase in Malaysia's adoption of renewable energy (RE) technologies, the nation's largest solar photovoltaic (PV) power plant was commissioned and entered service in June this year.

The new 10.3MW facility is located in Gemas, Negeri Sembilan and integrates more than 40,000 units of multi-crystalline solar PV modules that were imported from China. The panels are spread out over a total area of nearly 14 hectares.

Capable of producing up to 13.6 million kWh of electricity each year, this development is an example where Malaysia has benefitted from an ongoing tariff war between panel makers in China and the United States, and is a vital step towards the achievement of the 11% RE generation target set by the Ministry of Energy, Green Technology and Water (KeTTHA).

The 14-hectare photovoltaic project in Gemas, Negeri Sembilan is one of Malaysia's largest renewable energy initiatives to date, serving as an example of the high-scale solar installations that the country is poised to adopt in the coming years.

Empowered!

Encouraging Efficiency Through Creating Energy Smart Consumers

As part of its mission to ensure energy supply, security and efficiency in Malaysia, the Energy Commission regularly engages with stakeholders in the sector to help it fulfil its goals. It advises the government on policies related to the energy sector, and – in its role as a regulator – sets guidelines and oversees the performance of power produce rs and the electricity utilities. The Commission's efforts, however, are not just limited to the supply side, as it also reaches out to consumers and educates them on how to empower themselves to make informed decisions that will keep their energy prices low, and efficiency high.

A BALANCING ACT

With just five years to go before the 2020 deadline for Malaysia to become a fully-industrialised economy, the government is stepping up efforts to bring that about, and this has been encapsulated in the Economic Transformation Programme (ETP). Introduced in 2010, the ETP identifies several sectors as National Key Economic Areas (NKEAs) and a number of projects have been lined up with the aim of enhancing their contribution to the economy.

These Entry Point Projects (EPPs) are expected to boost the gross national income (GNI) to US$523b and per capita income to US$15,000 by the year 2020. However, in order to reach these targets, productivity will have to be increased, thus leading to a rise in power usage. Already, energy demand and consumption has surged over the last decade, with maximum demand rising from more than 10,000MW in 2003 to above 15,000MW in 2013.

At the same time, the government realises that dependency on fossil fuels, particularly imported coal and subsidised natural gas, is putting a strain on national finances. In addition, it is hindering the goal of achieving a 40% reduction in carbon intensity by 2020, as announced by Prime Minister Dato' Seri Najib Tun Abdul Razak in 2009.

The two goals seem to be dichotomous. After all, increasing productivity and energy usage will likely mean burning more fossil fuels, thus running counter to the government's environmental and fiscal aims. It is such dilemmas that the Energy Commission was set up to manage, and it has already mastered the art of juggling the different needs of different stakeholders.

EFFICIENCY THE KEY

One thing that the Energy Commission has highlighted is that energy efficiency does not mean having to compromise on the quality of supply. After all, the goal of efficiency is to enable the same or even higher level of performance with less consumption.

On the supply side, initiatives have been advanced to better manage the generation and transmission of electricity. This includes the introduction the Incentive-Based Regulation (IBR) framework at the start of 2014, which

Using guidelines detailed in the Energy Commission's website, home owners and occupants should perform regular energy audits of their premises to ensure that appliances and equipment are energy efficient.

Every household needs lighting, and savvy consumers should invest in energy saving bulbs which last longer and have lower wattages, thus reducing electricity costs.

lays out rewards and penalties regulating the performance of the electricity utility, namely Tenaga Nasional Berhad (TNB).

In addition, the Commission continues to work with power producers to bring about more efficient and sustainable ways of generating electricity, such as adopting the latest technologies and best practices to improve performance.

ENERGY SMART CONSUMERS

While such efforts are important, the Energy Commission is also cognisant of the fact that bringing about efficiency and sustainability requires action from both the supply and demand side.

In other words, it is not enough to just focus on ensuring better performance in terms of electricity generation, supply, and transmission, but also to bring about more awareness among consumers of how they can better manage their utilisation of electricity.

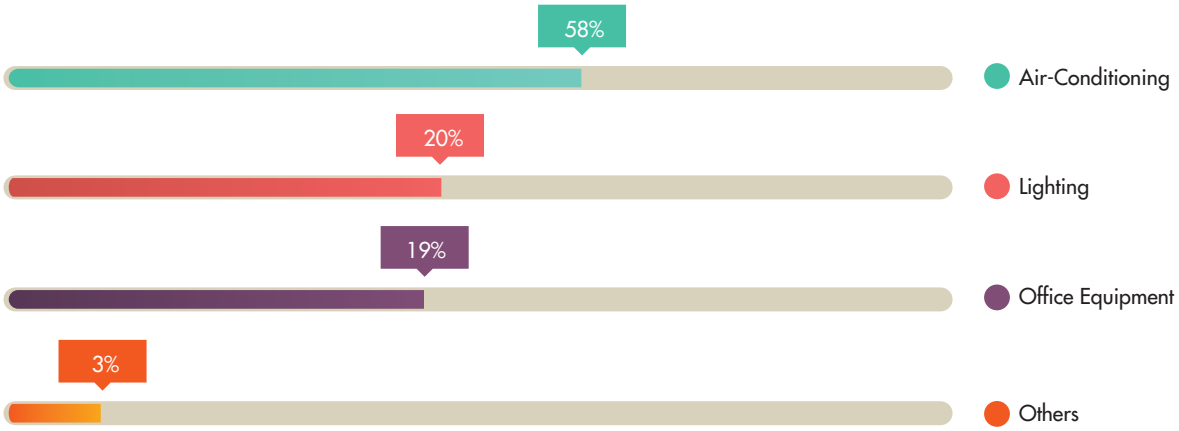
The aim is to create 'energy smart' consumers, who are more knowledgeable about what they can do to increase efficiency in their everyday consumption, and in doing so reduce the level of demand and consequent strain on the sector.

SHOWING THE WAY

It does this through several measures. For instance, it publishes guidelines that help highlight to consumers – both industrial and individual – the methods they can employ to optimise their power usage.

One example is the *Guidelines on No-Cost and Low-Cost Measures for Efficient Use of Electricity in Buildings*. Available for download from the Energy Commission's website, the

TYPICAL ELECTRICITY USAGE IN OFFICE BUILDINGS IN MALAYSIA



ENERGY-SAVING INITIATIVES

1. Formulate a simple energy management policy, with targets and make it available to all staff, workers and occupants.
2. Appoint a specific person with responsibility for energy management activities. Assign an energy management team with representatives from various department/sections.
3. Have a suggestion box for possible energy saving measures.
4. Provide simple incentives for good energy-saving practices.
5. Include energy efficiency in specifications and procurement for new equipment.
6. Keep records of energy consumption within the facility. Trend consumption figures to track variations or excessive use and the reasons for them.
7. Publicise energy saving successes to motivate the staff towards greater commitment.
8. Reinvest a portion of the savings in more saving measures.

Source: The Energy Commission

Among the advice given by the Energy Commission for home and office owners is to regularly clean the air-conditioning unit, as dirty or dusty filters mean that the unit has to use more power to cool the air. In addition, the temperature should be set to 24 degrees Celsius in order to conserve energy.

Guidelines highlight how building owners and occupants can carry out an energy audit of their premises and identify ways to reduce electricity wastage. They also offer advice and hints on building management so that lighting and cooling systems are used to their best effect.

In addition to that, it also came up with the *Energy Rating and Labelling Programme for Household Appliances* in 2009.

This led to the development of the Energy Label where the energy efficiency of certain household appliances such as air-conditioners and refrigerators is graded according to a star-rating. Thanks to this system, people know the energy consumption rate and performance of the appliance they want to buy and can compare and contrast these figures to others.

Furthermore, the programme resulted in the establishment of the Minimum Energy Performance Standards (MEPS). This was made mandatory for refrigerators, air conditioners, televisions, electric fans and lamps on the 3rd of May 2013.

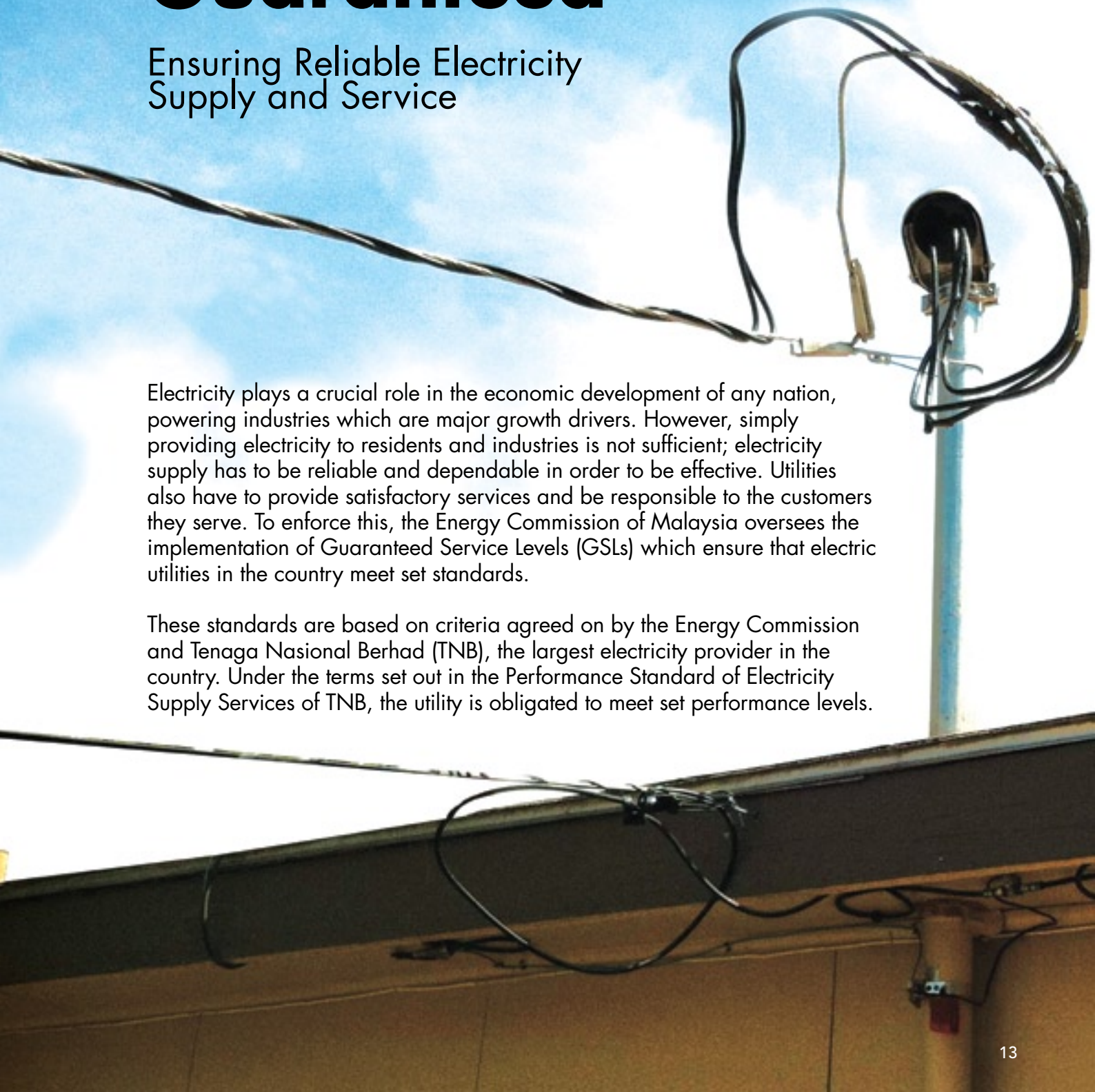
It is also worth noting that the Malaysian government, through the Sustainable Energy Development Authority of Malaysia (SEDA), formulated the SAVE programme which gave rebates for the purchase of five-star energy efficient appliances. Because of this, more than 141 million tonnes of CO2 were prevented from being emitted from 2011 to 2013, as consumers opted for the more environmentally-friendly choice of refrigerators and air conditioners.

In order to fulfil the goals of economic development and efficient energy management, consumers can no longer afford to be passive when it comes to electricity usage. By educating and providing guides and references to members of the public, the Energy Commission is playing a vital role in the creation of a more energy-savvy and responsible consumer base.

When buying appliances such as stoves, washing machines and fridges, members of the public are advised to look for the Sirim and Energy Rating Label by the Energy Commission, where a five-star rating means the best in energy savings.

Performance Guaranteed

Ensuring Reliable Electricity Supply and Service



Electricity plays a crucial role in the economic development of any nation, powering industries which are major growth drivers. However, simply providing electricity to residents and industries is not sufficient; electricity supply has to be reliable and dependable in order to be effective. Utilities also have to provide satisfactory services and be responsible to the customers they serve. To enforce this, the Energy Commission of Malaysia oversees the implementation of Guaranteed Service Levels (GSLs) which ensure that electric utilities in the country meet set standards.

These standards are based on criteria agreed on by the Energy Commission and Tenaga Nasional Berhad (TNB), the largest electricity provider in the country. Under the terms set out in the Performance Standard of Electricity Supply Services of TNB, the utility is obligated to meet set performance levels.

FEWER SUPPLY DISRUPTIONS

The agreed standards provide guaranteed performance levels and applicable penalties for not meeting them. Over five sections and two schedules (one dealing with supply issues and the other, associated services), the GSLs cover TNB's electricity supply and its service delivery.

GSL 1 and 2 encompass the availability of electricity, providing for frequency of interruptions and restoration time. Both service level will become operational on 1st January 2015.

GSLs 3 to 5 have been in effect since the 1st of January 2012 and cover providing supply and customer contact.

FASTER SERVICE DELIVERY

For new customers, GSL3 stipulates that for premises that have been cleared by the relevant parties to receive cabling, the installation should be completed within five working days. This applies to low voltage cable installation works for overhead line installations.

For those that require underground cables, the maximum time taken is 14 working days. The penalty for not meeting the standard is RM50 in rebates paid to the affected customer. Further underlining this, GSL4 specifies a three-day period to connect a new domestic customer after payment of a deposit, with a RM50 rebate if the agreed time is exceeded. Also, wrongful disconnection of power supply warrants a RM100 rebate under GSL5.

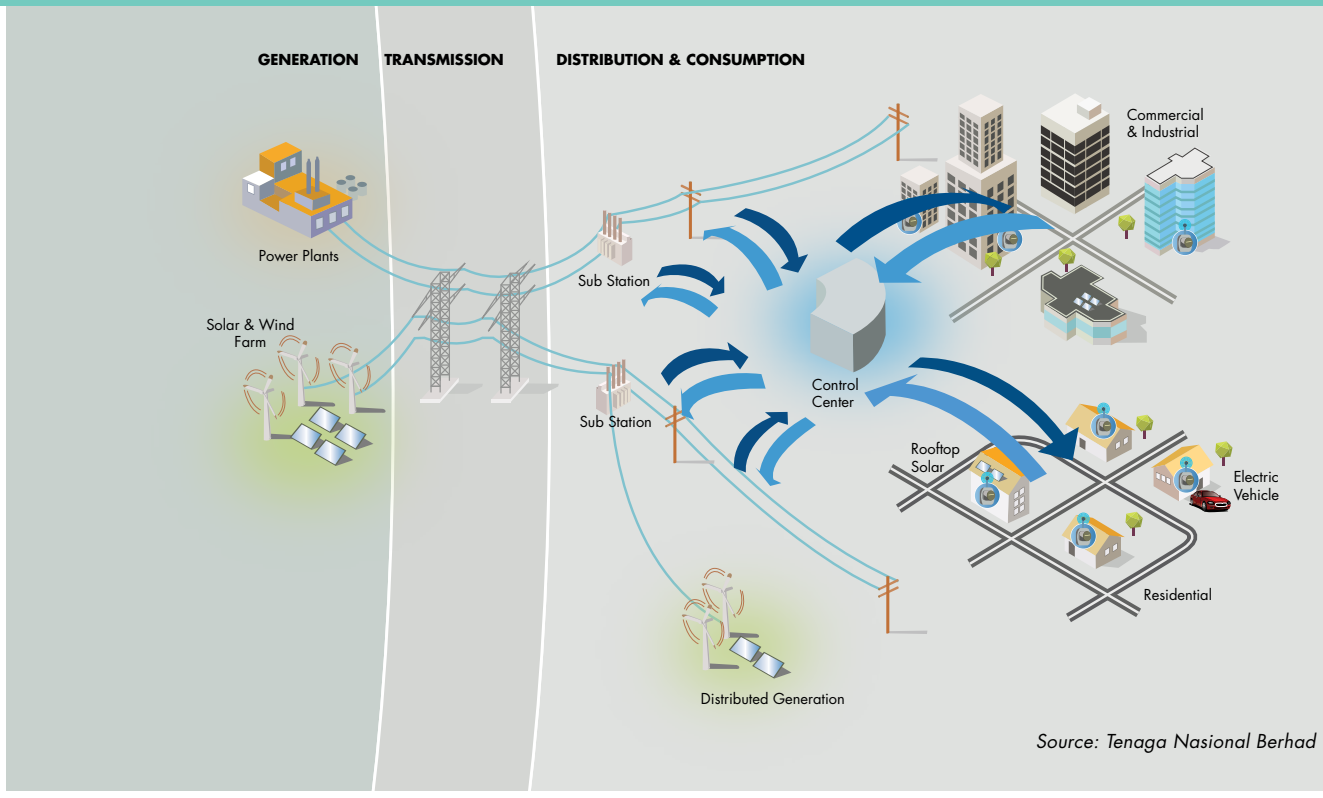
INTERNAL BENCHMARKING

In addition to reimbursing customers for failing to meet set standards for reliable and effective electricity supply, TNB is also required to monitor its own performance and its compliance with the GSL and the established minimum service levels in Schedules 1 and 2. Within three months of the end of every calendar year, the utility is mandated to submit a report to the Energy Commission.

The report includes details from TNB on the number – and amount – of rebates issued by category, claims received and rejected (and reasons for rejection), descriptions of interruptions and major incidents and reasons for exceeding service levels, if applicable. However, the utility may be asked to submit reports outside the scheduled annual summary.

Together with the *Malaysian Grid and Distribution Code*, the *Electricity Supply Service Performance Standard* published by the Energy Commission helps ensure that electricity supply and services in the country – from power generation to its distribution and consumption – are reliable and consistent.

ELECTRICITY SUPPLY



Source: Tenaga Nasional Berhad

GUARANTEED SERVICE LEVELS

The first schedule of the *Performance Standard of Electricity Supply Services of TNB* encompasses the supply of electricity and the associated penalties for failing to meet its terms.

Service Indicator	Performance Level	Penalty In The Form Of Rebate to Customers
Frequency of Supply Interruption **Guaranteed Service Level: GSL1** Maximum number of unplanned electricity supply interruptions allowed in the following regions: • Kuala Lumpur City and Putrajaya • Other areas	 4 times per year 5 times per year	**Domestic consumers** 1% of average monthly bill amount or minimum RM10, whichever is higher **Commercial consumers** 1% of average monthly bill amount, up to a maximum of RM300 **Industrial consumers** 0.5% of average monthly bill amount, up to a maximum of RM1,000
Time Taken to Restore Power **Guaranteed Service Level: GSL 2** Allowed time it takes for electricity supply to be restored after a minor network distribution fault Except due to natural disaster or weather-related incident, the time taken to restore power supply in the case of: • Medium voltage breakdown for 33, 22 and 11kV cable system with alternative supply to customers • Medium voltage breakdown without alternative supply to customers Restoring electricity supply after major grid or transmission incidents – except due to natural disasters – which result in: • Partial Blackout • Total Blackout	 3 hours 4 hours 12 hours 8 hours 18 hours	**Domestic Consumer** 1% of monthly bill amount or minimum RM10, whichever is higher **Commercial Consumer** 1% of monthly bill amount, up to a maximum of RM300 **Industrial Consumer** 0.5% of monthly bill amount, up to a maximum of RM1,000 (Monthly bill of the particular month when non-compliance occurs) For major incidents involving the grid or transmission system, the decision to impose penalty is dependent on the outcome of an investigation by the Energy Commission.
Providing Power Supply **Guaranteed Service Level: GSL 3** Time period allowed for the implementation of service connections that require the installation of low voltage cables, from the registration of new individual connections until the connection of supply. This is subject to the completion of preparations to receive the new cable at the premise, as well as the clearance of way-leave by the relevant parties. **Guaranteed Service Level: GSL 4** Time period allowed for individual domestic low voltage connection after payment of deposit and a connection date has been agreed on by both TNB and the customer, and there is access, with the count commencing a day after receiving the deposit. For meter installation only.	 5 working days for overhead lines 14 working days for underground cables 3 working days	 RM50 Applies only to the last 3 additional poles nearest to the premises RM50
Disconnections **Guaranteed Service Level: GSL 5** Disconnection must only be undertaken according to applicable legislation and disconnection procedures	 No wrongful disconnection	 RM100

MINIMUM SERVICE LEVELS

The second schedule of the *Performance Standard of Electricity Supply Services of TNB* ensures that the utility's services are up to par with the quality of electricity distribution in the country and stipulates the minimum service and performance levels that have to be met.

Service Scope	Service Indicator	Performance Level
Availability of Supply	• Notice period allowed for planned or scheduled electricity supply interruption	2 days
	• Time taken to respond to customers who report interruptions to electricity supply	1 hour
Quality of Supply	• Time frame taken to fix voltage complaints or limit violation, as well as correction to complaints about voltage that require reinforcement to the network.	180 days
	• Investigation duration, beginning from date of complaint receipt, for complaints about over-voltage.	30 working days
	• Maximum amount of time allowed to complete investigation and provide report about voltage-dip complaints from the date complaint was received.	14 days
Providing Supply	• Time taken to notify a developer about the connection charges to be paid upon receipt of complete application i. Up to 22kV ii. 33kV	 30 days 60 days
	• Implementation of electrification schemes that require new substations after connection charges have been paid, way leave obtained and handing over substation to TNB: i. up to 22kV ii. 33kV with cable installation of up to 5km in length a. in KL and Putrajaya b. in other areas	 60 days 180 days 120 days
	• Maximum allowed waiting time at site following an appointment to connect electricity supply. (In case of unavoidable occurrences, a call must be made to the customer at least an hour before the appointment)	1 hour
Customer Contact	• Maximum response period to a written enquiry or complaint	7 working days
	• Allowed average amount of time a customer queues at a service centre	15 minutes
	• Time within which a customer service officer must respond to an incoming call	90% of calls are answered within 30 seconds.
Metering Services	• Response time for appointments, visits or testing for issues pertaining to meters after official notification or request by customers	2 working days
	• The response period in case of replacement or relocation of meters following official notification	3 working days
	• Interval between successive billings	1 month

Under the terms set out in GSL3 of the *Performance Standard of Electricity Supply Services of TNB*, the maximum allowed time to implement overhead low-voltage cables is five days, exceeding which, customers are entitled to a RM50 rebate.

OBLIGATIONS OF THE LICENSEE (TNB)

1. In the case of non-compliance with GSL1, the affected consumers may claim for a rebate within the first 2 months of the following year, when the number of interruptions exceed the threshold for that particular year.

2. A rebate for GSL1 is to be calculated based on the average monthly bill for 12 months in the preceding calendar year.

3. Interruptions referred to in GSL1 are those interruptions sustained for more than 4 hours which are not due to natural disaster or weather-related incidents.

4. In the case of non-compliance with GSL2, the affected consumers may claim for a rebate within the next 2 months after the incident.

5. A rebate for GSL2 is to be calculated based on the monthly bill when the incident occurs.

6. In the case of non-compliance with GSL3 or GSL4, the affected consumers may claim for a rebate within the next 2 months after connection of supply.

7. In the case of non-compliance with GSL5, the affected consumers may claim for a rebate within the next 2 months after non-compliance is established.

The implementation of the GSLs and the associated penalties, which are agreed on by TNB and the Energy Commission, is in line with meeting the functions specified under Section 4b of the *Electricity Supply Act 1990*. Complaints and rebate requests should be made at TNB offices, and if no action is taken by the power utility, the public may request further checks by the Energy Commission. This ensures that customers' rights are protected and the quality of power supply and the associated services in the country support the development and industrialisation of the economy.

In Our Next Issue

Energy Malaysia explores the Energy Commission's efforts to protect the interests of the public through comprehensive enforcement measures.

Learn about Malaysia's institutionalised **Monitoring and Enforcement** mechanisms, including regulations and inspections, as well as the punitive actions taken on offenders.

Gain an understanding of the Energy Commission's **Customer Service** efforts, which allow consumers to lodge complains or reports on electricity theft and fraud.

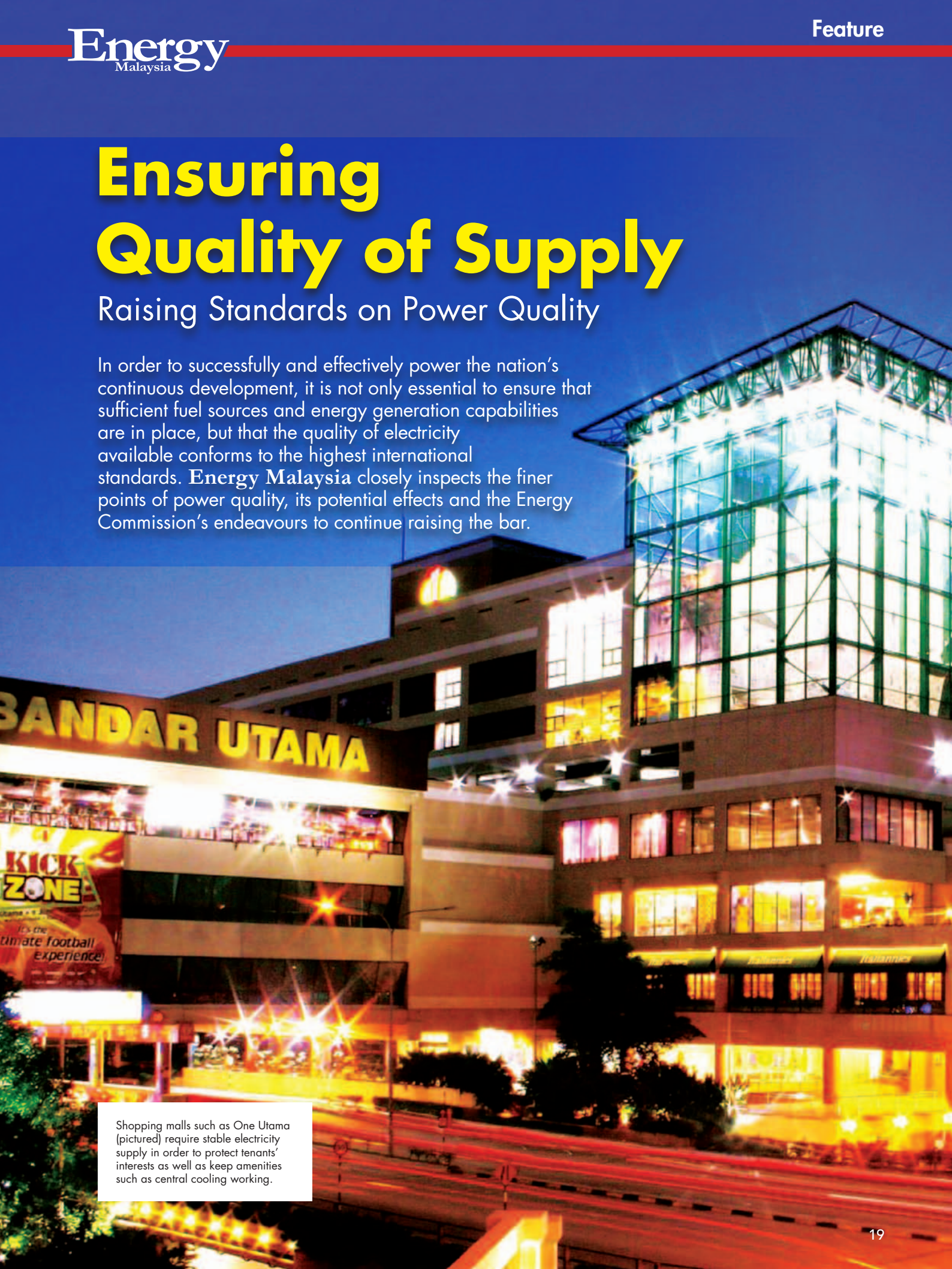
And more...

...in Malaysia's Energy Sector Thought Leadership Magazine

Ensuring Quality of Supply

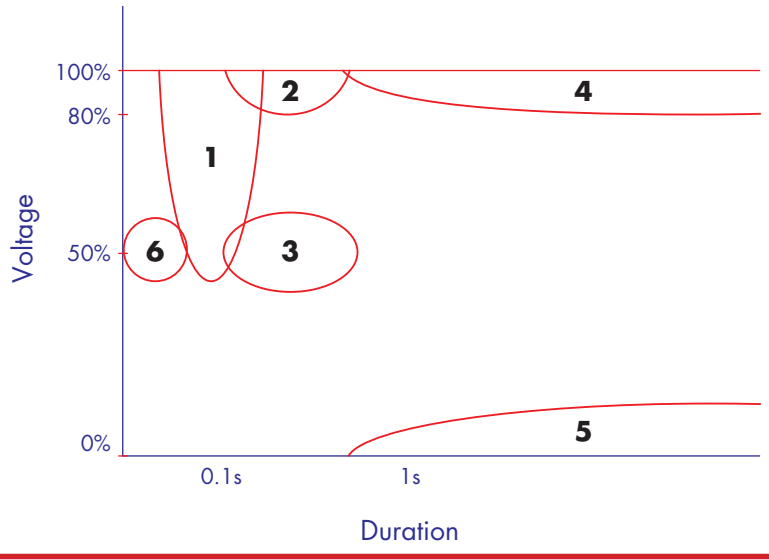
Raising Standards on Power Quality

In order to successfully and effectively power the nation's continuous development, it is not only essential to ensure that sufficient fuel sources and energy generation capabilities are in place, but that the quality of electricity available conforms to the highest international standards. **Energy Malaysia** closely inspects the finer points of power quality, its potential effects and the Energy Commission's endeavours to continue raising the bar.



Shopping malls such as One Utama (pictured) require stable electricity supply in order to protect tenants' interests as well as keep amenities such as central cooling working.

Understanding Voltage Sags



The duration and magnitude of each voltage sag coincides with the location and type of the preceding fault in the power system.

LEGEND:
1 – Transmission systems faults
2 – Remote networks faults
3 – Local networks faults
4 – Motor starting
5 – Short interruptions
6 – Fuses

In a huge range of applications involving industrial facilities, the provision of energy at stable power quality levels is absolutely essential to maximising productivity and reducing avoidable downtime.

PREDICTABLE POWER

In broad terms, power quality events refer to disturbances in the flow of electrical energy. This can be manifested as deviations in the voltage, current or frequency of electricity, which result in the malfunction or sub-optimal operation of equipment used by energy utilities and end-users alike. As defined by the International Electrotechnical Commission (IEC) – an organisation which publishes international standards relating to electrical and electronic technologies – power quality concerns "The ability of equipment or systems to function satisfactorily in an electromagnetic environment without introducing intolerable disturbances to that environment."

Additionally, the IEC prescribes that steps must be taken to limit the controllable electromagnetic emissions of each piece of equipment, and that all equipment should have adequate immunity to the disturbances that it would ordinarily be exposed to in a given environment. In all, a total of seven types of power quality disturbances have been identified. These comprise voltage sags, voltage swells, voltage interruptions, transients, flickers, harmonics variations and frequency variations.

WHEN VOLTAGE SAGS

Among all the types of power quality events that exist, voltage sags have attracted the greatest attention from both utility companies and industrial consumers in recent years. This is because large disruptions caused by voltage sags have the potential to result in considerable losses in the productivity and profitability of industrial processes, while also causing severe problems for a large number of customers connected to the power network system.

Also sometimes referred to as voltage dips, these power quality events have been defined by the Institute of Electrical and Electronics Engineers as "A decrease in RMS (root mean square) voltage or current at the power frequency for the duration of half a cycle up to a minute." Similarly, the IEC refers to voltage sags as "A sudden reduction in voltage at a point in the electrical system, followed by a voltage recovery after a short period of time, ranging from half a cycle to a few seconds."

Voltage sags are associated with the occurrence and termination of short-circuit faults or extreme increases in current. These increases can be caused by various factors, such as the starting of large loads or induction motors, which draw

approximately five times their total running current when starting. They are also sometimes caused by faults or short circuits in the power system. Adverse weather events, such as thunderstorms, also contribute towards these occurrences, as well as high winds which blow tree branches into power lines and result in line-to-ground faults. Such faults in the power system have been found to be a major cause of voltage sags, with the potential to cause problems for large numbers of customers.

CAUSE AND EFFECT

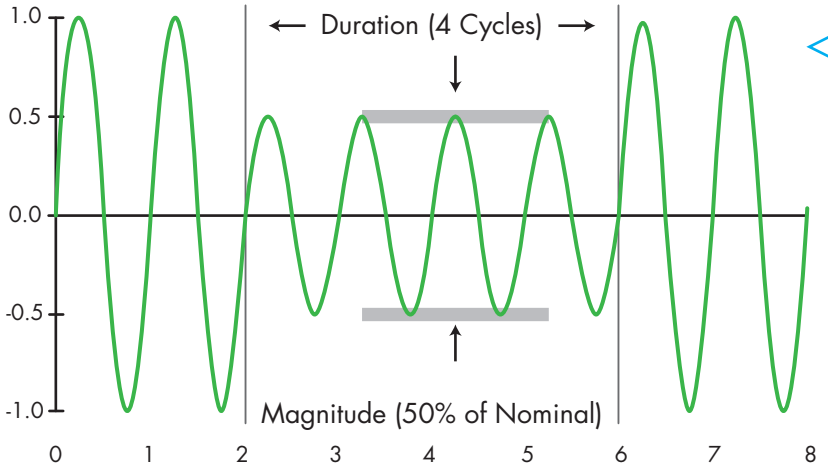
The duration of voltage sags are usually dependent on a variety of

Operating Time of Protective Devices

Protective Device	Operating Time
Current-limiting fuses	Less than one cycle
Expulsion fuses	10 – 1000 ms
Distance relay with fast breaker	50 – 100 ms
Distance relay in zone 1	100 – 200 ms
Distance relay in zone 2	200 – 500 ms
Differential relay	100 – 300 ms
Over-current relay	200 – 2000 ms

Different devices can be installed to mitigate the effects of voltage sags and other power quality events, offering varying capabilities to suit different applications.

Voltage Sag Characteristics



The duration of voltage sags typically last from half a cycle to one minute, while voltage magnitude drops to between 10% and 90% of the nominal value.

factors. Some examples of this include the presence of over-current protection equipment that has been installed, as well as the duration of current flow during the preceding fault. In addition, voltage sags that are caused by the starting of large loads such as induction motors usually last longer in duration, but are smaller in magnitude.

The magnitude of each voltage sag is also the product of multiple elements, and is usually expressed as the net RMS voltage during the occurrence of each fault – in terms of a percent or per unit decrease in the nominal system voltage. Among the influencing factors are the characteristics of each connected load and the distance between the equipment affected and the location of the fault, as well as underlying system configurations such as those relating to fault impedance.

During voltage sags, the magnitude of voltage decreases by 10% to 90% of the nominal value, which may cause some equipment to trip when this dip is sustained for longer than one or two cycles. Sometimes, system faults may cause the loss of supply to parts of the network, and these are classified as interruptions. At the same time, the rest of the connected network will experience a voltage drop.

Voltage sags have the potential to result in numerous detrimental effects. For instance, induction motors must draw more current to supply the same load as before the sag, potentially causing overheating and damage to the motor. These power quality deviations affect not only sensitive and susceptible equipment, but often the entire production line, as modern manufacturing methods commonly involve complex processes that utilise multiple devices which act in concert. This may result in complete system shutdown even though only a single device is affected by the voltage sag, making it one of the most serious and costly power quality issues.

POWERING PRECEDENT

In order to tackle these dangers, the Energy Commission has approved an action plan that was implemented by electricity utility Tenaga Nasional Berhad (TNB), to address the causes of voltage sags and other power quality events. As part of this process, TNB conducted several seminars and dialogues with energy users, to enhance their knowledge and understanding of the relevant challenges. Aside from this, the utility carried out a number of activities and initiatives to elevate power quality standards, by mitigating damage to underground cables and reducing transient interference in the national transmission and distribution grids.

In April, 2010, the Energy Commission also undertook to enhance understanding of power quality in Malaysia, in order to ascertain the impacts of power quality standards on customers and industry, as well as introduce improved regulations that further strengthen and elevate the standard of energy delivery in the country. In that month, the Commission mandated the undertaking of a Power Quality Baseline Study for Peninsular Malaysia, which was carried out by Global Technology Innovation and Management – the Commission's officially appointed party.

Through this, power quality logging was conducted at 500 industrial, commercial and residential premises, while power quality monitoring was undertaken at 50 commercial and industrial locations throughout northern, eastern, central and southern Peninsular Malaysia – measuring power quality performance in terms of System Average RMS Variation Frequency Index (SARFI), which represents the maximum level of voltage dipping experienced in each recorded case. Through this initiative, the Commission was not only be able to obtain baseline data on power quality events throughout the Peninsula, but also determine the source of each event.

Completed in February 2014, the production of this report has enabled the Energy Commission to proceed with discussions on the suitable period for implementation and enforcement of relevant Malaysian Standards and Regulations relating to power quality, with quarterly meetings convened specifically on the issue of voltage sags.

In carrying out its Power Quality Baseline Study for Peninsular Malaysia, the Energy Commission took steps to guarantee the accuracy of results by employing state-of-the-art equipment, such as this Fluke 1750 power quality monitor.

As Malaysia rapidly advances to realise its aspirations of developed nation status, the provision of high quality energy is consequently an increasingly essential and indispensable asset to all sectors of the economy. Thus, it is essential for energy utilities and consumers alike to place greater emphasis on enhancing the consistency and stability of energy supply. At the same time, the onus is on the Energy Commission to forge ahead and break new ground on this issue, for the benefit of the nation in the long-term.

Elevating Metering Accuracy

Maintaining the Reliability of Electricity Meters

As part of its efforts to create a world-class energy sector in Malaysia, the Energy Commission recognises the importance of empowering both domestic and commercial power consumers through enhanced precision and consistency in the measurement of electricity consumption, as well as the calculation of energy costs. In light of this, **Energy Malaysia** takes a look at numerous efforts that have been undertaken to strengthen and elevate the standard of electricity metering in the country.

MODERNISED METERS

At the start of 2003, the vast majority of electricity meters being used in Malaysia were conventional electro-mechanical devices which have a number of known technical limitations, such as the inability to produce accurate readings after prolonged use. This has been attributed to a range of external factors, including the weather, temperature and humidity where each meter is installed.

That year, electricity utility Tenaga Nasional Berhad (TNB) began to introduce digital meters. These overcame the limitations of earlier models, allowing for more precise and consistent measurement of electricity consumption, and enabling more reliable calculation of energy consumers' monthly electricity bills.

Following this, the utility instituted a broad-ranging installation campaign from 2010 to 2012, resulting in the replacement of up to 1.2 million electro-mechanical meters with digital versions, in domestic, commercial and industrial premises across the country. This brought the number of digital electricity meters being used in Malaysia up to a total of 4 million units, out of the estimated 7.8 million electricity meters in operation overall.

PROBING A PROBLEM

From the earliest stages of TNB's electricity meter replacement programme, the Energy Commission began receiving complaints from energy consumers across the country, who were experiencing rising monthly electricity bills, even though their estimated energy use matched the months prior to the meter replacement. As the statutory body responsible for regulating the energy sector and ensuring the delivery of a reliable, safe and affordable electrical supply, the Energy Commission immediately commenced efforts to verify and guarantee the metrology aspect of both newly-installed electricity meters, as well as those that would be produced in the future.

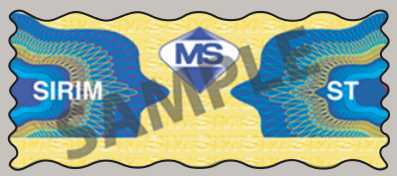
In early 2012, the Commission began conducting inspections of electricity meter manufacturers in Malaysia. It engaged the expertise of the National Metrology Laboratory (NML), SIRIM Berhad – which is the national custodian of weights and measures – and its subsidiary SIRIM QAS International – one of the country's leading quality assurance firms – as independent third parties tasked with ensuring that inspections and tests were carried out in a thorough and transparent manner. As a result, it was found that all of the meters being produced were in compliance with relevant technical requirements, as set out by the Malaysian Standards (MS) and International Electrotechnical Commission (IEC) accreditation schemes.

The Energy Commission's Metering Taskforce was also established and equipped with 10 portable electricity meter test sets, in order to conduct comprehensive analyses of electricity meter accuracy in the Klang Valley, drawing sample readings from nearly 200 domestic, commercial and industrial premises. The findings of this survey indicated that all of the meters tested were performing within the permissible 3% margin of error, as stipulated by Article 12(2) of the *Licensee Supply Regulations 1990*. In addition, it was determined that the meters studied were also in compliance with the Malaysia Laboratory

"To strengthen the testing and verification of electricity meters following disputes by consumers on the accuracy of meter readings, the Commission drew nearly 200 samples from digital meters at various consumers' premises throughout the Klang Valley, in order to check their accuracy."

– Datuk Ir Ahmad Fauzi Hasan
CEO of the Energy Commission

NEW LOOK



In line with the Energy Commission's new guidelines for electricity meters, every individual unit of electricity meter that is produced now carries a new quality assurance label that is jointly-accredited by the Commission and SIRIM QAS International.

Accreditation Scheme (SAMM), which is supervised by the Department of Standards Malaysia under the Ministry of Science, Technology and Innovation (MOSTI).

CREATING A LASTING IMPACT

In-depth consultations were also conducted between the Energy Commission and public bodies such as the Ministry of Domestic Trade, Cooperatives & Consumerism (MDTCC), the Department of Standards Malaysia, the NML, SIRIM Berhad, SIRIM QAS International, TNB and electricity meter manufacturers registered with the utility, in order to develop the *Guideline for Electricity Meters: Approval, Testing and Initial Verification Requirements*, which strengthens and streamlines the regulatory mechanism for electricity meter accuracy.

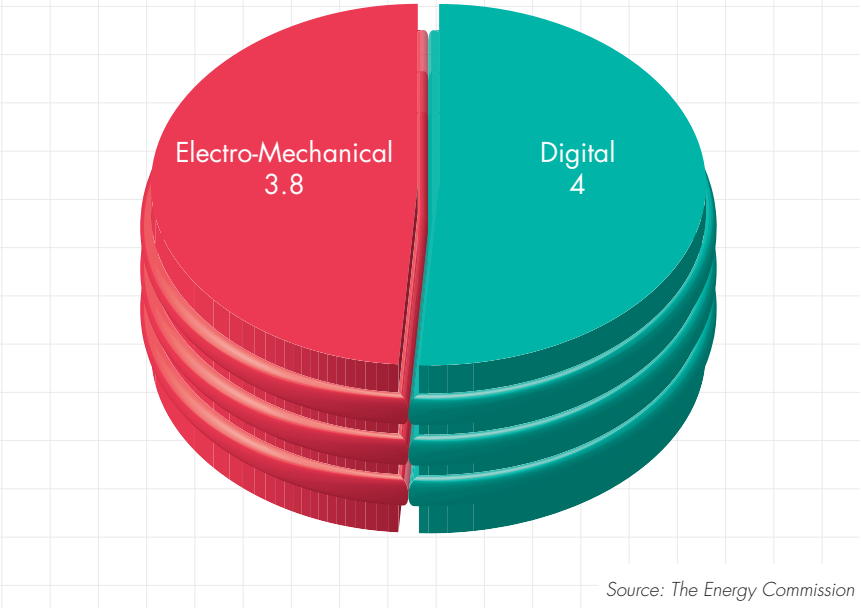
The Guideline, which came into effect in the first half of 2013, establishes a number of new criteria that electricity meters must fulfil, such as attaining pattern approval from the NML and SIRIM Berhad, as well as product certification from SIRIM QAS International. Aside from this, it is now compulsory for all electricity meters installed in new premises or replacing older meters to undergo a set of rigorous testing and verification processes, in order to earn a new quality assurance label which is jointly-accredited by SIRIM QAS International and the Energy Commission, and is attached to every approved meter.

On top of enhancing oversight on the manufacture and testing of electricity meters, these initiatives also complement the *Electricity Regulation 1994* – which states that electrical equipment must be approved by the Energy Commission before it is manufactured, imported, displayed, sold or advertised. Besides this, the new Guideline ensures that all electricity meters are monitored and audited in a transparent manner by both the Energy Commission and SIRIM QAS International, as well as other relevant parties.

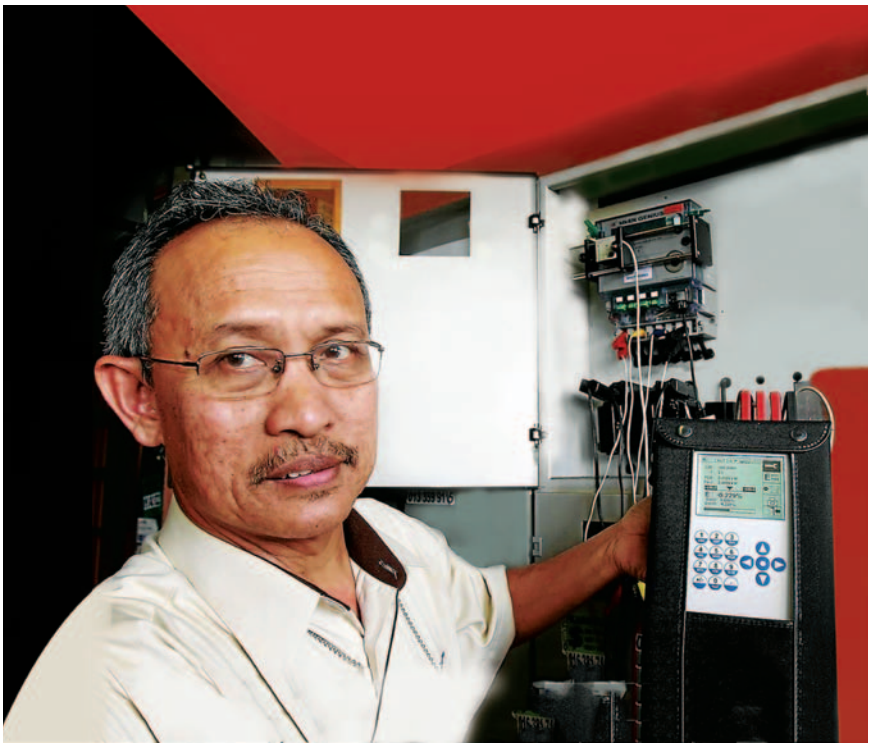
> *"Meters that have satisfied the stipulated testing and verification requirements are given approval to feature the new Energy Commission-SIRIM quality assurance label on each unit. The Commission will also continue to ensure that inaccurate digital meters found to be in operation are replaced immediately."*
>
> **– Datuk Ir Ahmad Fauzi Hasan**
> CEO of the Energy Commission

Apart from regulating the meters themselves, the Guideline also requires that meter manufacturers obtain MS ISO/IEC 17025:2005 *(General Requirements for the Competence of Testing and Calibration Laboratories)* accreditation under the Malaysia Laboratory Accreditation Scheme (SAMM), which is offered by the Department of Standards Malaysia. Additionally, the laboratories operated

Composition of Electricity Meters in Malaysia
(in millions)



Source: The Energy Commission



"The Energy Commission has carried out random inspections of new digital meters, prioritising those consumers who have lodged complaints. At least three readings are recorded for each meter and the final result is derived by calculating their average."

– Ir Othman Omar
Director of the Enforcement and Regional Coordination Department

by these manufacturers are also subject to audits by the Energy Commission and SIRIM QAS International, both before their products receive approval, as well as periodically during regular operations.

SUSTAINED PROGRESS

At the start of 2014, a total of seven electricity meter models had attained full accreditation under the *Guideline for Electricity Meters*. These comprise single-phase meters – which are used in residences – and three-phase meters, more commonly found in commercial and industrial premises. This number is anticipated to rise throughout the rest of the year, as there are already a number of applications for additional models to be accredited, currently undergoing the relevant processes.

To safeguard the interests of Malaysian electricity consumers, the Energy Commission will also continue to ensure that in any cases where electricity meters fail the predefined conditions and operate outside the stipulated accuracy range, they are immediately replaced with a new meter by the energy utility responsible. To support and facilitate this, the Commission is currently drafting an upcoming *Guideline for Electricity Meters: In-service Testing*.

Aside from helping maintain the reliability, consistency and affordability of energy supply in Malaysia, greater metering accuracy enables each electricity consumer to better understand and manage their individual demand, thus creating new opportunities to effectively optimise energy use. Additionally, these measures serve to ensure a fair and transparent energy distribution system that balances the interests of both consumers and energy utilities, guaranteeing that neither one is subject to untoward costs.

Reliable Distribution

Creating a Safe Domestic Gas Piping System

While pipes offer convenience to those using gas, its flammable nature means that such installations can be dangerous if planned improperly. Therefore, it is important that they be designed, maintained and repaired according to set standards. The Energy Commission of Malaysia has published the *Guidelines on Domestic Gas Piping Installations* to protect the integrity of the buildings and ensure public safety.

Clear, Visible and Safe

The piping system must be designed in such a way that the gas meter provided by the supplier can be easily located. For example, in Malaysia, gas pipes are painted yellow, allowing for instant recognition.

To protect an installation from damage, pipes should not pass through dangerous areas such as near high-voltage wires, sources of excessive external stress vibration or corrosion, or areas with high traffic. They should also not be laid under or through load-bearing foundations or walls, and outlet fittings or piping should not be placed behind doors.

Pipelines should be routed close to walls, not cut into load veering walls and be at least 50mm away from other services. There should also be enough clearance to permit the use of a pipe wrench without straining or bending the pipe. If electrical services are used in the same duct, the gas riser must be separated from them using a gas tight partition.

Secured Outlets

Isolation valves need to be accessible to users, as they allow gas to be confined to certain areas during an emergency, such as a fire or a leak. These should be located on each floor and section of the building, where gas is piped.

Each outlet, including pipes with valves, should be securely closed with an approved threaded cap or plug, to ensure they are airtight, and should be left closed until an appliance is connected.

It is unlawful to remove or disconnect any gas equipment without plugging or capping the outlet from which the gas equipment is removed. For safety reasons, capping the outlet is best done using a screwed joint fitting.

Preventing Dangerous Leaks

To prevent the distribution of gas leaks through the building, piping should not be laid in escape routes, shafts, chimneys, gas vents, ducts and other unventilated spaces.

If such areas cannot be avoided, gas detectors must be installed to detect any leaks. Also, pipes passing through a cavity must take the shortest route possible, and be properly encased in sleeves. If there is no other route available, pipes should run above a ceiling, and drop down to appliances.

As often as possible, gas pipes should run outside a building. This is especially true when the operating pressures exceed 35kPa (5psi). For maintenance purposes, pipe risers should also be installed at easily accessible locations such as corridors or dedicated shafts. Such ducts must have 2-hour fire-rated doors, with one side an external wall with fixed louvres or ventilation blocks, so that any leak will dissipate into the atmosphere. Additionally, such pipes should enter the building above-ground to ensure that they remain in well-ventilated locations.

Operation and Maintenance

Maintaining the safe operation of the system in accordance with the manufacturer's specifications is the duty of the owner – or occupant of the premises.

1. Ensuring that the gas pipeline can be identified continuously.	2. Immediately taking all reasonable steps to shut off supply when a gas leak is suspected or known.	3. Informing the energy commission or gas utility licensee if gas continues to escape after supply has been shut off.	4. Taking all reasonable steps to ensure that gas can be re-supplied without causing any danger after supply is shut off for safety reasons.
5. Ensuring that the gas installation is well-maintained.	6. Ensuring that safety is observed at all times so as to prevent danger from arising at the gas installation.	7. Attending and assisting any inspection on the gas installation carried out by the energy commission or any authorised officers.	8. Keeping a maintenance record detailing when any maintenance or repairs are carried out.
9. Being informed of any alteration or repairs carried out on the supply system by a competent person.	10. Being notified of any necessary or emergency repairs done by a competent person.	11. Taking adequate precautions preventing a gas installation or equipment from being accidentally or inadvertently made unsafe during maintenance.	

Preparing a Maintenance Programme

The person in charge of the gas pipeline/installation is also responsible for proper maintenance programmes and safety measures. This includes steps for regular leak surveillance of the system and emergency procedures, which have to be established in advance and rehearsed regularly, for an orderly implementation during emergencies involving gas leaks or fires.

The piping system must be subjected to a thorough inspection and be tested by registered competent persons at least once every three years. Pressure vessels must comply with the Department of Occupational Safety and Health (DOSH) requirements, and maintenance and repair work on the system must similarly be performed by competent persons.

While uncommon, pipeline failures can and do occur. While there are many hazards associated with gas leaks, proper design, maintenance and repair can mitigate them. The Energy Commission's guidelines aim to reduce such incidents, and ensure a safe and convenient gas supply for those having domestic piping system.

Datuk Dr Rahamat Bivi Yusoff

EPU Director General on Encouraging Efficiency, Green Growth and Cost-Effectiveness

In its role as the main agency concerned with economic planning and policy formulation in Malaysia, the Economic Planning Unit (EPU) aspires to maintain the nation's long-term trend of economic growth, while balancing these targets with the need to sustainably leverage energy resources. **Energy Malaysia** speaks with Datuk Dr Rahamat Bivi Yusoff, Director General of the EPU, who shares her thoughts on the nation's efforts to improve energy use, and the steps that are still to come.

The main function of the EPU is to promote the efficient and effective management of the economy, which also extends to energy policy. How do you ensure the implementation of these initiatives and how effective have they been in the last few years?

EPU'S main function is economic planning and policy formulation. It set the macro policy directions, including energy policy; it does not involve directly in the implementation of these policies, but is part of the committee that oversees this implementation. In the case of Energy Efficiency (EE), the Ministry of Energy, Green Technology and Water (KeTTHA) and its agencies – particularly the Malaysian Green Technology Corporation – have been tasked with carrying out the necessary initiatives. On the whole, promoting efficient energy use is one of the pillars of the New Energy Policy (2011-2015) under the Tenth Malaysia Plan.

The *Sustainability Achieved Via Energy Efficiency* (SAVE) programme came into effect in 2011, offering rebates for energy efficient electrical appliances such as refrigerators, air-conditioners and chillers. The government's allocation of RM44.28 million in 2011 was fully utilised and as of end-2012, the market share of refrigerators, air-conditioners and chillers promoted under SAVE climbed to 40.8%, 21.6% and 39.2% respectively, surpassing their original targets.

Minimum Energy Performance Standards (MEPS) were also gazetted by the Energy Commission in May 2013 and fully enforced in 2014, covering five types of electronic goods: fans, air-conditioners, lamps, refrigerators and televisions. Equipment with MEPS labelling will discourage inefficient energy equipment from entering the Malaysian market.

In the building sector, a revision of the Uniform Building By-Laws has been incorporated in the *Malaysian Standard Code of Practice on Energy Efficiency and Renewable Energy for Non-Residential Buildings* or *Malaysia Standards 1525* (MS 1525). Its objective is to spur design, construction, operation and maintenance of new and existing buildings that reduce the use of energy.

The *Building Sector Energy Efficiency Project* (BSEEP) is also being undertaken in collaboration with the United Nations Development Programme (UNDP), to improve EE utilisation in commercial and government buildings. This involves policy and capacity developments, regulatory frameworks, EE financing capacity improvements and information and awareness efforts, as well as demonstration buildings.

Additionally, there are currently 436 energy managers who have been trained and registered by the Energy Commission to facilitate energy efficiency measures in Malaysia. These professionals are appointed for installations that use more than three million kWh of electricity for six consecutive months, in order to ensure that EE measures are implemented.

Since the introduction of Minimum Energy Performance Standards (MEPS), electrical equipment and appliances such as these now feature the Energy Commission's energy efficiency rating label prominently.

Energy plays a key role in the national economy. How does the EPU complement the Energy Commission to ensure that Malaysia's energy efficiency goals are met?

As mentioned, the EPU provides overall policy direction on energy matters. While the Energy Commission is the dedicated statutory regulator entrusted to establish guidelines, enforcement measures and penalties, the EPU is also represented in most committees established by the Commission.

Moving forward, the government is focusing on implementing several energy efficiency practices in Malaysia. These include reviewing energy prices towards market price and ensuring consumers use energy efficient products, increasing the number of electronic goods to be registered under the MEPS, expanding the Energy Performance Contract Management to government buildings in order to reduce the cost of utilities and maintenance, phasing out the Special Tariff by 2017, and incentivising industries to utilise energy efficient equipment.

Also, we are preparing the blueprint for the *Sustainable Consumption and Production* (SCP) programme, which seeks to decouple economic growth and environmental degradation along the entire life cycle of products and services. It takes a holistic approach that calls for sustainable production and consumption patterns at all stages, including extraction, production, marketing, use and end-of-life.

How effective have the EPU's energy efficiency programmes been in cutting electricity cost in government buildings?

A number of the government's initiatives have helped reduce electricity use and costs in government buildings. For example, in line with savings measures announced by the government, public agencies were asked to reduce their monthly electricity bill at least by 10%. The government also announced in 2011 that all public buildings in Malaysia must set air-conditioning units at a minimum of 24°C, which has resulted in lower energy bills at government facilities.

Aside from that, EPU's buildings have been fitted with energy efficient T5 lamps, which has helped to further cut electricity bills by approximately 10-15% per month.

Left: At the crux of ensuring the security and affordability of energy supply, is the need to support Malaysia's rapid development and steadily growing population.

What is your outlook for the energy sector in Malaysia this year? What is the EPU aiming to achieve this year, on the journey towards the overall goal of energy efficiency?

The energy sector has faced a number of challenges in 2014, with regards to energy supply and demand fluctuations that are related to energy security, fuel supply and pricing, energy efficiency and resource conservation.

Factors such as population growth, economic growth, energy prices and technological advancement raise critical concerns on energy demand. With economic growth forecast at 5-5.5% this year, energy demand is expected to grow in tandem as well. On the other hand, supply concerns are related to ensuring continuous supply to the nation at affordable prices. Between the months of January and May, 2014, electricity utilities experienced a series of severe disruptions in Sabah, Sarawak and Peninsular Malaysia.

To mitigate these issues, a number of initiatives have been undertaken by service providers. For example, several coal power plants in Peninsular Malaysia are currently undergoing modifications to their boilers, in order to improve heat circulation and minimise the likelihood of breakdowns. This is anticipated to reduce the risk of further supply disruptions and interruptions in the long term.

Another important aspect to consider is the rationalisation of energy subsidies. In 2014, the price of gas for electricity and the non-power sector was increased by RM1.50/mmbtu. This change took effect on the 1st of January, 2014 for the power sector and on the 1st of May, 2014 for non-power industries. Gas prices will continue to be reviewed gradually, until they reach parity with market levels.

Beyond balancing national development goals with the need to maintain an affordable energy supply in Malaysia, the EPU is forging ahead to provide comprehensive and holistic frameworks that serve to guide the nation's sustained and environmentally-compliant growth in the long-term. For regulatory agencies like the Energy Commission, these instruments play the pivotal roles of unifying and streamlining both ongoing and future developmental efforts.

Monitoring Power Performance in 2013

Pursuing Continued Improvement

Aside from being a public utility, the electricity industry has a comprehensive infrastructure, delivering energy to residential, commercial and industrial sectors and promoting economic growth within the country. It is thus important to keep track of the adequacy and reliability of systems and allow consumers to be more aware of their options based on availability. **Energy Malaysia** examines and analyses information related to the energy supply industry in 2013.

TNB AND INDEPENDENT POWER PRODUCERS (IPPs) GENERATION SYSTEM IN PENINSULAR MALAYSIA

Average Thermal Efficiency (%)

Plant Type	2008		2009		2010		2011		2012		2013	
	TNB	IPP	TNB	IPP	TNB	IPP	TNB	IPP	TNB	IPP	TNB	IPP
Combined Cycle	41.20	44.80	41.00	44.30	41.20	41.90	40.84	43.98	44.34	43.96	43.30	43.97
Open Cycle	25.60	26.10	17.40	27.40	22.60	27.30	22.30	27.09	26.29	26.77	26.70	27.38
Conventional (Oil/Gas)	18.30	32.20	n/a	31.90	25.60	32.30	27.27	30.58	26.6	32.34	27.03	32.68
Conventional (Coal)	-	33.80	-	34.70	-	33.10	-	35.11	-	35.53	-	35.21

TNB, which provides nearly half of the power generation in the country, saw a rise in efficiency in both combined and open cycles, thanks to regular maintenance of these plants, but saw a decline in the conventional oil/gas plants due to ageing and degrading facilities.

Source: Electricity Supply Industry in Malaysia 2013

CREATING EFFICIENCY

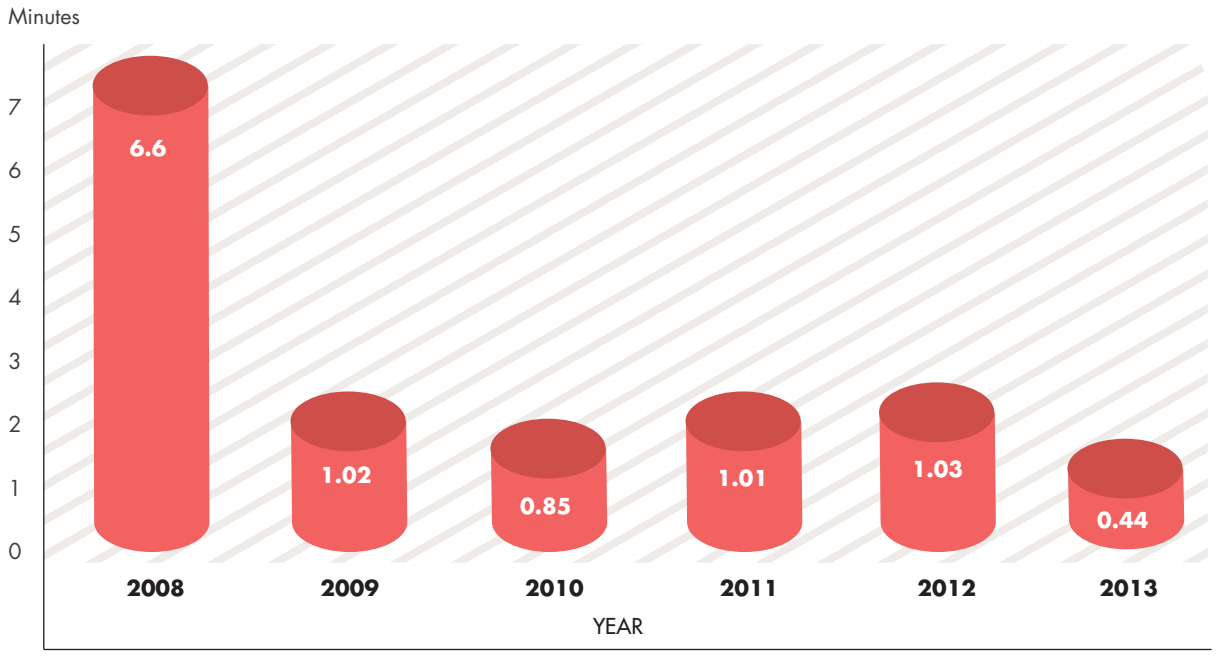
Electricity generation facilities derive their revenue from selling power at a set price, while offsetting the operating cost and the cost of raw fuel required for their processes. It follows that reliable operation and efficiency are crucial in ensuring a profit margin, and this is something all power producers aim to achieve.

Thanks to frequent scheduled maintenance throughout 2013, as well as a high average capacity factor, average thermal efficiency improved in combined and open-cycle power plants owned by Tenaga Nasional (TNB), the largest utility company in Malaysia. However, in plants owned by Independent Power Producers, efficiency saw a slight decline overall.

In Sabah, the average thermal efficiency showed consistent gain,

DELIVERY POINT UNRELIABILITY INDEX (DePUI) - SYSTEM MINUTES TNB

Since 2009, TNB has maintained a low Delivery Point Unreliability Index (DePUI), and this, alongside the low tripping incidents, exemplifies the reliable service in Peninsular Malaysia.

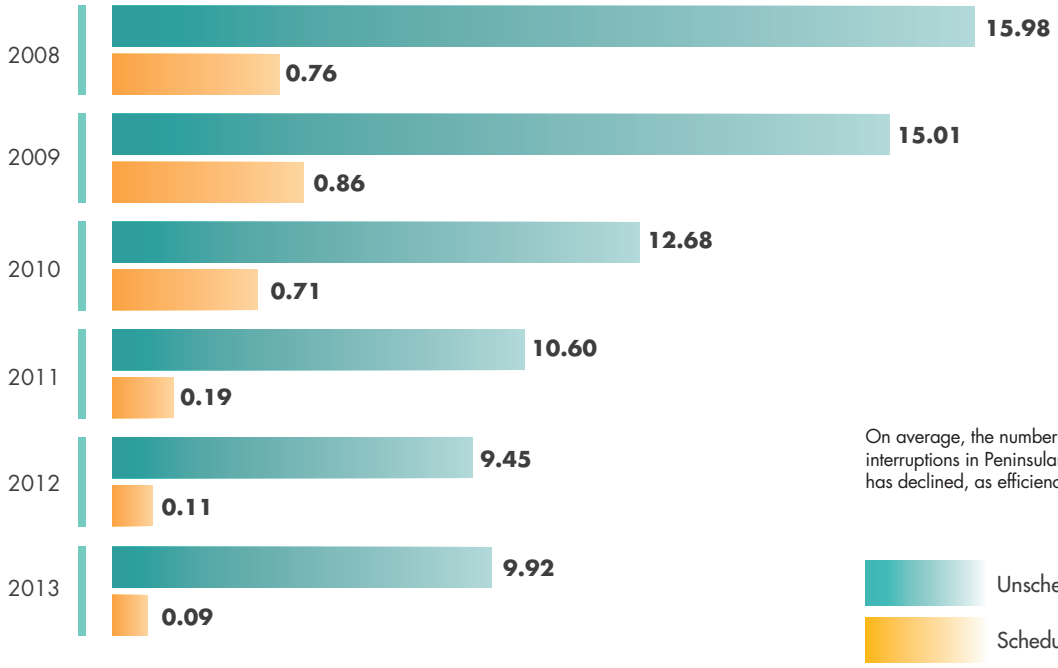


MONTHLY TRIPPING INCIDENTS FOR LINES/CABLES

Source: Electricity Supply Industry in Malaysia 2013

NUMBER OF ELECTRICITY SUPPLY INTERRUPTIONS

Tenaga Nasional Berhad
(Per 1000 Consumers)

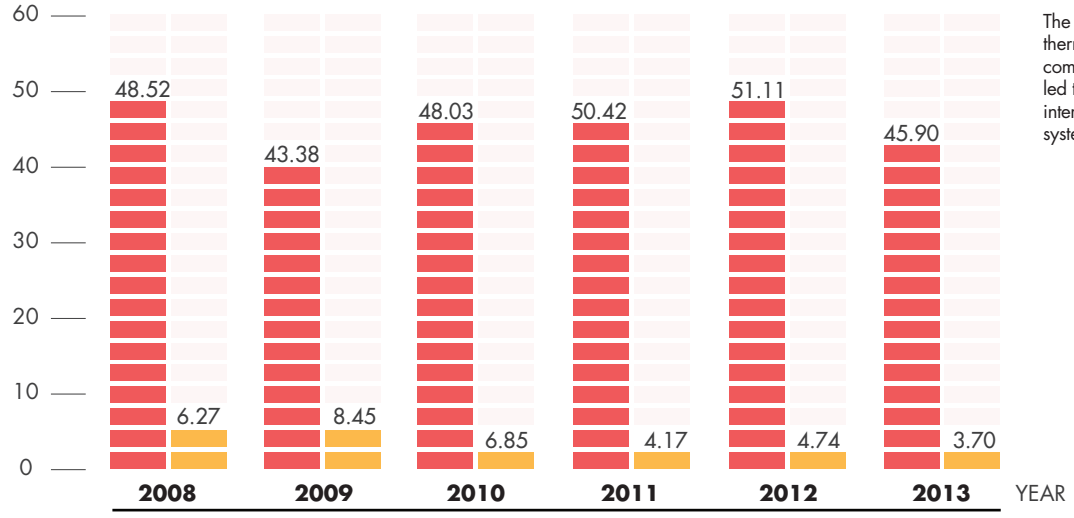


On average, the number of supply interruptions in Peninsular Malaysia has declined, as efficiency improves.

Unscheduled Interruptions

Scheduled Interruptions

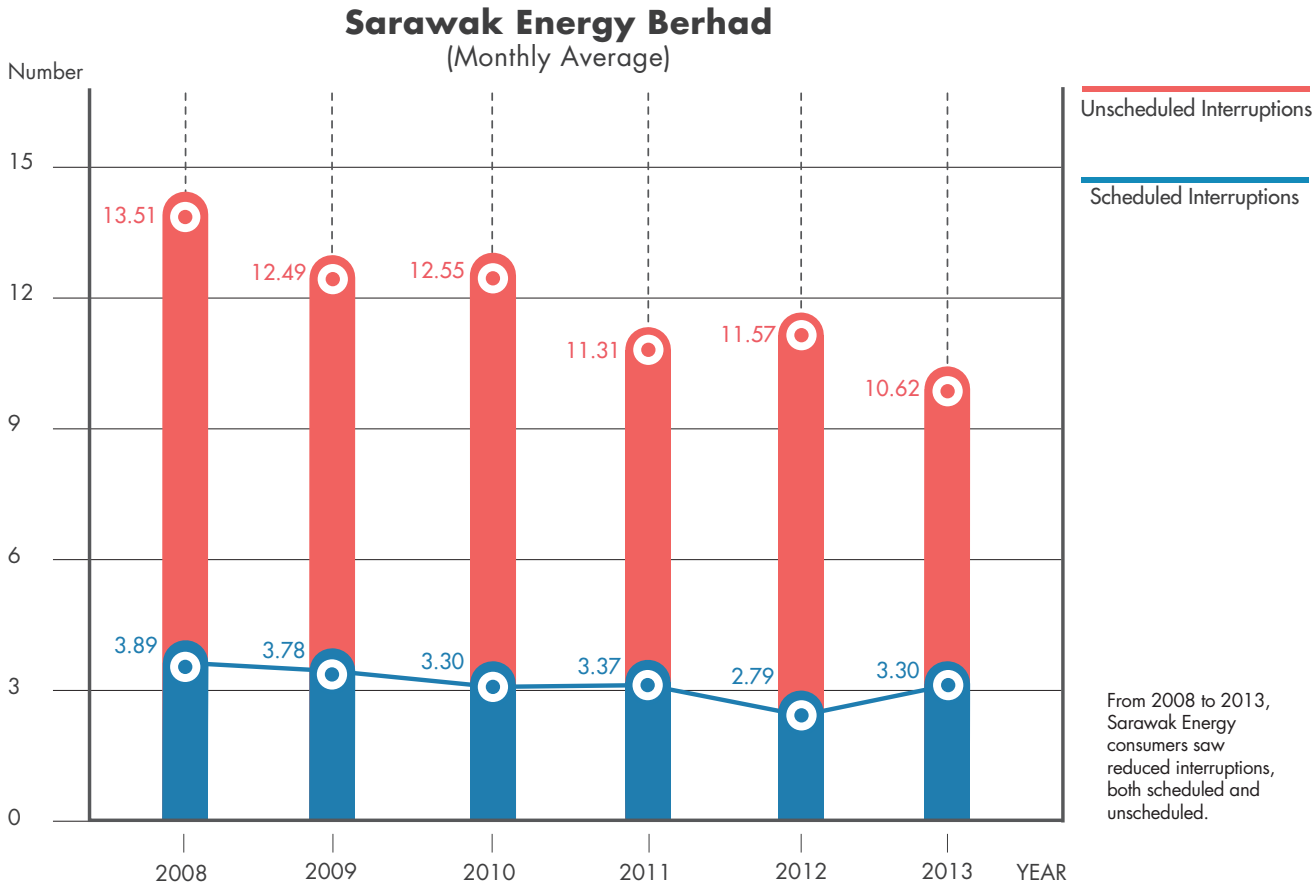
Sabah Electricity Sdn Bhd (SESB)
(per 1,000 Consumers)



The improved average thermal efficiency of the combined cycle plants led to lower supply interruption of distribution systems in 2013.

Note: Excludes the interruptions at generation and transmission systems

Source: Electricity Supply Industry in Malaysia 2013



Source: Electricity Supply Industry in Malaysia 2013

mainly due to the gas-based power plants operating at full capacity.

SUPPLY AND DEMAND

Transmission in Peninsular Malaysia saw improvement from the previous year, with only two tripping incidents, compared to four the previous year. There were also no cases of load shedding, but there was a 11.9% increase in unsupplied energy.

Sabah still faced an issue of insufficient generation capcity and low reliability throughout the year. Should any high-capacity generator stations come to a halt, the operation system of the electricity supply in Sabah will be jeopardised.

TNB saw a maximum demand of 16,532MW, and generated a total of RM33.86 billion in sales, an increase from the 15,826MW and RM32.45 billion in 2012.

Sabah Electricity (SESB) observed a 5.3% increase from the previous year's maximum demand, at 828.4MW in 2012 to 874MW in 2013, as wellas an increase in sales from RM 1.35 billion to RM1.38 billion.

Meanwhile, Sarawak Energy (SEB) had a total generating capacity of 1,332MW, as there were no change in the number of generating units in operation. Maximum demand in the state increased by 19.3%, to 1,466MW (from 1,229MW in 2012), but total electricity sales increased by 21.7% to a total value of RM2.26 billion.

The performance and statistics in 2013 reveal that Malaysia as a whole continues to see increased demand for electricity, in tandem with the country's economic growth. Such data allows the Energy Commission to measure the performance of producers and distributors, and ensure that the consumers receive electricity supply of the best quality.

Money Saving Measures

How Smart Meters Help Lower Your Electricity Bills

Smart meters have been hailed by their supporters as a way for households to manage their electricity usage more efficiently, thus saving on electricity bills. Northern European countries, beginning with Sweden, took the lead in adopting this technology in 2003, while the United Kingdom intends to install one in every home by 2020. Malaysia itself is conducting a feasibility study which involves 1,000 units to be deployed in Melaka and Putrajaya. **Energy Malaysia** explores the principles of this technology and its potential benefit to the consumer.

METERS THAT TALK BACK

Presently in Malaysia, the utility company conducts premise-to-premise reading of electricity meters – a method which causes inconvenience to consumers who have to stay home in order to let the technician into their home. Even though Self Meter Reading is available, that, too, puts the onus on the consumer to read the meter and then send the figures to the utility.

Smart meters, however, remove the burden from consumers by enabling remote readings as the meters are connected to computers at the utility through transmission control protocol/internet protocol (TCP/IP). In addition, they can measure energy usage on a time interval basis and store these readings for retrieval, as well as provide information on power quality, load management and outages in real-time.

Smart meters are an integral part of the larger Advanced Metering Infrastructure (AMI), which also includes communications networks and data management systems that facilitate two-way communication between the meter and the utility. With present AMI technology, utility companies can provide real-time information using networks that extend to the customers' homes.

The two-way communication between the meter and the utility means that meters can be remotely upgraded when new technology or software become available. Maintenance is also easier – smart meters allow for faster response to outages and service disruptions, as the extra information they record (voltage surges and harmonic distortions) can help pinpoint the problem.

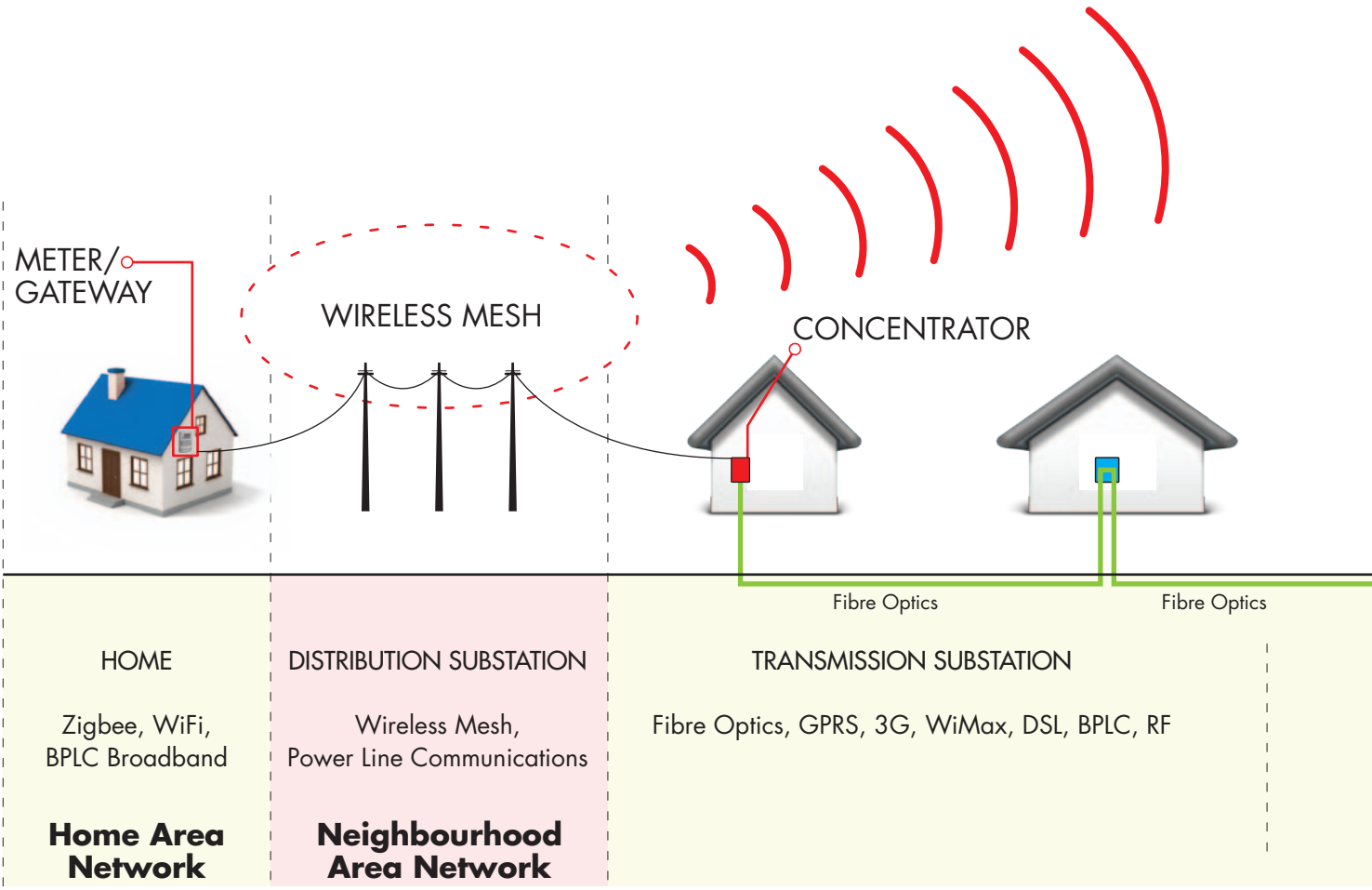
They red-flag the utility companies on momentary outages in individual homes, which often pre-indicate grid failure. This helps the utility predict where possible sustained outages might occur and take action to prevent them.

BETTER INFORMATION = MORE SAVINGS

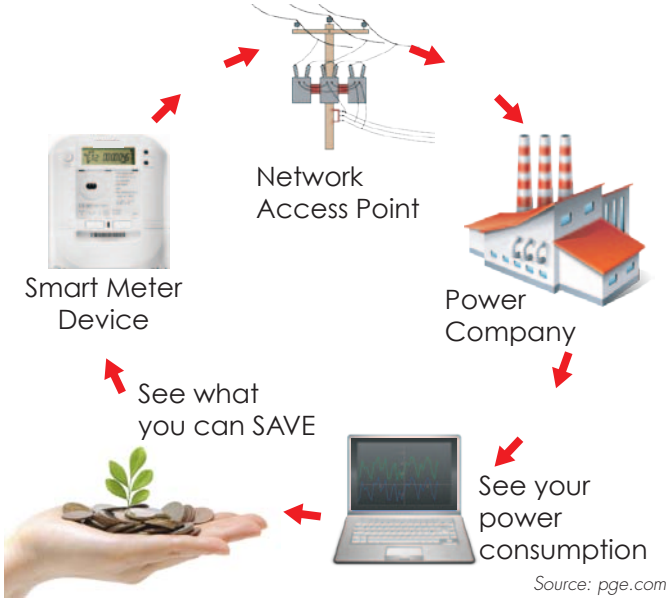
Electricity consumers are further empowered by smart meters because they can monitor their consumption and cost, and

AMI NETWORK SOLUTION

How Smart Meter Data is Relayed to the Energy Provider



EMPOWERED SAVING



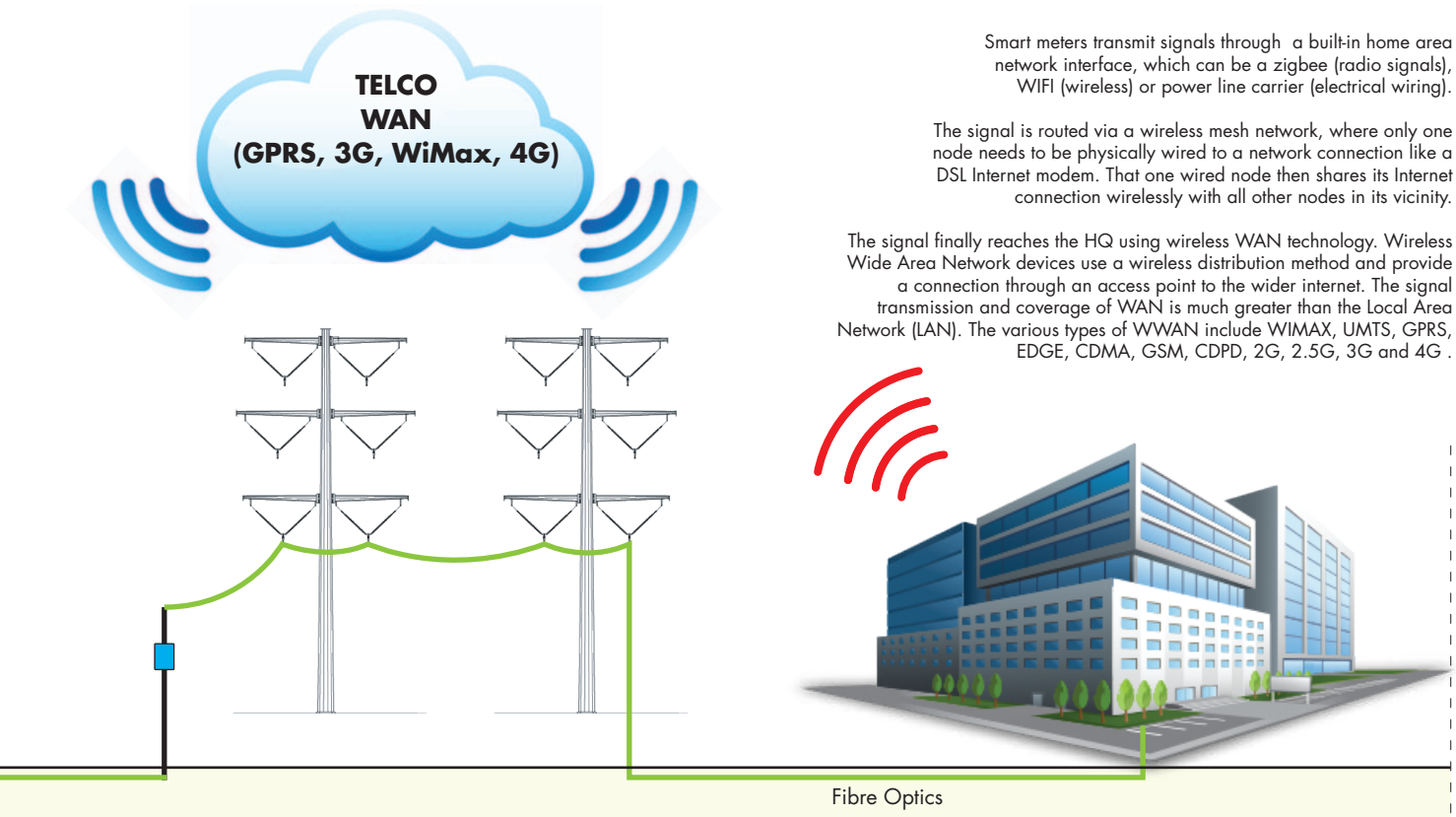
make use of time-of-use (TOU) rates offered by consuming electricity at off-peak hours. They also have better awareness of their personal consumption patterns, being able to access their previous day's electricity usage online.

The in-home display, which is connected wirelessly to the meter, monitors electricity usage and cost in real time, allowing customers to respond on-the-fly to price changes by switching off or delaying the use of a high-energy appliance. Smartphone applications could be developed that alert the user when electricity consumption exceeds a preset limit.

As mentioned, smart meters can also send readings to the utility company, negating the need for manual reading of the meter. This also results in lower tariffs as cost savings enjoyed by the utility are passed onto the consumer.

ONE IN EVERY HOME?

It should be noted that while all smart meters are digital, not all digital meters are smart. For example, in Malaysia, the country's largest electricity utility Tenaga Nasional Berhad (TNB) is rolling out digital electricity meters to enhance accuracy of readings.



Wide Area Network

Source: Tenaga Nasional Berhad

In addition, it has been carrying out remote meter reading since 2007, especially of its large customers that consume the most electricity. However, since this communication between utility and meter is one-way, these meters do not qualify as smart.

Asia as a whole, however, is starting to embrace smart meters. For example, in neighbouring Singapore, the Energy Market Authority (EMA) has led a Smart Grid pilot project deploying smart meters, dubbed Intelligent Energy Systems (IES), while a similar smart grid test bed is underway in Jeju, South Korea.

In Malaysia, the move towards smart meters is reflected in an RM9 million feasibility study conducted by TNB. Under this plan, 800 smart meters will be installed in Melaka (Bandar MITC, Ayer Keroh) and 200 in Putrajaya. The company aims to collect data for the purpose of evaluating cost effectiveness, formulating time-of-use (ToU) tariff schemes, studying consumer behaviour and planning a nationwide rollout.

The pilot project is a part of phase 2 of TNB Research's wider Smart Grid Plan which focuses on 'empowering customers' and 'improving energy and network efficiency'. However, according to Datuk Nazri Sharuddin, TNB's Vice-President of New Business and Projects, the utility will not rush into nationwide implementation, even if the results are positive. Among the issues to be thrashed out is the installation cost, which is currently about RM1000 per meter.

While it may not result in the immediate or even short-term roll-out of smart meters across the country, positive results for the pilot project will establish that it is feasible, as far as the technical details are concerned. And it is definitely a huge leap forward for the eventual expansion of the technology. Through smart meters, consumers have knowledge of their usage patterns, and will be better informed on how to better utilise their consumption of electricity. After all, as the old saying goes, knowledge is power and with smart meters, it is power at a lower price.

Reducing Electricity Consumption

Promoting Energy Efficiency in the Home

Electricity is a necessity, but excessive consumption results in costly bills and squandering of natural resources. In a typical home, there are many appliances whose use can be better managed to not only reduce their draw-down of power leading to bill reductions, but also ultimately helping to reduce the emission of greenhouse gases by power producers. **Energy Malaysia** provides a few tips for people to introduce more prudent and efficient energy practices throughout their homes.

The Living Room

Lights: Turn off all unnecessary lights to reduce unnecessary power consumption.

Fans: Because a fan creates air flow in order to cool a room, windows and doors should be left open for ventilation to enhance the cooling effect.

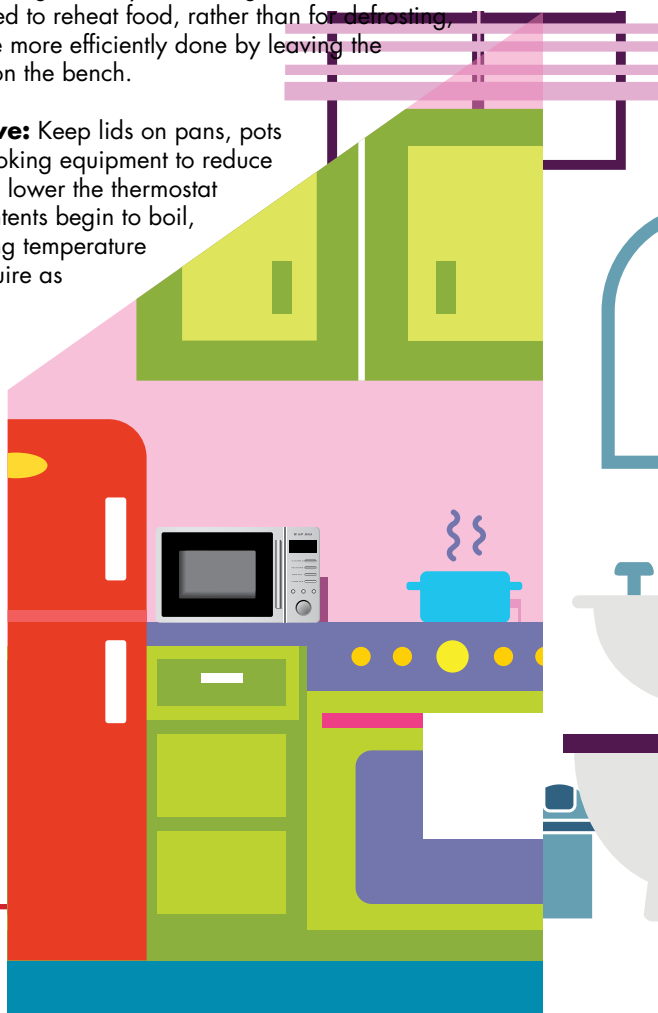
Air conditioners: The air conditioner should be placed in a cool area, away from heat-generating sources such as the sun, to ensure that the thermostat reads the temperature accurately, and regular maintenance should be carried out to maintain efficiency. The room can also be kept cooler for longer periods if windows and doors are closed to prevent cooled air from escaping.

Kitchen and Dining Area

Refrigerator: The refrigerator should not be placed next to a heat source such as a stove, oven or sunlight, as this lowers its efficiency. To reduce energy use, let food cool naturally prior to being refrigerated, and set the thermostat to the right temperature. The door should not be left open longer than necessary, to prevent cooled air from escaping.

Microwave Oven: Use a lid with microwaveable containers to speed up cooking times by containing moisture. The microwave should be used to reheat food, rather than for defrosting, which can be more efficiently done by leaving the frozen food on the bench.

Electric stove: Keep lids on pans, pots and other cooking equipment to reduce heat loss and lower the thermostat when the contents begin to boil, as maintaining temperature does not require as much heat as warming up.



Ensuring Efficiency

Manufacturers and importers of electronic appliances such as television, refrigerators and air conditioners are required by law to have an Energy Efficiency Label. These labels are affixed on the appliances, providing information on how energy-efficient the device is.

The top of the label will feature up to five stars, which denote the efficiency of the unit. The more stars there are, the better. Other information on the label includes information on the appliance, including type, energy rating, brand and model.

The energy consumption and energy savings are also listed, enabling total savings to be calculated. To give consumers the confidence that the appliance has been properly regulated, the testing standards are also provided.

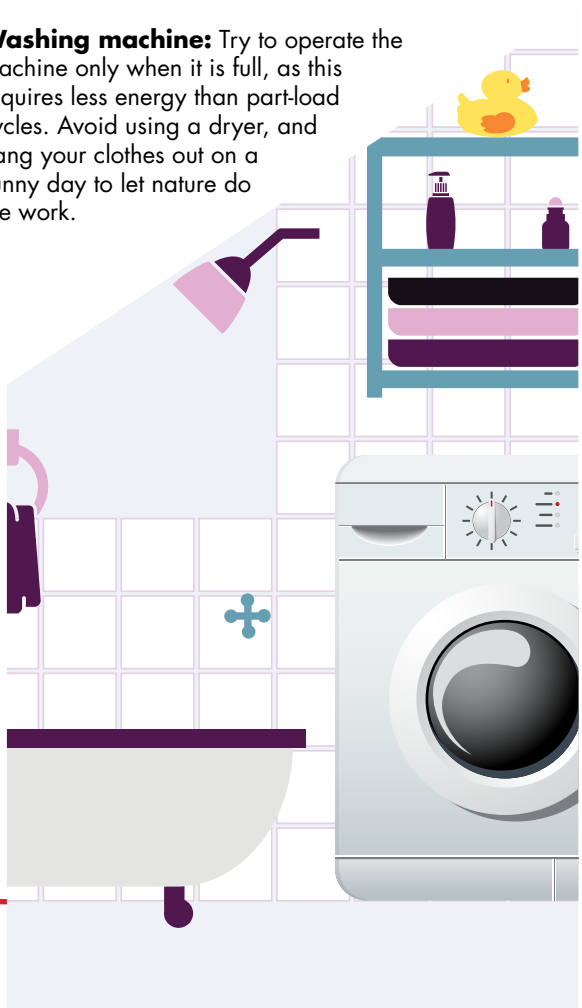
Bathroom

Water Heater: The temperature should be set to a comfortable level.

Hair dryers: If you use a hair dryer (not in the bathroom), soak up excess moisture with a towel first and set the dryer on the lowest heat setting necessary so as to prevent waste of energy.

Laundry Area

Washing machine: Try to operate the machine only when it is full, as this requires less energy than part-load cycles. Avoid using a dryer, and hang your clothes out on a sunny day to let nature do the work.



Bedroom or Study

Items such as computers, laptops, chargers and other electrical devices generally mean a tangle of wires. Consider using four gang socket strips, which will enable you to turn everything off with one switch.

Saving electricity in the home does not necessarily require major physical changes. Minor alterations in habits are sufficient to lower the waste of electricity and not only contribute to a greener environment, but also allow us to enjoy considerable savings. Consider applying these tips and relish your contribution to your natural surroundings and your wallet!

Sharing Strategy

Collaborating with Energy Industry Experts from the Netherlands

As part of the visit, the delegation was taken on a tour of the sustainable and energy-efficient features that have been integrated into the Diamond Building.

To enhance the standard of energy provision in Malaysia, the Energy Commission is constantly working with relevant organisations and institutions from around the world, in order to break new ground in efficient and sustainable power sector regulation. As part of this effort, the Energy Commission recently hosted a delegation of public and private sector experts from the Netherlands, on the 9th of September.

The delegation comprised representatives from various Dutch companies, who were in Malaysia to exhibit their products and services at the Netherlands Pavilion, during the recent POWER-GEN Asia 2014 energy conference, which took place in Kuala Lumpur from the 8th to the 12th of September.

The group of 12 which paid a visit to the Commission's headquarters in Putrajaya included representatives from Aarding Thermal Acoustics, Sulzer Turbo Services, Euroturbine BV and the Dutch Gas Turbine Association, as well as diplomatic officers from the Embassy of the Kingdom of the Netherlands.

The visit was organised to satisfy the guests' curiosity and interest in the Commission's energy-efficient Diamond Building, while also providing an opportunity for both sides to share their views on the provision of energy and discuss issues related to the generation and supply of electricity. Additionally, the session featured an exchange of information and experience relevant to effective energy sector management and regulation.

Regional Empowerment

Discussing Energy Sector Regulation with Indonesia's Key Players

Contributing towards its goal of engaging with comparable institutions and energy sector practitioners from across the region and the globe, the Energy Commission played host to a delegation of government and private sector officers and executives involved in the operation and management of Indonesia's energy sector, on the 11th of September.

Organised to facilitate discussions relating to the structure of the electricity industry in Malaysia – as well as the regulatory measures that have been put in place to date – the meeting was attended by approximately 30 individuals. They included public officials from the Indonesian Ministry of Finance and the Ministry of Mining, Energy and Mineral Resources, as well as the Ministry of State Owned Enterprises.

In addition, high-ranking representatives from the state-owned electricity utility Perusahaan Listrik Negara (PLN) were also in attendance, including the Director of Commercial, Risk and Compliance, Harry Pahlawan, the Head of Risk Management and Compliance, Krisna Simbaputra, and the Head of Corporate Planning, Syofvi Roekman.

Featuring prominently among the topics raised for deliberation were recent regulatory initiatives which have been undertaken by the Energy Commission, such as the introduction of the Incentive - Based Regulation (IBR) tariff calculation and adjustment regime. These measures were assessed for their potential in paving the way to onward growth and development, as well as their suitability for the Indonesian energy market.

Above: Following the meeting, Energy Commission CEO Datuk Ir Ahmad Fauzi (right) presented PLN Director of Commercial, Risk and Compliance, Harry Pahlawan with a commemorative memento.

Right: The visiting delegation featured 30 participants who represented public and private sector institutions that are involved in Indonesia's energy industry.

Promoting Responsible Efficiency

In line with the Energy Commission's effort to actively engage and share information with members of the private sector and the public, the Commission's CEO, Datuk Ir Ahmad Fauzi Hasan, recently participated in a panel discussion on energy efficiency. This was part of the three-day Energy for Tomorrow conference organised by the *International New York Times*, and held in Kuala Lumpur.

Organised as a result of the shifting focus on energy issues towards the Asian region, the conference – which took place from the 18th to the 20th of November – was officially launched by the Prime Minister of Malaysia, Dato' Sri Mohammad Najib Tun Abdul Razak.

Featuring two full days of insightful talks by over 50 experts and thought leaders from the global energy community, the gathering served as a central resource on a host of issues, including those related to energy security, renewable technology, sustainability funding and investment, as well as carbon neutral mobility.

On the final day of discussions, Datuk Ir Ahmad Fauzi contributed as a panellist on the topic of Accelerating Energy Efficiency. Accompanying him were Dr Leena Srivastava, Vice-Chancellor of TERI University, New Delhi and Anthony Jude, Senior Advisor and Practice Leader (Energy) at the Office of the Director General of the Regional and Sustainable Development Department in the Asian Development Bank (ADB). *New York Times* writer at the Dot Earth blog, Andrew Revkin, served as the moderator.

Public sector regulators and business professionals from a wide range of countries and respective industries were in attendance during Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan's presentation on Malaysia's energy efficiency improvements.

Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan (second from right) delivers his presentation on energy efficiency improvements in Malaysia, flanked by (from left) TERI University Vice-Chancellor Dr Leena Srivastava, ADB Senior Advisor and Practice Leader (Energy) Anthony Jude, and *New York Times Dot Earth* blog writer Andrew Revkin.

The Energy Commission CEO shared information on Malaysia's experience in improving energy efficiency through regulation, while his international counterparts spoke on similar efforts that have been undertaken throughout the region. Aside from enumerating the various national policy frameworks that have been instituted to date, Datuk Ir Ahmad Fauzi also revealed findings from various studies on energy-intensive industries and consumption trends in Malaysia.

Additionally, he touched on the progressive deregulation of energy prices in the nation, as well as the Energy Commission's strategies to drive capacity-building in the adoption of renewable energy sources and technologies through market factors.

All Charged Up

Energy Commission Strategy Workshop

The Energy Commission held a two-day workshop to review their existing key performance indicators in order to balance the interests of the various players (investors, utility operators, policy makers) and consumers amid a changing industry. The workshop participants included Energy Commission members and departmental staff, facilitated by Ernst & Young and featured a guest speaker, Soh Sai Bor, from the Energy Market Authority of Singapore.

Left: Soh Sai Bor receiving a token of appreciation from Energy Commission Chairman Dato' Abdul Razak Abdul Majid (left) and CEO Datuk Ir Ahmad Fauzi.

Below: The Q & A sessions drew many questions from the floor and sparked much spirited discussion.

In his opening address, Dato' Abdul Razak Abdul Majid, the chairman of the Energy Commission, said that the outcomes of the workshop would define its strategy for the next five years.

He highlighted that electricity supply itself has progressed to become a service that promotes society well-being and individual lifestyle. "The quality of a nation's energy supply directly impacts its economy, and the Energy Commission can support the government's agenda to transform the country into one with a high income economy," he said.

Soh Sai Bor, a director at Singapore's Energy Market Authority (EMA) shared the regulatory practices of his department (Energy Regulation and Licensing Department). He said Singapore was committed to allowing tarriff rates to be market-determined, but added that less affluent households were given subsidies directly.

Datuk Ir Ahmad Fauzi Hasan highlighted key developments in the evolution of the Energy Commission and shared his vision of the future in his presentation.

Audience participation was high, with the presenters responding to questions from the floor. The workshop sessions on the first day focused on identifying the Commission's critical success factors based on a collective understanding of its role and function. The mutually agreed upon success factors were then translated into an action plan during breakout sessions, with key actions prioritised.

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 ***aduan.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.
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Suruhanjaya Tenaga
Energy Commission

In order to further enhance the performance of the energy supply industry, the Malaysian Government established the Energy Commission of Malaysia (*Suruhanjaya Tenaga* - ST) under the *Energy Commission* Act 2001. It is a statutory body responsible for regulating the energy sector, particularly the electricity and piped gas supply industries in Peninsular Malaysia and Sabah. The Energy Commission ensures that the provision of electricity and piped gas to consumers is secure, reliable, safe and reasonably priced.

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