Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga
Energy Commission

Volume 7 2016
www.st.gov.my

Electricity Supply Act 1990

Electricity Supply (Amendment) Act 2015

Enabling Excellence in the Power Sector

The Electricity Act Gets an Upgrade

MYR 8.48 Volume 7
ISSN 2289-7488 07
9 772289 748003
*Price includes GST

Towards A World-Class Energy Sector
Energy Malaysia
Suruhanjaya Tenaga Energy Commission

ST Publication No: ST(P)08/09/2015

Conceptualised, Produced and Published for

SURUHANJAYA TENAGA (ENERGY COMMISSION)

by

AMG Holdings International Sdn. Bhd.
(356247-V)

10-3A, Jalan PJU8/3,
Damansara Perdana,
47820 Petaling Jaya,
Selangor Darul Ehsan, Malaysia.
Tel: +603-7729 4886
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Website: www.amginternational.net

Printed by

Percetakan Skyline Sdn. Bhd.
(135134-V)

35 & 37, Jalan 12/32B,
Jalan Kepong,
52100 Kuala Lumpur, Malaysia.

A Year to Remember

2015 has been a milestone year for the energy sector in Malaysia. A number of regulations and amendments were introduced to strengthen the security, performance and efficiency of the electricity and gas industries, notably the amendments to the *Electricity Supply Act 1990*.

These amendments address structural issues to the Act. In particular, they enhance the powers and scope of the Energy Commission and give it more authority with regards to the governance of the power sector, as well as management of safety and enforcement of regulation. This is in line with the aim of creating a world-class energy sector.

In addition, several processes are being reviewed and revamped, and will become effective at the start of 2016. Under the New Enhanced Dispatch Arrangement (NEDA) rules, the load dispatch procedure has been revised, making it more competitive through a liberalised bidding system to encourage greater competition and efficiency among power producers.

We are also phasing out the Special Industry Tariff and introducing the Enhanced Time-of-Use (EToU) system. This will see the introduction of a third type of tariff for industrial consumers. Known as the mid-peak period, it is meant to help industries maximise output while minimising costs by offering them a charge that is between peak and off-peak hours.

Aside from new regulations, other methods of improving energy efficiency and reducing wastage are being explored, one of them being the use of stored energy such as batteries which allow power to be stockpiled and then utilised as and when needed.

Then there are alternative and renewable energy sources such as solar photovoltaic and biomass, which are already present and need further expansion. In fact, under the national plan, Malaysia aims to have more than 5% of its energy mix coming from renewables by the year 2020. One major development in this area is the introduction of net metering for individual solar power producers, where they can use electricity from renewable sources to offset their electricity bills.

These initiatives, among others, will take us a step closer to fulfilling the agreement reached by the Minister of Energy, Green Technology and Water, the Honourable Datuk Seri Panglima Dr Maximus Johnity Ongkili during the *33rd ASEAN Ministers on Energy Meeting*, which aims to reduce ASEAN's energy intensity by 20% by the year 2020, and 30% by 2025.

Achieving this figure is contingent on member countries, and Malaysia intends to take the lead in this respect. As such, our plan is to reduce Malaysia's energy intensity by 8% over the next 10 years.

The Energy Commission is committed to helping the nation achieve these aforementioned goals, as well as to continue to promote safety and excellence in the energy sector. To succeed in our mission, we need the help and support of all stakeholders, from the generators to the utility to individual users.

Together, we can make Malaysia a model for the rest of Southeast Asia to follow.

On behalf of the Energy Commission, I wish all of you a very happy and fruitful 2016.

Dato' Abdul Razak Abdul Majid
Energy Commission of Malaysia

Sabah's Energy Boost

Sabah is in for reinvigorated social development and economic growth as the Ministry of Rural Development is committed to fostering the development of renewable energy (RE), especially in the less-developed regions of the state. Minister Datuk Radin Malleh commented that the efforts would provide rural communities with more alternatives to access sustainable energy.

As reported in The Borneo Post, Datuk Radin said that, "Hybrid systems based on solar, wind, hydro and biomass can contribute to electrification and sustainable development for rural areas that do not have access to electricity grids". He also pointed out that expanding rural electrification programmes is still a top priority of the government.

The 11th Malaysia Plan calls for rural electrification programmes to be reinforced in order to increase national coverage to 99% by 2020, a sizeable jump from its current 94%. To this end, the ministry has revealed the Rural Electrification Programme to deliver electricity to rural settlements on islands and in small estates in Sabah.

Datuk Radin further said that solar hybrid and mini hydro electricity generation would be supported by off-grid networks to ensure wider coverage. Renewable energy from solar, waves and wind turbine also make for viable alternatives in the future, with the potential to revolutionise electricity generation in Sabah.

Minister of Rural Development Datuk Radin Malleh (top) believes that rural communities in Sabah that do not have access to electricity grids will benefit tremendously from localised RE as a source of power.

Nuclear Power a Possibility

Malaysia is on the verge of a nuclear energy future if new legislation passes parliament. According to Minister of Energy, Green Technology and Water Datuk Seri Panglima Dr Maximus Ongkili, the act, which will likely be an update to the existing *Atomic Energy Licensing Act 1984*, will be tabled next year.

Speaking to Bernama, he added that the legislation is still at the initial stage, pending the completion of policy and legal frameworks, and that Malaysia requires at least 10 years to prepare the necessary infrastructure and to gather the required manpower if the Act is passed by parliament.

Along with renewable energy (RE), the ministry considers nuclear power an alternative source of energy to fortify the power generation capacity of the country, especially as the dependence on conventional fuels such as oil, gas and coal wanes in the future.

With the tabling of the new nuclear energy legislation, Malaysia could see nuclear power added into its power generation mix, which currently involves conventional sources of energy such as (pictured here) combined cycle gas turbine (CCGT) power plants.

Bright Energy Prospects

The RE Plan, developed by SEDA, has set RE capacity targets up to 2030. Following the introduction of new energy mechanisms by the government, SEDA COO Dato' Ir Dr Ali Askar Sher Mohamad is optimistic about achieving the 2020 2,000MW target, thanks primarily to solar energy.

National Renewable Energy (RE) Targets as per the RE Plan

Year	Cumulative RE Capacity
2020	2,080 MW
2025	3,000 MW
2030	4,000 MW

Source: SEDA

Malaysia is looking at harnessing over 2,000MW of power from renewable energy (RE) sources by 2020, in the wake of new energy mechanisms being approved by the government. The mechanisms – net-metering and utility scale solar (USS) – will incentivise the adoption of sustainable energy, chiefly solar power, among various players. Via net-metering, consumers can install solar photovoltaic (PV) panels at their property to generate power and reduce their electricity bills. USS caters for bigger players who are looking into generating more than 1MW of solar energy.

Sustainable Energy Development Authority (SEDA) COO Dato' Ir Dr Ali Askar Sher Mohamad told Bernama that RE development has been promising thanks in part to the boost provided by the introduction of the Feed-in-Tariff (FiT) in 2011, which has seen 400MW being connected to the solar power grid so far. He foresees "overshooting the 2,000MW target with the two mechanisms and the existing FiT for energy security in place".

He supplemented this statement by saying that as the cost of solar PV is fixed, the need arises to bring in RE soon, especially in the face of predictions that government subsidies would be reviewed and reduced. In the long run, these measures to promote RE would help lessen the dependency on coal energy imported from Indonesia.

SEDA CEO Catherine Ridu praised the net-metering mechanism, saying that it is a "good mechanism which is likely to start next year once we have discussed it with the relevant stakeholders, namely the Energy Commission and the Ministry of Energy, Green Technology and Water (KeTTHA), and the framework and policies have been made."

The smart meters, which facilitate efficient electricity usage, fit neatly into Melaka's Green City Action Plan.

Smart Meters in Melaka

Under the Melaka government's Green City Action Plan, customers of Tenaga Nasional Berhad (TNB) in the state will receive smart meters by the end of 2016.

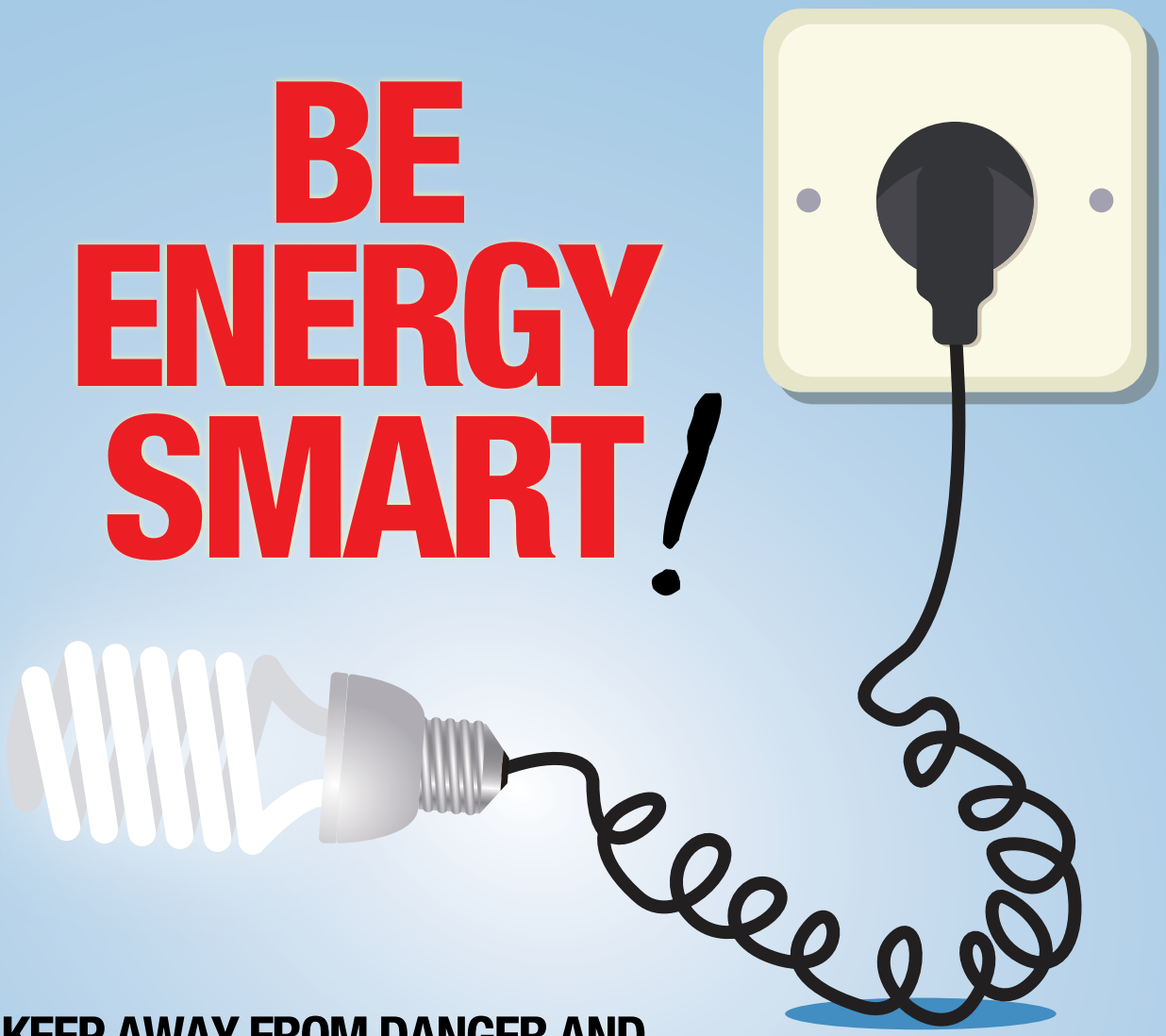
The sophisticated meters, which allow users to keep an eye on their electricity consumption and cost, have been installed in stages since 2014. That first wave, initiated late that year, was the pilot project for smart meter implementation. By March 2015, 800 addresses had taken delivery of the new meters.

According to TNB Melaka GM Datuk Baderul Sham Saad in The Borneo Post, the smart meter project optimises grid control and monitoring. This helps to encourage efficient energy use, while being a boon for the environment as well.

The project received RM9 million in financial support from the Energy, Green Technology and Water Ministry (KeTTHA) and the Malaysian Electricity Supply Industries Trust Account.

Suruhanjaya Tenaga
Energy Commission

BE ENERGY SMART!



KEEP AWAY FROM DANGER AND AVOID WASTAGE WITH GOOD PRACTICES SUCH AS:

Use electrical appliances that have ST-SIRIM safety label and energy efficiency label.

Turn off all electrical and gas appliances when not in use.

Press the 'T' button on the automatic circuit breaker switch in your home once a month to ensure it functions satisfactorily.

Do not overload a socket outlet with multiple electrical appliances.

Get the services of registered electrical and gas contractors for repairs and regular checks.

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Change for the Better

Amendments to the Electricity Supply Act Afford Improved Regulation of the Industry

Almost seven years in the making, the *Electricity Supply (Amendment) Act 2015* – also known as Act A1501 – was passed by Parliament in July 2015. The amendment process began in 2008 when the Energy Commission consulted stakeholders and industry players including government agencies (such as the Ministry of Energy, Green Technology and Water (KeTTHA)) and consumer groups to obtain their feedback on the suggested changes. **Energy Malaysia** talked to the **Energy Commission** to understand the significance of these amendments.

The implementation of the amendments will benefit many areas of the industry, as well as bring changes to Malaysia in relation to other nations in the Asean region. **Ir Azhar Omar, Senior Director of the Electricity Supply & Market Regulation Department**, said, "The amendments to the Act primarily focus on improving governance and sectoral efficiency to ensure reliable and cost-effective supply to consumers. As such, both the electricity supply industry as a whole and the consumers will definitely benefit from them."

"The amended provisions of the Act include determination of the standards of equipment and installations, which will facilitate and enable an Asean-harmonised Electrical and Electronic Equipment (EEE) Regulatory Regime, ease import and export, and facilitate trading among Asean countries," Ir Azhar added.

MAIN CHANGES AT A GLANCE

Governance
Roles and powers of the Energy Commission are more clearly defined

Safety
Codes serve as detailed guidelines for mandatory safety management systems

Enforcement
Heavier penalties to help curb malpractice

Protection
Better protection for consumers against wrongdoing and negligence

ENHANCING CONTROL

According to **Shahrilnazim Shaari, Head of Legal**, the amendments give the Energy Commission a tighter rein on the electricity industry. "Most of the changes affect the powers and functions of the Energy Commission, where it is given additional authority with regards to governance of the industry, safety management and enforcement of the laws," he said.

For instance, the amendments call for the Energy Commission to be more actively involved in Power Purchase Agreements (PPAs) to ensure that they are properly drafted and contain the necessary provisions on a fair basis. The same is true for Consumer Supply Agreements (CSAs) to ensure that the terms and conditions are properly defined in accordance with the law.

On governance, when it comes to economic regulation, the Energy Commission is given authority to determine the electricity tariff, subject to the approval of the Minister of Energy, Green Technology and Water.

"The amendments also allow the functions of the System Operator and Single Buyer to be separated from the utility, ensuring independence and transparency in electricity supply," Shahrilnazim added.

SECURING SAFETY

The Energy Commission will be more involved in the regulation of safety management practices via the implementation of safety codes. "With the new amendments, we have the power to issue codes that cover all parties involved; not just the power producers, but the manufacturers and importers of electrical equipment as well. Even the activities of contractors, whether electrically competent or not, will be regulated," Shahrilnazim added.

The codes complement general regulations that already exist, and they are more comprehensive – specifically in the detailing of technical requirements. "Relevant

parties have to comply with the codes. A licensed power producer, for instance, will have to draft their own safety management plan in accordance with the codes we issue," explained Shahrilnazim.

"They must adhere to it, and we will conduct inspections from time to time to check if they are. This hopefully encourages self-regulation among industry players."

As **Ir Othman Omar, Director of Regional Operations**, stated, "The Energy Commission came up with guidelines such as the Distribution Code and the Grid Code some time back, but they were just administrative in nature. Now that they are included in the Act, they are mandatory to be complied with."

HEFTIER PENALTIES

The amendments will also herald an improvement in enforcement. The penalties for offences under the Act have been reviewed and increased where necessary. "The main purpose was to ensure that such offences are not committed in the first place, as they not only cause losses for the utility and the public, but also pose a danger to life and property," said Shahrilnazim.

"If a domestic consumer is found guilty of power theft, there is a minimum penalty for the first offence: a minimum fine or a jail term. Both the fine and jail term increase for repeat offenders."

For non-domestic customers such as factories, penalties will be higher still. As these offences have become widespread over recent years, it is hoped that the higher penalties will serve as an effective deterrent.

Ir Othman also discussed an increase in penalties for negligence, which applies in cases where a party does not follow required safety standards, resulting in damage to equipment, injuries or fatalities. "If a crane operator affects the transmission line for example, it will cause an interruption of supply to a large number of consumers. These interruptions have the potential to cause millions of ringgit in losses to some industries."

"The amended provisions of the Act will facilitate and enable an Asean-harmonised Electrical and Electronic Equipment (EEE) Regulatory Regime, ease import and export, and facilitate trading among Asean countries."

– Ir Azhar Omar
Senior Director of the Electricity Supply & Market Regulation Department

> *"In this digital age, it is pertinent to protect consumer information and secure supply infrastructure from cyber attacks. The Energy Commission is among the first to introduce legal requirements pertaining to this."*
>
> **– Shahrilnazim Shaari**
> Head of Legal

CONSUMER WELFARE

Consumer protection will be better catered for once the Act comes into effect, specifically against actions by a licensee or a third party. "If there is negligence by the licensee which affects consumer equipment, compensation can be demanded from the licensee by the consumer," Ir Othman said. A television set damaged by a power surge is an example of this.

"We have also introduced provisions to deter a third party from interfering with the power supply to a customer," he continued. It will be an offence if an outside party prevents a consumer from electricity connection. "Say a landlord tries to evict a tenant by compelling the licensee to terminate electricity supply to the house. As long as the tenant pays the bill and is a registered consumer of the licensee, the supply cannot be disconnected by any third party."

There is also a focus on cybersecurity in the amendments. "In this digital age, it is pertinent to protect consumer information and secure supply infrastructure from cyber attacks. The Energy Commission is among the first to introduce legal requirements pertaining to this," Shahrilnazim stated.

Additionally, the amendments allow for the power lines to transport communications. "If a broadband service provider registered with the communication and multimedia commission wishes to utilise power lines as part of their network, they can piggyback off the existing lines to channel their broadband," Ir Othman said.

Smart meters, the new technology being used to gauge electricity usage, are also looked at. "The Energy Commission will be given the power to regulate smart meters, in order to ensure accurate metering," he added.

The amended law was gazetted on the 5th of November 2015, and came into force on the 1st of January 2016. The updated legislation will help to bring improvements in the regulation of the nation's electricity industry by the Energy Commission, and give all parties involved in the supply and distribution chain a greater degree of protection. EM

Progressive Changes

Strengthening the Electricity Supply Industry

Electricity supply is a crucial process of the energy industry, and it is one of the reasons for the *Electricity Supply (Amendment) Act 2015*. The reforms, made to update and strengthen regulations, are expected to have a wide-reaching and significant impact on the electricity supply sector across the country. The new Act will see the enhancements of consumer and industry safety, stricter punitive measures for power theft, improvements to competition and the strengthening of the national economy.

Enforced by the Energy Commission, the *Electricity Supply Act 1990* was created to aid the regulation of the electrical supply industry, with clauses governing the licensing and control of electrical installations, plants and equipment, the supply of electricity at reasonable prices as well as ensuring the safety of consumers and operators, and the efficient use of electricity in the industry.

With TNB being the Single Buyer and Grid System Operator (GSO) — having control from the generation, transmission and distribution to the end-users — one of the latest amendments to the Act introduces increased transparency and competition in the

"We want to enable the electrical supply infrastructure to be used for communication purposes, to attract more foreign investors."

- Datuk Seri Panglima Dr Maximus Ongkili
Minister of Energy, Green Technology and Water, speaking at the *Sabah Electrical Society Annual Dinner* in February 2015

industry. The proposal is for a 'ring fence,' a demarcation to separate the activities, assets, costs, revenues, service obligations and functions of the GSO and Single Buyer from those of licensees (such as Independent Power Producers or IPPs) to ensure independence, and enhance transparency and competition.

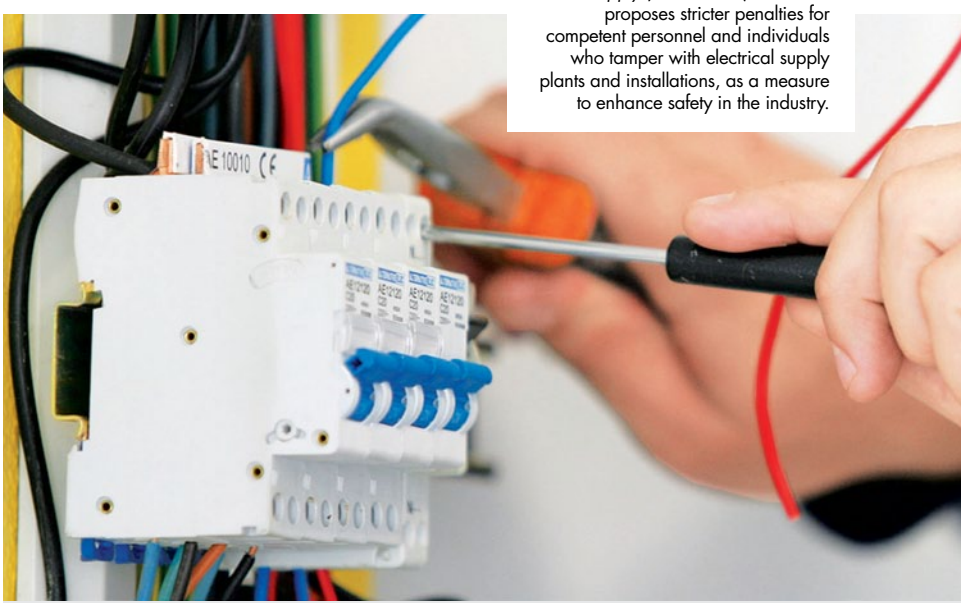
The measures were emphasised further in a meeting of the Special Committee on Competition chaired by the Malaysia Competition Commission (MyCC). The meeting comprised representatives of sector regulators: the Malaysia Communications and Multimedia Commission (MCMC), the Land Public Transport Commission (SPAD), Bank Negara Malaysia (BNM), the Energy Commission, the National Water Services Commission (SPAN), and the Securities Commission.

STRONG SIGNALS

The *Electricity Supply (Amendment) Act 2015* also has a new Section 44A that governs the use of supply lines and electrical installations and infrastructure for communications under the *Communications and Multimedia Act 1998*.

Speaking at the *Sabah Electrical Society Annual Dinner* in February 2015, Datuk Seri Panglima Dr Maximus Ongkili, Minister of Energy, Green Technology and Water, said that the Ministry hoped the amendments would optimize the existing infrastructure to increase economic returns while strengthening the nation's electrical supply industry.

"We want to enable the electrical supply infrastructure to be used for



Below: The review of the *Electricity Supply (Amendment) Act 2015* proposes stricter penalties for competent personnel and individuals who tamper with electrical supply plants and installations, as a measure to enhance safety in the industry.

Left: Electricity supply installations, such as the Manjung Coal-Fired Power Plant in Perak, have to implement measures to ensure that their premises and supply processes are safe for use by personnel.

communication purposes, to attract more foreign investors," he said.

Under the proposal, operators licensed under the *Communications and Multimedia Act 1998* who intend to use such existing electrical supply infrastructure, plants and installations for communications need to meet the stipulations of the *Electricity Supply (Amendment) Act 2015*. As the national regulator of electricity supply, the Energy Commission may also issue codes, guidelines and directions in the use of electrical infrastructure for signals and communication.

SAFETY FIRST

In addition to the previous Act's *Part VII: Notification of Accident or Fire – Serious accidents to be reported. Investigation by the Commission*, the recent amendment emphasises consumer and industry safety with the new, *Part VIIA: Safety of Installation and Equipment.*

This section encompasses the responsibilities for safety of licensees who operate and maintain any electricity supply infrastructure. It includes the preparation of safety management plans that highlight their implementation of conventions stipulated in the electrical infrastructure safety codes, or with standards and prudent utility practices as may be determined by the Energy Commission.

The addition also comprises undertaking electrical work by competent persons; the responsibilities of non-domestic electrical installation operators, and public and private electrical installation owners; and liabilities relating to non-electrical work (such as building construction and farming).

REINFORCING QUALITY

The safety section introduces compliance inspection that allows the Energy Commission to inspect or request the inspection of premises or electrical installations that it suspects do not meet the requirements of the safety management programme (for non-domestic electrical installations) and the safety management plan.

Offenders that tamper with private and public electricity installations to the extent of endangering human lives or causing damage to property will be fined RM1 million and up to 10 years in prison. Where the current Act stipulates that repeat offenders found guilty of stealing electricity or tampering with electricity meters are fined up to RM100,000 and/or a jail term of up to three years, the amendments suggest up to RM100,000 in fines and/or up to a five-year jail term for domestic consumers. For non-domestic customers, the fine will be up to RM5 million and/or imprisonment for up to 10 years.

It is clear that the safety of consumers and the electricity supply industry players formed a key part of the preparation of the amendments to the *Electricity Supply Act 1990*. Using existing electrical supply infrastructure for signals and communication also minimises the need for domestic and international investors to develop green leaf projects, hence minimising costs and increasing the attractiveness of investment in the country's energy and communications industries. EM

Change Leadership

Ir Azhar Omar, Senior Director of the Electricity Supply & Market Regulation Department, tells Energy Malaysia what customers need to know about the *Electricity Supply (Amendment) Act 2015*.

How would the amendments to the *Electricity Supply Act 1990* affect the Malaysian Electricity Supply Industry (MESI), specifically in terms of competition, compliance, safety and consumers' interests?

The *Electricity Supply Act (Act 447)* has been amended to improve governance and quality of service in the MESI, particularly to enhance transparency, planning, compliance monitoring and enforcement, to create a level playing field for the all players in the industry, and to improve safety management and protection of consumers' interests.

The Energy Commission's role in planning will ensure the coordinated and orderly development of the MESI in meeting the needs of reliable and cost-efficient electricity supply. To instil confidence in investors in the industry, a transparent and level playing field has to be established, particularly as TNB, being a major player in the industry, has control over most activities.

In protecting consumers' interests, the amended Act will enhance the role of the Energy Commission in regulating supply applications and requirements; tariff setting processes; meter testing and verification; and safety of equipment and installations. The terms and conditions of supply, charges imposed by licensees and meters to be installed have to be approved by the Energy Commission. The performance of licensees will be gauged through an approved standard of performance, and safety will be enhanced through the establishment of safety management plans/programmes and the stipulation of standards for equipment and installation.

In ensuring cost-effective electricity supply, a tariff-setting process through the implementation of Incentive-Based Regulations (IBR) has been established. The procurement of electricity supply through Power Purchase Agreements (PPAs) will be scrutinised by the Energy Commission.

What changes do the amendments to the *Electricity Supply Act 1990* bring to the implementation of the mentioned programmes or projects, and how would the projects be impacted?

Under the amended Act, apart from the licensing requirements, implementing some of the programmes and projects—particularly on new power plants—will have to be in line with the approved plan and subject to approval by the Energy Commission. Transmission and distribution projects will be subject to the Energy Commission's scrutiny under the IBR mechanism. Implementation of the smart grid and smart meters will have to demonstrate the cost benefit of such programmes before being approved by the Energy Commission to be included under IBR investment.

What is the Electricity Industry Fund (EIF) and what prompted its introduction into the *Electricity Supply Act 1990*? How will it contribute to industrial development and what are the roles of the Energy Commission in administrating this fund?

The implementation of ICPT for adjustment of fuel costs and generation specific costs will impact consumers every six months. Recognising the need to soften the financial effect, the *Electricity Supply Act (Act 447)* has been amended to establish an industry fund for tariff stabilisation and other such purposes pertaining to MESI. Contributions to the fund will be through various means, such as input by licensees, savings from operational efficiency, and savings and penalties under PPAs.

A trust deed for the fund will be established to determine allocation and disbursement of the funds for various purposes pertaining to the development of the industry. Funding for industry development-related activities will help spur further expansion in line with the industry needs.

Under the amended Act, the Energy Commission will be the custodian of the EIF, and will be responsible for managing the collection, allocation and investment of the funds in line with established procedures.

Focusing the Spark

Enforcing Act 447's Amendments

Ir Othman Omar, Director of Regional Operations, explained to **Energy Malaysia** that the Energy Commission has been working together with industry players, stakeholders and relevant associations in developing all the mechanisms required in the Act to ensure smooth adoption of the law.

"We need to ensure that all industry players comply with the amendments in the Act and that their installations are properly maintained, to ensure the continuous production and transmission of electricity."

– Ir Othman Omar
Director of Regional Operation and Enforcement

"The amendments were made primarily to enhance the licensing of electricity supply activities and the conduct of licensees, to stabilise the regulatory and enforcement mechanism, including stricter deterrent measures to combat theft of electricity. It is our fervent hope that the harsher penalties will serve as an effective deterrent and ensure significant abidance to the law," Ir Othman said.

SEVERITY OF PENALTIES

The new amendments to Act 447, as it is also called, seek to improve the quality of services by the licensees towards consumers, enable advanced metering of electricity and the use of the latest in communications technology, and improve the safety of installations and electrical equipment.

Of particular note are the increased penalties for tampering with electrical installations or electrical equipment. Under the original Act (clause 37(1)), the penalty was a fine of RM100,000, or imprisonment for five years, or both. In the amended Act 447, this penalty was increased to a fine of RM1 million, or imprisonment for ten years, or both.

Ignorance of the law is an unacceptable reason; under the amended clause 37(2) of the Act, causing damage to people or property through rash or negligent action is an offence that will result in an RM100,000 fine or five years of imprisonment, or both.

Additionally, several amended and new clauses within the Act now clarify and expand the scope of authority given to officers of the Energy Commission, allowing them to conduct audits of licensees, and audits of non-domestic electrical installation owners and operators. Under the

COMPARISON OF PENALTIES FOR THE MOST SERIOUS ELECTRICITY-RELATED OFFENCES:

Offence	Penalties (*Electricity Supply Act 1990*)	Penalties (*Electricity Supply (Amendment) Act 2015*)
Tampering / adjusting any electrical installation, or manufacturing / importing / selling equipment that may endanger other people or property	RM100,000 fine / 5 years of imprisonment / both penalties	RM1,000,000 fine / 10 years of imprisonment / both penalties
Causing damage to any person or property, through either rash action or negligence	RM50,000 fine / 3 years of imprisonment / both penalties	RM100,000 fine / 5 years of imprisonment / both penalties
Illegal consumption of electricity / tampering or preventing normal operation of electricity meters	RM100,000 fine / 3 years of imprisonment / both penalties	**Domestic consumers:** First offence: RM1,000 – 50,000 fine / 1 year of imprisonment / both penalties Second and subsequent offences: RM5,000 – 100,000 fine / 3 years of imprisonment / both penalties **Non-domestic consumers:** First offence: RM20,000 – 1,000,000 fine / 5 years of imprisonment / both penalties Second and subsequent offences: RM100,000 – 5,000,000 fine / 10 years of imprisonment / both penalties

Source: mltic.my

amended Act, the Energy Commission is also now able to issue directives to the industry to ensure players' strict compliance with the Act.

RAISING AWARENESS

Although the amended Act 447 has yet to come into force, the Energy Commission has already conducted several safety audits on many of the players within the Malaysian electricity supply industry.

"These efforts identified vulnerable areas and hazards in their electrical systems and installations, and served to gauge their level of compliance with the Act's legislation and best practices," Ir Othman explained. He added that "these amendments will also enable the Energy Commission to determine the standards applicable to licensees and non-domestic owners or operators, and any installation or equipment they oversee."

Communicating awareness to the public at large has been an integral part of the Energy Commission's efforts. The Energy Commission has planned to organise campaigns and is in collaboration with the Ministry of Energy, Green Technology and Water (KeTTHA) and various government agencies to raise awareness on the Act. Once the amended Act 447 comes into force, Ir Othman believes that Malaysia's electricity supply industry will become even more efficient and reliable. EM

Greater Efficiency

The Power Sector and Economic Transformation

The *Economic Transformation Programme* (ETP) identified 12 sectors as National Key Economic Areas (NKEAs). These NKEAs are considered to be the drivers of growth, and they receive priority in funding and government support. Given the importance of power to economic development, the Oil, Gas and Energy sector has been highlighted as an NKEA.

With a generation capacity of 2,400MW, Bakun Dam in Sarawak is one of the projects under the Sarawak Corridor of Renewable Energy (SCORE) and is part of EPP 12 under the Economic Transformation Programme.

Overall, the Oil, Gas and Energy NKEA is expected to generate gross national income (GNI) of RM131.4 billion and create 52,300 new jobs by the year 2020. Out of the 13 Entry Point Projects (EPPs), four are related to electricity.

INCREASING EFFICIENCY

The driving force behind the EPPs is the reduction of Malaysia's dependence on fossil fuels, namely coal and gas, and increasing the use of renewable sources in the generation of electricity. Aside from utilising new and sustainable sources of energy,

EPP 9 : Improving Energy Efficiency
EPP 10 : Building Up Renewable Energy and Solar Power Capacity
EPP 11 : Deploying Nuclear Power for Power Generation
EPP 12 : Tapping Malaysia's Hydroelectricity Potential

EPP 9 : Aims to contribute RM13.9 billion to GNI
EPP 10 : RM457.5 million
EPP 11 : RM212.3 billion
EPP 12 : RM5.7 billion

The total number of jobs created from the four EPPs is **5,133**, of which **1,906** will come from EPP 10, **2,637** from EPP 11 and **590** from EPP 12.

there is also an impetus to enhance efficiency in electricity usage, in order to maximise the volume and utilisation of power generated while reducing the amount of feed-stock needed.

This is where EPP 9 comes in. The government, through the Ministry of Energy, Green Technology and Water (KeTTHA), has introduced *Minimum Energy Performance Standards* (MEPS), which stipulate that electrical appliances – fans, air conditioners, refrigerators, lamps and televisions – need to meet a minimum efficiency level before they can be sold in Malaysia.

To measure and grade the efficiency rating of appliances, the Energy Commission came up with the Energy Star Label rating system, where five stars indicate that the appliance has maximum energy efficiency. This rating system allows consumers to choose appliances that will help them reduce their electricity bills.

In order to further encourage take-up of energy efficient appliances, KeTTHA also introduced the *Sustainability Achieved via Energy Efficiency* (SAVE) programme. Under SAVE, which ran from 2011 to 2014, consumers (both domestic and industrial) were given rebates of between 5% and 7% when they bought refrigerators and chillers (as well as chillers from commercial/industrial customers) that were rated five-star on the Energy Star Label system.

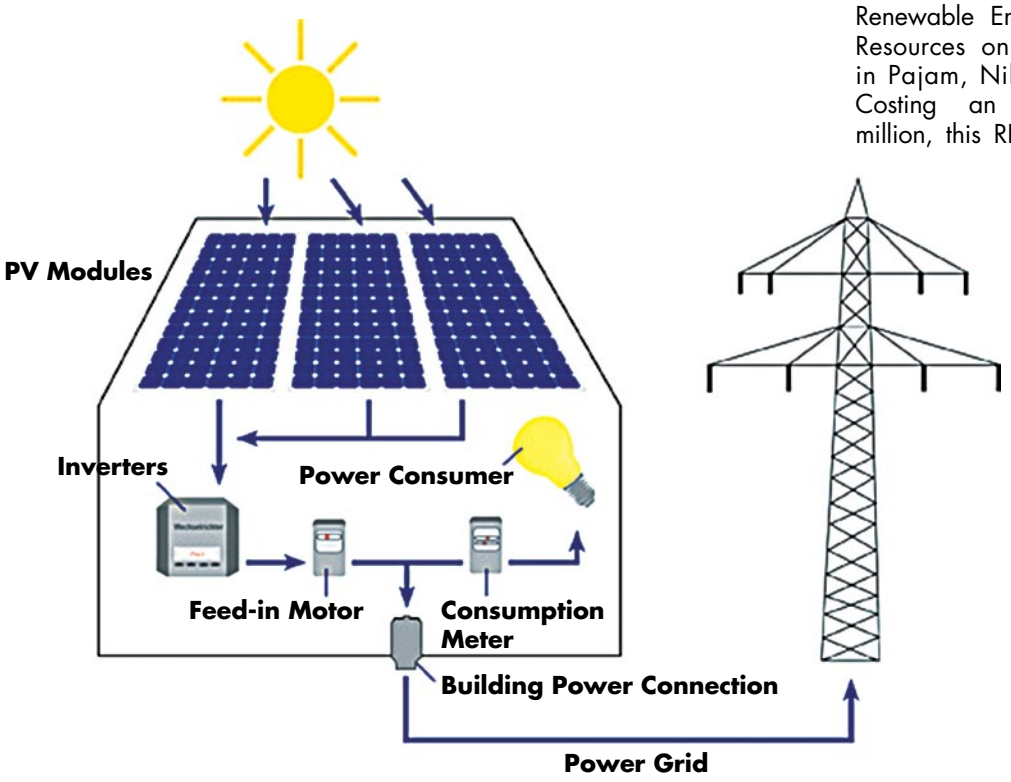
The onus of the NKEAs is not just on consumers though, and the government recognises the importance of leading by example. Thus, one of the projects under EPP 9 is Energy Performance Management System. Under this, energy audits are carried out on government buildings which are then upgraded and retrofitted to increase energy efficiency. Examples are installing energy-savings lightbulbs and glazing windows to reduce heat from the sun.

HARNESSING ALTERNATIVE SOURCES

The utilisation of renewable energy sources, particularly solar power, is the focus of EPP 10. One of the most notable initiatives introduced under it is the feed-in-tariff (FiT) system, where home and business owners generate electricity from renewable sources (mainly solar photovoltaic) and then sell it to the utility.

Furthermore, this EPP calls for the increase of grid-connected renewable energy power plants such as solar farms and biodiesel plants. In 2014, total installed capacity for renewables reached 245MW. Although this was just short of the 250MW target, the progress made was still tremendous.

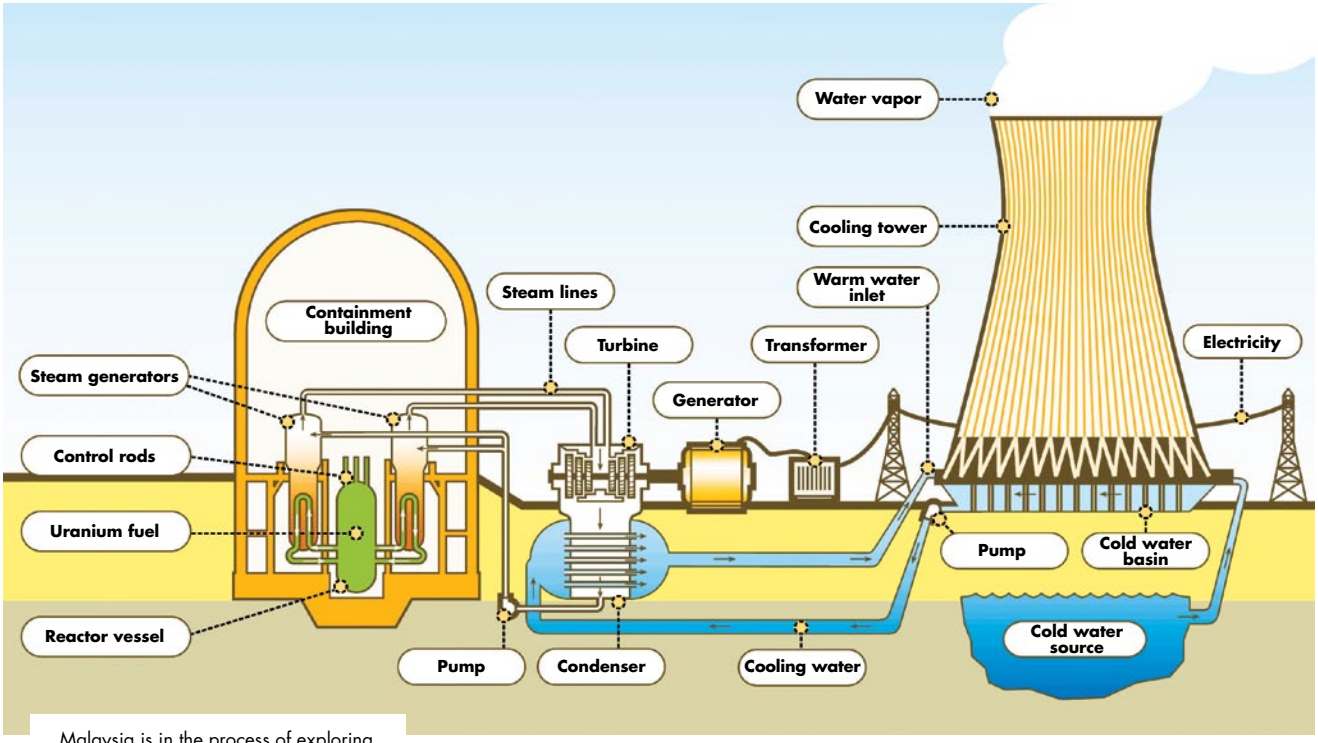
One initiative is the construction of a Renewable Energy Park by Cypark Resources on a 26-hectare landfill in Pajam, Nilai, Negeri Sembilan. Costing an estimated RM94.29 million, this RE Park will utilise solar



EPP 10 aims to enhance the take-up of solar power in Malaysia. One initiative was the introduction of the feed-in-tariff which enables private home owners to generate electricity through solar power and then sell it to the utility.

Source: greensunrising.com

Nuclear Power Plant Diagram



Malaysia is in the process of exploring the possibility of utilising nuclear energy as a power source under EPP 11.

Source: tr.instela.com

power, biogas and waste products to generate 10MW worth of electricity.

Aside from renewable energy, the Malaysian government is also looking at nuclear power, which is the focus of EPP 11. Under it, a Nuclear Power Development Steering Committee has been set up and it has come up with the Nuclear Power Infrastructure Development Plan. In addition, the Malaysia Atomic Energy Regulatory Commission (MAERC) has been set up, and its governance structure finalised.

Spearheading this EPP is the Malaysia Nuclear Power Corporation which has been tasked with planning this initiative, which is expected to take 12 years to complete. It should also be noted that the Malaysian government is cognisant of the risks and controversies surrounding nuclear power, which is why it is focused on ensuring that such a source is safe and secure.

Another source of energy identified under the Oil, Gas and Energy NKEA is hydroelectricity. Under EPP 12, the focus of this will be Sarawak on the island of Borneo, which is expected to have a generation capacity of 7,400MW of hydropower by the year 2025.

Driving the development of Sarawak's hydropower potential is the Sarawak Corridor of Renewable Energy (SCORE), which has identified a total of five dams to be built. Currently, three of these dams – the 100MW Batang Dam, 2,400MW Bakun Dam, and 944MW Murum Dam – are already operational. Two more – the 1,200MW Baram Dam and the 1,295MW Balleh Dam – have been planned.

The importance of EPP 12 in the overall provision of energy to the whole of Malaysia is reflected in the expectation that by 2025, the Sarawak Interconnection will enable Peninsular Malaysia to buy electricity from Sarawak. This will make up 10% of the energy mix in Peninsular Malaysia, thus reducing dependency on fossil fuels.

Hydropower in Sarawak can also be sold to other ASEAN countries such as Indonesia as part of the ASEAN Power Grid (APG) initiative, which aims to enable the transfer of electricity between ASEAN member states.

The *Economic Transformation Programme* (ETP) seeks to enhance the efficiency and supply of electricity in Malaysia. This is also the aim of the *Electricity Supply (Amendment) Act 2015* which introduces new provisions on the licensing of electricity suppliers. As can be seen from Energy Malaysia's highlights of the Amendments, these new regulations complement and help fulfil the national objective of the ETP for the power sector. EM

New Enhanced Dispatch Arrangements

Supporting Electricity Supply

Commencing in October 2015 for existing generators with Power Purchase Agreement (PPA) and Service Level Agreement (SLA), and in the first quarter of 2016 for non-PPA generators, the Malaysian energy sector will make the transition to a new system of competitive daily bidding for electricity prices. By opening up electricity supply to power generators with existing and expired agreements, the New Enhanced Dispatch Arrangement (NEDA) will help push down the cost of electricity tariffs in the country.

Left: Ir Mohd Yusrizal Mohd Yusof, Senior Manager at the Scheduling Unit, Power & Resource Planning of the Single Buyer Department of TNB, explains the details and benefits of the New Enhanced Dispatch Arrangement (NEDA).

Below: Representatives from TNB and the IPPs hold the NEDA Rules. Behind them are (from left to right) Charanjit Singh Gill – Single Buyer Senior General Manager, Ir Gurcharan Singh – Grid System Operator General Manager, Dato' Roslina Zainal – TNB Vice-President Regulatory Economics and Planning, Energy Commission Chairman Dato' Abdul Razak Abdul Majid, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan and a representative from KeTTHA.

Definitions

Power Purchase Agreement (PPA): contract between a power Generator (seller) and the Grid Operator (buyer).

Service Level Agreement (SLA): contract between a service provider and a customer that defines the level of service expected.

System Marginal Price (SMP): lowest variable cost of power from available Generators.

Variable Operating Rates (VOR): flexible all-inclusive price per kWh based on existing energy market conditions.

Under the current structure, Independent Power Producers (IPP) supply electricity to Tenaga Nasional Berhad's (TNB) transmission and distribution divisions based on prices stipulated in the PPA and SLA. For smaller, non-IPP plants supplying power to TNB, a new agreement will be in place to enable participation. Under NEDA, power generators can supply electricity at a lower variable price than stated in either the PPA or SLA.

THE BIGGEST CHANGE

According to the Energy Commission's NEDA Rules Ver. 1.1 in September 2015—which provides operational guidelines for the new electricity supply policy—the primary objectives of NEDA include creating opportunities for generators that do not have PPAs and SLAs, such as co-generators, renewable energy producers and embedded generators. It also includes enhancing cost efficiency through short-run competitive bidding, allow holders of expired PPA and SLA licences to put their generators to use, and promote the use of energy efficient sources of energy, such as co-generation.

THE BENEFIT

Unlike the current cost-based bidding system where the electricity cost is consistent throughout the validity of the PPA or SLA—annually or otherwise—NEDA allows daily variable price-based bidding. What this translates to is potential savings in cost for generators and reduced tariffs for consumers.

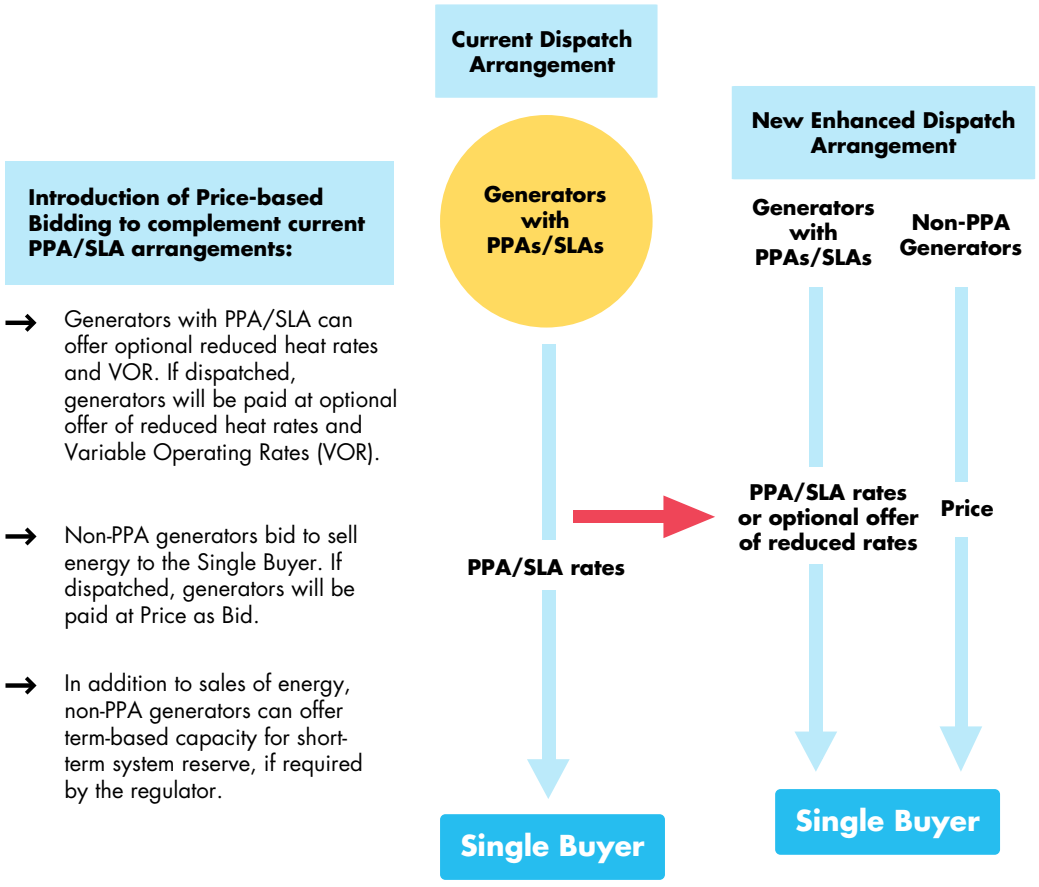
HOW NEDA WORKS – LARGE SUPPLIERS

The rules of NEDA stipulate that Merchant Generators (independent power producers who do not have active PPAs and SLAs) that have a

supply capacity of more than 10MW can offer to sell power to the Single Buyer (a company—in this case TNB—authorised by the Energy Commission to be responsible for the management and procurement of electricity and related services). If they win the bid to dispatch (supply power), they will be paid at a Price as Bid (which is their stated price). However, it is subject to a limit capped at the System Marginal Price (SMP), determined by the variable cost of the most expensive PPA or SLA Generator's bid available.

These energy generation bids are submitted by 10:00am the day before they are scheduled to be dispatched along with their Daily Availability Declaration, a daily notification presented by power generators to the Grid System Operator and Single Buyer indicating the level of availability of their generating plants, as stipulated in the Malaysian Grid Code. In the event that a Merchant Generator declares its availability for dispatch but fails to do so, or can only supply a lower load than it indicated in its agreement, the Generator will reimburse the Single Buyer with the incremental cost of obtaining a replacement Generator.

NEW ENHANCED DISPATCH ARRANGEMENT (NEDA)



While the current dispatch arrangements only allow bids by Independent Power Producers (IPPs) and Generators with valid Power Purchase Agreements (PPA) and Service Level Agreements (SLA), NEDA will create a more open market by allowing the participation of non-PPA Generators in supplying electricity to the Grid.

"If NEDA is implemented effectively, the potential financial savings in generation cost, and hence, tariffs for consumers can be in the tens to hundreds of millions of ringgit."

Dato' Abdul Razak Abdul Majid
– Chairman of the Energy Commission announcing the NEDA transition, 1st October 2015

HOW NEDA WORKS – SMALL SUPPLIERS

Meanwhile, Merchant Generators with smaller power production capacities between 100kW and 10MW in co-generation or renewable energy plants can also bid to sell energy to the Distributor (a company licensed under Section 9 of the Electricity Supply Act 1990, is connected to the Grid System and distributes electricity). These smaller generators will be paid on a monthly basis based on the daily average of the half-hourly SMP of the Single Buyer market.

COST-EFFECTIVE

To ensure that the system is cost effective, the Single Buyer schedules the distribution of generated energy based on the Least Cost Dispatch Scheduling Methodology. This allows TNB to dispatch hierarchically, from bottom to top, from the Generator with the lowest marginal cost towards the highest until demand is met.

REQUIREMENTS

Participating in the Single Buyer market requires Generators to possess the appropriate generation licenses issued by the Energy Commission. Those who already hold the required licenses are required to also register with the Energy Commission as Participants under the Single Buyer Rule, as well as register their Generating Units—connected to the Peninsular Malaysia Grid System—as Centrally Dispatched Generating Units (30MW and more) or Non-Centrally Dispatched Generating Units (less than 30MW). These Participants include the Grid System Operator, Single Buyer, and all PPA and SLA Generators.

TRANSITION

During the transition period from October to the first quarter of 2016, NEDA will be open to only Generators with PPAs and SLAs for alternative offers of Variable Operating Rates (VOR)—an all-inclusive per kilowatt-hour price that may change by the hour, day, month or year based on existing market conditions. This means that market prices determine the rates at which power is sold to the National Grid.

Under NEDA, a Generator offering a lower variable price will lead to the under-utilisation of other plants, and theoretically, this will encourage the under-utilised plant to also reduce its variable price to maintain its usage, thereby encouraging a healthy and competitive energy sector, for generators, consumers and investors. According to Dato' Abdul Razak, this will be reflected in massive economic savings for the entire country, pointing out that just 1% improvement in generation efficiency can enable up to RM150 million in fuel cost savings annually based on current fuel prices. EM

33rd ASEAN Ministers on Energy Meeting

As Malaysia is the Chair of ASEAN in 2015, it played host to the 33rd ASEAN Ministers on Energy Meeting (AMEM) and its associated meetings from the 5th to the 9th of October 2015. Held at the Grand Hyatt Hotel in Kuala Lumpur and themed "Powering ASEAN Towards a Greener Community", other highlights of the five-day event included the 12th ASEAN + 3 Ministers of Energy Meeting (AMEM + 3) and the 9th East Asia Summit Energy Ministers Meeting (EAS EMM).

A NEW PLAN

Comprising Ministers and senior officials responsible for the energy sector in ASEAN member states, the 33rd AMEM aimed to enhance energy security and inter-connectivity in the region. A significant step was taken when the AMEM endorsed the ASEAN Plan of Action for Energy Cooperation 2016 - 2025 (APAEC), which is the blueprint for the region over the next 10 years.

APAEC 2016 – 2025 is themed "Enhancing energy connectivity and market integration in ASEAN to achieve energy security, accessibility, affordability and sustainability for all", and will be implemented in two phases. Lauding the plan to Bernama, Malaysia's Minister of Energy, Green Technology and Water (KeTTHA) The Honourable Datuk Seri Panglima Dr Maximus Johnity Ongkili (who also chaired the meetings) said, "It will help us achieve energy connectivity and power ASEAN towards a greener community."

The Minister also urged all stakeholders throughout ASEAN, including governments, corporations and individuals, to collaborate in finding sustained and sustainable, as well as cost-efficient, supply of energy for the future.

This, Datuk Seri Panglima Dr Ongkili noted, is even more vital as energy demand has been rising, while the situation in the Middle East – a prime source of petroleum – is becoming increasingly volatile.

NOTING ACHIEVEMENTS

The focus of the 33rd AMEM was on bringing about the strategy for

ASEAN Energy Ministers and Senior Officials link arms in unity at the 33rd AMEM. From left to right: Brunei's Minister of Energy Pehin Dato Dr Mohammad Yasmin Umar, the Secretary of State for Cambodia's Ministry of Mines and Energy Ith Praing, Indonesia's Director General of Electricity Ir Jarman, Lao Minister of Energy and Mines Dr. Khammany Inthirath, Officer-in-Charge at the Philippines' Department of Energy Zenaida Y. Monsada, Malaysia's Minister of Energy, Green Technology and Water Datuk Seri Panglima Dr Maximus Johnity Ongkili, Myanmar's Union Minister for Energy U Zay Yar Aung, Singapore's Minister of Trade and Industry S. Iswaran, Thailand's Minister of Energy General Anantaporn Kanjanarat, Vietnam's Deputy Minister of Industry and Trade Hoang Quoc Vuong, and Deputy Secretary General of ASEAN for ASEAN Economic Community Lim Hong Hin.

greater cooperation, efficiency and sustainability in the regional energy sector. One milestone agreement reached is the aim to reduce ASEAN's energy intensity by 20% by the year 2020 and by 30% by the year 2025.

One of the main driving forces behind this target is the success member countries had in helping ASEAN to achieve the target of an 8% reduction in energy intensity, which was part of the goals for APAEC 2010 – 2015.

2016 is also an important year for ASEAN as it marks the start of the ASEAN Economic Community (AEC), which allows for free flow of talent, capital, and goods within the bloc. Consolidation of the regional energy sector is regarded as a key target, and this is manifested in the implementation of the ASEAN Power Grid (APG), which will enable electricity generated in one member state to be bought and used by another.

The ASEAN Ministers noted their approval of the efforts by the Heads of ASEAN Power Utilities/Authorities (HAPUA) in the implementation of the APG. These include conducting studies on taxation of cross border power trade and investments as well as on financing APG projects. In addition, handbooks and guides on achieving best practices in power asset management, reducing carbon emissions and power plant efficiency have also been published.

Another breakthrough recognised at the 33rd AMEM was the operationalisation of the Sarawak–West Kalimantan Interconnection, which enables the transmission of power from the Malaysian state of Sarawak to the Indonesian province of Kalimantan, both on the island of Borneo.

Cross border trade and investment in the oil and gas sector was also a topic for discussion at the meeting. ASEAN Ministers lauded the plan to achieve better integration of the gas supply sector through the Trans-ASEAN Gas Pipeline (TAGP), with one of the goals being to complement physical pipelines with liquefied natural gas (LNG) storage and regasification facilities.

GREEN INITIATIVES

With regards to sustainability efforts, the 33rd AMEM highlighted the importance of continuing development of clean energy in the region through adopting renewable energy as well as energy efficiency and clean technology applications and practices.

This, they said, requires stronger collaboration between stakeholders so that natural, human capital and technical resources can be effectively shared and utilised by all members. The importance of research cooperation was also highlighted, and the ASEAN Ministers applauded the release of a study on the impact of climate change on hydropower in the region.

This has led to the development of measures to mitigate any problems to hydropower infrastructure brought

Attendees

The 33rd AMEM was officiated and chaired by The Honourable Datuk Seri Panglima Dr Maximus Johnity Ongkili, Malaysia's Minister of Energy, Green Technology and Water (KeTTHA) with Myanmar's Union Minister for Energy U Zay Yar Aung as the Vice Chair for the 33rd AMEM.

Other ASEAN Ministers in attendance were Brunei's Minister of Energy Pehin Dato (Dr.) Mohammad Yasmin Umar, Lao Minister of Energy and Mines Dr. Khammany Inthirath. Singapore's Minister of Trade and Industry S. Iswaran, Thailand's Minister of Energy General Anantaporn Kanjanarat, and Vietnam's Deputy Minister of Industry and Trade Hoang Quoc Vuong.

Also in attendance were Lim Hong Hin, Deputy Secretary General of ASEAN for ASEAN Economic Community, and Datuk Loo Took Gee, Secretary-General of KeTTHA. ASEAN member states who were unable to send their Minister or Deputy Minister to AMEM, were represented by senior officials, Among them were Ir Jarman, Indonesia's Director General of Electricity, and Zenaida Y. Monsada, then Officer-in-Charge at the Philippines' Department of Energy of the Philippines and now Energy Secretary, and the Secretary of State of Cambodia's Ministry of Mines and Energy Ith Praing.

ASEAN Energy Awards

Organised by the ASEAN Centre for Energy, the ASEAN Energy Awards was held on the evening of the 7th of October 2015 at the Mandarin Oriental Hotel in Kuala Lumpur. Taking place on the side-lines of the 33rd AMEM, this glamorous annual event celebrated the success of ASEAN companies and organisations in achieving best practices in the following areas.

Energy Efficient Buildings

Category:
New & Existing
Winner:
ITE College Central, Singapore

Category:
Retrofitted
Winner:
UOB Plaza 1, Singapore

Category:
Tropical
Winners:
- The Breeze Mall, PT Bumi Derpong Damai TBK, Indonesia
- Suanmingmongkol (Insee Green Park), Siam City Cement, Thailand

Green Buildings

Category:
Small & Medium Green Building
Winner:
Mat Jambo House, Singapore

Category:
Large Green Building
Winner:
Ocean Financial Centre

Renewable Energy Projects

Category:
Off-Grid Power
Winner:
Solar Home System, Myanmar

Category:
Off-Grid Thermal
Winner:
Integrated Biogas Development using Human Manure and Domestic Waste, Dar El Hikmah Boarding School in Pekanbaru, Riau, Indonesia

Category:
National On-Grid
Winner:
1.15 MW BIPV Power Plant to TNB 11 KV Distribution System by Superspan in Teluk Panglima Garang, Kuala Langat, Selangor Malaysia

Category:
Local On-Grid
Winner:
Rural Electrification through Mini Hydro Power Project, Myanmar

Category:
Co-generation
Winner:
Bimoass Power Plant by Thip Sukhothai Bio Energy, Thailand

Energy Management in Buildings and Industries

Category:
Small & Medium Buildings
Winners:
- Bangchak Petroleum Public Office Building in Thailand
- Toyota Buzz Showroom and Office, Thailand

Category:
Large Building
Winner:
Chaophraya Yommarat Hospital, Thailand

Category:
Large Industry
Winners:
- Map Ta Phut Olefins, Thailand
- Richmond Stylish Convention Hotel by Amornpinthip, Thailand

about by climate change. Noting that such actions have already been implemented in Vietnam and the Philippines, the 33rd AMEM called for other member states to carry out similar studies in order to strengthen regional energy infrastructure.

The Ministers also welcomed the implementation of the ASEAN Standards Harmonisation Initiative for Energy Efficiency (ASEAN-SHINE), such as developing a regional roadmap for minimum energy performance standards in air conditioners.

Further recognition was given to a number of agreements made between ASEAN and Japan, namely the ASEAN-Japan Energy Efficiency Partnership Program (AJEEP) and ASEAN-Japan Pilot Project on Energy Efficiency Market Transformation with Information Provision Scheme (AJ-EMTIPS).

THE FUTURE

The close of the 33rd AMEM and Associated Meetings was marked by the launch of the 4th Southeast Asia Energy Outlook by the International Energy Agency (IEA). This report noted that ASEAN GDP is expected to grow by 3.7 times while energy intensity will rise by 2.7 times from 2013 to 2035. Also, by 2025, coal will overtake oil and gas as the region's main energy source.

Excellence in Individual Energy Management

- **Arne Schweinfurth**, Former Principal Advisor of ASEAN-RESP, GIZ
- **Kazuhiko Yoshida**, General Manager ,The Energy Conservation Center, Japan (ECCI)
- **Kurujit Nakornthap**, Former Permanent Secretary, Ministry of Energy, Thailand
- **Loreta G. Ayson**, Outgoing Undersecretary, Department of Energy, Philippines
- **Lydia Hardiani**, Deputy Director Of Technique And Environment, Directorate General of Mineral And Coal, Ministry Of Energy And Mineral Resources, Indonesia
- **Puangthip Silpasart**, Director General, Department of Mineral Fuels, Ministry of Energy, Thailand
- **Sae Ri Yang**, Program Manager, Korea Energy Agency (Kea), Korea
- **Tae Woo Kim**, President, Korea Nuclear Association For International Cooperation (KNA), Korea
- **Tomoyuki In**, Senior Policy Advisor for International Affairs Division, Agency for Natural Resources And Energy (Anre), Ministry Of Economy, Trade And Industry (METI), Japan

The biennial ASEAN Coal Awards was also held that evening, with 18 awards given out for achievements in Surface Coal Mining, Clean Coal Usage and Technology in Power Generation, Clean Coal Usage and Technology in Industry, Coal Distribution, Corporate Social Responsibility, and Innovative Application and Use of Coal.

Coal's role in supplying the region's energy sets the stage for the next AMEM, which will be held in Myanmar in September 2016. Among the topics most likely up for discussion will be on the implementation of cleaner coal technology, further reducing fossil fuel dependency, and enhancing regional interconnections. The 34th AMEM will definitely be building on the success of the 33rd AMEM; an event which has seen Malaysia praised as both a congenial host and a key player in promoting regional energy excellence. EM

Seven Strategic Areas of APAEC 2016 – 2025

Under the ASEAN Plan of Action for Energy Cooperation 2016 – 2025, seven key strategic areas on which to focus have been identified. They are:

1 **The ASEAN Power Grid** (APG – through initiating multilateral electricity trade in at least one sub-region in ASEAN)

2 **The Trans-ASEAN Gas Pipeline** (TAPG – through enhancing connectivity within ASEAN for energy security and accessibility via pipelines and regasification terminals)

3 **Coal and Clean Coal Technologies** (through enhancing the image of coal in ASEAN)

4 **Energy Efficiency and Conservation** (through reducing energy intensity in ASEAN)

5 **Renewable Energy** (through increasing RE share in the ASEAN energy mix)

6 **Regional Policy and Planning** (through greater profiling of the ASEAN energy sector internationally)

7 **Civilian Nuclear Energy** (through building nuclear energy capabilities)

Safety Matters

Enhancing the Electrical Safety Industry

Between 2002 and 2015, there were 807 incidents of electrical accidents in Peninsular Malaysia and Sabah, 48.26% of which were fatal. This translates to an average of 62 cases of electrical accidents annually over the last 13 years. Causes include from improper installations and lack of maintenance, to unsafe work practices, trespassing and dangerous activities near electrical plants. To enhance electrical safety in the country, the Energy Commission organised the second iteration of the *National Conference on Electrical Safety* on the 9th of November 2015 as a platform for industry players, consumer groups, regulators and policymakers to interact and share the latest information and strengthen the industry.

The one-day event at the Putra World Trade Centre in Kuala Lumpur featured nine experts who discussed various aspects of electrical safety in the country. Also present were about 250 participants with interests in the Malaysian electrical safety industry, from government agencies and consumer associations, to consultants and training institutions.

FOLLOWING REGULATIONS

Welcoming the attendees to the conference, Datuk Ir Ahmad Fauzi Hasan, Chief Executive Officer of the Energy Commission, emphasised that the role of the Energy Commission included ensuring the safety of the public and industry players across the chain, from the generation and production of electricity to supply and consumption. He noted that electrical accidents can be avoided if the parties complied with safe installation and recommended maintenance procedures.

These practices include ensuring that the entire process—from design to installation to testing and maintenance—are implemented in line with the codes and guidelines developed by the Energy Commission, such as the *Licensee Electrical Infrastructure Safety Code, Non-Domestic Electrical Installation Safety Code, Guidelines for Electrical Wiring in Residential Buildings,* and *MS IEC 60364 Standards* (International Electrotechnical Commission's international standard on electrical installations of buildings). These electrical works must be performed or supervised by competent and certified personnel, who must test completed installations and certify satisfactory performance according to the *Electrical Supply Act 1990* and the *Electrical Regulations 1994*. In addition, the equipment and components used must be approved by Malaysia's standards agency, SIRIM, and other body recognised by the Energy Commission.

Organised by the Energy Commission, the National Conference on Electrical Safety 2015 saw the attendance of about 250 participants from the electrical industry, including government agencies, training institutions, power utilities, industry associations, and consultants and contractors.

MOVING FORWARD

The speakers included Mohd Elmi Anas, Energy Commission's Director of Electrical Safety Regulation; Murugiah Suppiah, President of the Institute of Certified Engineers Malaysia; and Mohd Farith Osman, Tenaga Nasional Berhad (TNB) Chief of Occupational Safety and Health Asset Management. Other experts who presented papers were Saral James Maniam, Manager of Policy on Standards and Relative Activities at the Malaysian Association of Standards Users; Ir Zuraidah Muhammad, Senior Electrical Engineer at the Malaysian Public Works Department; and Ir. Lim Kim Ten, The Institution of Engineers Malaysia Committee Member. Others were Ir Looi Hip Peu, Member of The Electrical & Electronic Association of Malaysia; and Prof Dr Ir Mohd Zainal Abidin

CEO of the Energy Commission, Datuk Ir Ahmad Fauzi Hasan (centre) with some of the speakers at the National Conference on Electrical Safety 2015. From left to right: Lokman A.Dahlan, Murugiah Suppiah, Mohd Farith Osman, Prof Dr Ir Mohd Zainal Abidin Abdul Kadir, Mohd Elmi Anas, Ir Lim Kim Ten, Saral James Maniam, and Ir Zuraidah binti Muhamad.

PROACTIVE SECURITY

Safety statistics for the power sector show an increasing trend in the number of electrical accidents happening in the country recently. Hence, there is an urgent need for us to make the industry safer and better. Among the main causes identified were improper installation and maintenance as well as inadequate safety procedures.

Accidents and interruptions can be avoided if safe operating procedures are followed closely and effective protection systems are put in place in the supply and use of electricity. For this to happen, roles of the management and professionals are crucial to ensure that these procedures and systems are embedded in the design, as well as the protocols used in the construction, operation, maintenance and repair of their electrical facilities. Equally critical is for management to ensure that adequate training, supervision and the necessary tools are provided to those given the responsibility to perform electrical works.

Undoubtedly, managing electrical risks and addressing the power industry safety issues in recent years are becoming more complex and challenging. Business-as-usual control approaches and measures are mostly no longer adequate due to rapid changes in technologies and operating environments taking place in the power sector.

In order to achieve continuous improvement in safety performance, it is important that in this era of cyber economy and globalisation, competent electrical consultants, managers, operators and contractors constantly innovate and empower themselves with state-of-the-art technologies and standards so that they are always well-equipped and ready to serve the varying needs of the industry.

- The Energy Commission

Ab Kadir, Director of the Centre for Electromagnetic & Lightning Protection Research at University Putra Malaysia.

In his presentation titled Competent Control of Electrical Installations: Issues and Challenges, Murugiah Suppiah, President of the Institute of Certified Engineers Malaysia, explored a number of factors that hinder the implementation of safe electrical installations in the industry. These include ignorance and disregard of existing laws, conflicting laws, a shortage of certified personnel and a mismatch in skills between the needs of the industry and the number of trained personnel owing to rapidly changing technology. Murugiah also suggested a number of solutions to these problems, such as the review of conflicting and overlapping legislations by the responsible agencies, including the Department of Occupational Safety and Health and the Construction Industry Development Board (CIDB).

Saral James Maniam, in her Electrical Products Safety Requirements from the Perspective of Consumers paper, highlighted that 37 complaints in 2014 were about electrical product safety. She called for better consumer education with improved recall processes and mandatory reporting of incidents. Saral James also urged the industry to implement better fraud control measures, such as SIRIM's test approval label design change to combat unapproved electrical products.

Other topics discussed included Electrical Safety Legislation Updates: Towards Better Safety Management Practices; Lightning Protection Systems in Buildings, Electrical Safety Management in Government Buildings; Ensuring Water Heater Safety: Challenges in Design & Installation; and Enhancing Compliance to MS IEC 60364: Standards for Residential Wiring. Other subjects were on Substandard Cables: Challenges and Way Forward, and Improving Electrical Safety Management in TNB.

Safety Standards and Best Practices

To ensure electrical safety for the public and industry players, a number of international standards and best practices have been adopted.

These include standards by the International Electrotechnical Commission (IEC), International Organization for Standardization (ISO) and the Institution of Electrical Engineers (IEE) as reference materials, adapted to Malaysian conditions, including:

MS IEC 60364: Electrical Installations of Buildings

MS 1936: Electrical Installations of Buildings - Guide to MS IEC 60364 for Non-residential buildings

MS 2979: Electrical Installations of Buildings - Code of Practice: Residential Buildings

IEE Wiring regulations and BS 7671: Requirements of Electrical Installations

Other standards recognised and used in Malaysia include Japanese Industrial Standard, Chinese Guobiao and European Standards.

In addition, amendments to the Electricity Supply Act recently approved by Parliament define the way electrical installations are implemented. For instance, public and private licensees, non-domestic and private electrical installations are required to detail their policies, systems and programmes to manage electrical risks in their organisations in a safety management plan that complies with the electrical infrastructure code issued by the Energy Commission.

During the National Conference on Electrical Safety 2015, the Energy Commission launched the updated version of its publication, Guidelines for Electrical Wiring in Residential Buildings, to facilitate compliance. The guidebook takes into consideration the requirements from a number of standards and policies, including the MS IEC 60364, Electricity Supply Act 1990, Electricity Regulations 1994, MS 1936:2006 and the MS 1979:2007.

Aware of the challenges, the Energy Commission has implemented measures and initiatives to enhance safety in the electrical industry. These include creating awareness programmes through workshops and conferences, building the country's human resource effectiveness via capability-building projects, and strengthening existing legal and regulatory frameworks—such as amendments to the *Electricity Supply Act* (encompassing new safety provisions in line with international good practices) that was tabled and approved by the Parliament in June 2015. EM

The Energy Industry Stakeholders

A stakeholder is any person, group, or organisation that has a vital interest in a business. Therefore, stakeholders can be either internal or external to the business. But who are the stakeholders in the energy industry? In this section, Energy Malaysia explains who some of these parties are.

FINANCIAL INSTITUTIONS

Financial backing influences the quality of the services provided by energy producers, as well as the technologies needed to run their operations effectively. As such, financial institutions hold a significant stake in the energy industry.

GOVERNMENT AGENCIES AND ENERGY REGULATORY BODIES

To guard against the misuse and wastage of energy, government agencies and energy regulatory bodies establish rules and regulations to ensure that energy is used and acquired wisely. Typical regulatory bodies in Malaysia include the Energy Commission of Malaysia and the Ministry of Energy, Green Technology and Water (KeTTHA).

CONSUMERS / END-USERS

This is the largest group of external stakeholders. They use energy on a regular basis daily. Typical consumers are home owners and residential users. Other than those, consumers also include commercial users such as offices, hospitals, hotels, retail centres and heavy industries.

MANUFACTURERS

This group is one of the major energy consumers. They are also among the top contributors to national income. A good electrical supply system is important to them to ensure that manufacturing processes are not compromised.

ELECTRICITY PRODUCERS, TRANSMISSION AND DISTRIBUTION SYSTEM OPERATORS

This group of stakeholders, which includes Tenaga Nasional Berhad (TNB) and Independent Power Producers (IPPs), is responsible for the supply, transmission, and distribution of energy to consumers. They work together with consulting and engineering companies, as well as the government regulatory bodies, to ensure effective transmission of energy.

ENVIRONMENTAL AND CONSUMER ORGANISATIONS

These establishments provide a set of checks-and-balances against government decisions, ensuring that they do not jeopardise the environment or consumers as a whole. Some of these organisations include the Consumers' Association of Penang (FOMCA), the Centre for Environment, Technology & Development, Malaysia (CETDEM), and Malaysian Environmental NGOs (MENGO).

High-Powered Ambitions

Raising ASEAN'S Energy Efficiency

The 33rd ASEAN Ministers on Energy Meeting took place in October, where ASEAN ministers gathered in Kuala Lumpur to discuss the opportunities and challenges of the region's energy industry. **Datuk Loo Took Gee, Secretary General at the Ministry of Energy, Green Technology and Water (KeTTHA)** of Malaysia, was a key voice in the meeting. **Energy Malaysia** spoke with her to discuss some of its outcomes.

As ASEAN economies continue to expand, governments across the region are working together to ensure cheap, clean energy is available to support this growth. To combat the problem of rising energy intensity, Malaysia has implemented the *Minimum Energy Performance Standards* (MEPS), and is encouraging the ASEAN community to adopt this measure. As a committed member of this group of nations, Malaysia has several initiatives in place from a national and industrial level, down to individuals who want to generate power for the home or small businesses.

Datuk Loo Took Gee is confident that Malaysia will be able to increase its energy efficiency, while assisting the ASEAN region in achieving its own energy efficiency goals.

How is Malaysia planning to take the lead in reducing energy intensity and improving energy efficiency in the ASEAN region?

"During the 33rd ASEAN Ministers on Energy Meeting, we have agreed to reduce ASEAN's energy intensity by 20% by the year 2020, and 30% by 2025. We hope that these targets can play an important role in scaling-up energy efficiency in Malaysia. We are also finalising Malaysia's *National Energy Efficiency Action Plan*, and we hope to reduce Malaysia's energy intensity by 8% over a ten-year period.

We have gazetted the *Minimum Energy Performance Standards* (MEPS) to ensure that certain electrical appliances are more energy efficient. We have also implemented other initiatives, such as the *Sustainability Achieved via Energy Efficiency* (SAVE) programme, which provides subsidies to the people to allow them to buy energy-efficient equipment. On our part, we have been conducting energy audits and retrofitting for certain government buildings to improve their energy efficiency.

Apart from energy efficiency, we are also moving towards the use of renewables and renewable energy. Under the current *Feed-in Tariff* (FiT) scheme, we are only able to generate about 320MW of electricity because it is limited by the Renewable Energy Fund. Therefore, the Malaysian government has agreed to scale up green technology by adopting other mechanisms, such as the increased use of solar farms to produce energy, and the use of light-emitting diodes (LEDs) in place of regular lights to reduce carbon emissions."

The Memorandum of Understanding for the Laos, Thailand, Malaysia and Singapore Power Integration Project (LTMS-PIP) was expected to have been signed during the 33rd ASEAN Ministers on Energy Meeting. Why was the agreement not signed?

"The issue that has prevented the signing of the MoU is that Singapore needs to study the LTMS-PIP agreement in further detail, to ensure that the agreement suits the needs of its energy market. Therefore, we have agreed to settle this issue in six months."

Will the ASEAN Power Grid help to enhance energy efficiency? And does Malaysia have a high energy reserve margin?

"The ASEAN Power Grid will allow for effective resource optimisation of ASEAN's energy resources, which will not only allow us to use our energy more effectively, but will also let us conserve and preserve the region's energy resources as a whole.

Malaysia has an energy reserve margin of about 20-25%, which may not be too high. However, we can still rely on these reserves if there are any major power disruptions. It is far better for us to have our own reserves, which will see us through difficult times.

We feel that these initiatives will help both Malaysia and the ASEAN region achieve their energy intensity and energy efficiency goals."

With the initiatives Malaysia has in place, Datuk Loo Took Gee believes that the nation can be a leading player in ASEAN's goal of future energy efficiency. She is also confident that the steps taken at the 33rd Energy Ministers' meeting will see ASEAN's leaders working closely together in the future to achieve this target. EM

Staying Charged

Malaysia's Electricity Supply Performance

As a rapidly advancing nation, Malaysia depends extensively on the performance of the electricity supply industry, even as electricity demand is expected to increase significantly in the future. According to the Energy Commission's *Performance and Statistical Information on Electricity Supply Industry in Malaysia 2014*, the Malaysian electricity supply industry has made some improvements through strengthening the generation and supply of electricity that has resulted in fewer electricity supply interruptions.

In the Peninsula and Sabah, the utilities—Tenaga Nasional Berhad (TNB) and Sabah Electricity Sdn Bhd (SESB) respectively—are required to submit regular performance statistics to the Energy Commission. This is to enable the Energy Commission to monitor the state of power supply in the country and the challenges in the system, as well as make improvements when and where necessary.

As Malaysia continues its rapid economic advancement, demand for electricity continues to surge. In 2014, the maximum electricity demand in Peninsular Malaysia surged by 2.05% from 16,562MW in 2013 to 16,901MW in 2014. There was also a 3.06% increase in the highest daily demand to 355.80GWh in 2014 from 345.25GWh in the previous year. Sabah also saw an increase in its maximum electricity demand, which surged 3.6% from 874.4MW in 2013 to 907.5MW in 2014. The biggest consumer was the industry sector with 44.17%, followed by the commercial sector with 32.98% and the domestic sector with 21.16%. Other sectors were the public lighting, others (including agriculture) and mining with 1.24%, 0.34% and 0.11% respectively.

Measuring Electricity Service Delivery

Peninsular Malaysia

2010	2011	2012	2013	2014
System Average Interruption Duration Index (SAIDI) (Minutes/Customer/Year) by Voltage Level				
96.25	69.11	60.46	60.35	56.65
System Average Interruption Frequency Index (SAIFI) (Number of Interruptions/Customer/Year) by Voltage Level				
1.23	0.97	0.81	0.87	0.92
Customer Average Interruption Duration Index (CAIDI) (Customer Average Interruption Duration Index) by Voltage Level				
78.30	71.62	74.64	69.37	61.58

Sabah

2010	2011	2012	2013	2014
System Average Interruption Duration Index (SAIDI) (Minutes/Customer/Year) by Voltage Level				
434	299	267	251	777
System Average Interruption Frequency Index (SAIFI) (Number of Interruptions/Customer/Year) by Voltage Level				
16.13	14.38	11.20	9.68	13.44
Customer Average Interruption Duration Index (CAIDI) (Customer Average Interruption Duration Index) by Voltage Level				
27.70	20.81	23.84	25.95	57.84

Source: Energy Malaysia

QUANTIFYING ADVANCEMENT

A highly effective electricity supply performance is particularly important considering that the country's rapid development is aided and accelerated primarily by the industrial and commercial sectors, which depend on high supplies of energy to operate. In addition to the performance of electricity supply, other factors are also considered and reported. These include the quality of energy supplied (sags and surges), scheduled and unscheduled disruptions, and the duration of such interruptions.

To measure some of these factors, a number of globally recognised standards are used. For instance, one of the major reliability indicators used by power utilities is the System Average Interruption Duration Index (SAIDI), which is the average outage duration per customer per year measured in minutes, with a lower SAIDI translating to higher service level and better supply reliability.

Other measurements used to gauge the performance of supply are the System Average Interruption Frequency Index (SAIFI)—which is the average number of interruptions that each customer experiences—and the Customer Average Interruption Duration Index (CAIDI), the average time it takes power utilities to restore power after an outage.

GENERATING POWER

The causes of electricity supply disruptions are also recorded, whether they occurred at the generating plant or due to losses during transmission. In Peninsular Malaysia, electricity generation suffered some setbacks owing to aging power stations and unscheduled downtime, and some improvements due to the import of liquefied natural gas to meet domestic needs. Between 2013 and 2014, the equivalent availability factor (EAF)—which measures the percentage of time that a generating plant is available to supply electricity—recorded the highest improvement in TNB's combined-cycle plants from 83.50% to 90.17%, while there was a decline in open-cycle power plants and conventional power stations (oil and gas).

In Sabah, the EAF for SESB and Independent Power Producers (IPPs) declined by up to 11% primarily due to gas rationing, extended unscheduled downtime and planned upgrades. For instance, the EAF for SESB fell by 2% as the Tenom Pangi Power Station's Unit 1 was being upgraded to a higher generation capacity.

Electricity Supply Interruptions in Peninsular Malaysia and Sabah

Interruptions declined by 33.3% between 2010 and 2014.

	2010	2011	2012	2013	2014
Johor	16,590	12,540	11,935	11,554	7,719
Kedah	7,901	7,635	6,590	6,642	5,538
Kelantan	10,151	8,211	7,813	7,169	5,901
Kuala Lumpur	11,970	9,620	10,181	9,861	9,391
Melaka	4,131	4,772	2,318	3,307	3,939
Negeri Sembilan	6,461	5,218	1,876	6,261	4,966
Pulau Pinang	7,376	5,662	6,269	6,678	5,021
Pahang	5,621	4,226	4,039	4,460	5,399
Perak	10,835	8,930	7,598	8,029	8,050
Perlis	772	1,240	420	422	1,086
Putrajaya/ Cyberjaya	13	8	7	9	4
Selangor	14,569	11,885	9,745	10,968	9,768
Sabah	24,173	25,334	26,841	24,849	22,739
Terengganu	3,866	3,370	3,150	3,709	3,847
Total No. of Interruptions	124,429	108,681	102,112	104,221	93,368

Source: Performance and Statistical Information on Electricity Supply Industry in Malaysia 2014

Sabah's addition of new power stations in 2014 has also reduced the need for SESB to shed load when demand is high while in the Peninsula, the development of new generation units has helped bolster the massive annual electricity demand (that increased by 2.22% to 114,856 GWh in 2014 compared to the previous year). EM

Building Capacity

Maintaining National Advancement

One of the effects of Malaysia's rapid economic growth and development is an increase in energy demand by industrial, commercial and residential consumers. According to the Energy Commission's *Peninsular Malaysia Electricity Supply Industry Outlook 2014*, peak demand is expected to exceed 25,000MW by 2032, with over 30,000MW of installed generation capacity connected to the national grid, 40% more than in 2014. This translates into a projected increase in demand of up to 4% annually, which requires expansion and upgrading to generation and transmission infrastructure and systems, to sustain this progress and development.

In 2011, Tenaga Nasional Berhad (TNB), Malaysia's largest utility, created the 10-year Transmission Development Plan (10-Year Plan) to strengthen Peninsular Malaysia's transmission system during normal operating conditions, as well as in outage (N-1) contingency situations. The plan—in line with the Malaysian Grid Code (MGC) License Conditions, the Transmission System Reliability Standard (TSRS) and the MGC—is based on the concept of load-level rather than time-dependent analysis.

What this means is that the transmission system is future-proof in terms of increases in energy load to cater for surges in power demand, regardless of the time or year in which they occur. This plan and its projects are reviewed, monitored and managed by a Transmission Development Plan Working Group, also created in 2011, and comprises representatives from the Energy Commission, TNB, Sabah Electricity Sdn Bhd (SESB) Economic Planning Unit, Public Private Partnership Unit and the Ministry of Energy, Green Technology and Water (KeTTHA).

ASSET UPKEEP

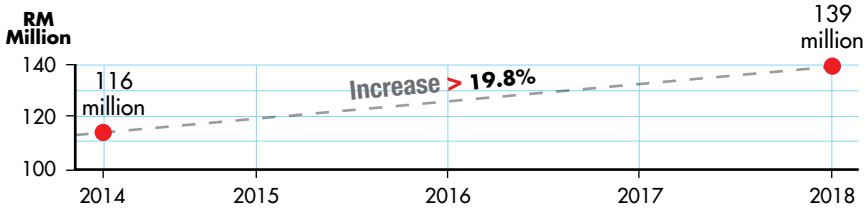
As the Grid System Operator (GSO), TNB's Transmission and Distribution Divisions are required to provide the Energy Commission with a 5-year annual plan on capital expenditure for transmission systems expansion and maintenance, and project development. In the 5 years from 2014 to 2018, TNB forecast a total expenditure of RM631 million for Asset Maintenance, with the cost of upkeep increasing by 19.8% from RM116 million in 2014 to RM139 million in 2018. Similarly, Bulk Capital is expected to grow by 40% from RM15 million to RM21 million during the same period with a cumulative spend of RM96 million.

In terms of transmission infrastructure and systems project development, TNB estimates a total of RM9.5 billion, with costs growing from RM1.5 billion in 2014 to RM2.13 billion next year before declining to RM1.6 billion in 2018. These projects will be divided into two categories: contracted projects that have been awarded for construction, and pre-award ventures, which could be in the planning, acquisition, land and wayleave, procurement or engineering phase.

HALF A DECADE

On the distribution side, TNB estimates a capital expenditure of RM17.4 billion over five years, between 2014 and 2018. In addition to the

Asset Maintenance Cost Forecast



Source: Peninsular Malaysia Electricity Supply Industry Outlook 2014

A 5-year plan that encompasses capital expenditure for transmission, distribution and major distribution projects is required to be submitted to the Energy Commission by the Grid System Operator to ensure that there is sufficient power to meet current and future needs of the country.

Capital Expenditure and Future Plans for Transmission and Distribution

Proposed capital expenditure for transmission

Financial Year (in RM million)	2014	2015	2016	2017	2018	5-year
Development Projects	3,320	1,891	2,135	2,266	1,684	9,555
Assets Maintenance	116	120	125	131	139	631
Bulk Capital	15	19	20	21	21	96
Total Capital Expenditure and Plans (CAPEX)	1,711	2,030	2,279	2,417	1,844	10,281

Proposed capital expenditure for distribution

Financial Year (in RM million)	2014	2015	2016	2017	2018	5-year
Ongoing and Estimated	3,320	3,380	3,480	3,590	3,710	17,480

Planned major distribution projects

Financial Year (in RM million)	Number of Projects		Cost of Projects		
	System Development	Supply to Customers	System Development	Supply to Customers	Total Cost
2013	47	19	723	173	897
2014	106	49	1,894	502	2,396
2015	99	21	1,712	250	1,962

Source: Peninsular Malaysia Electricity Supply Industry Outlook 2014

5-year sub-transmission capacity review to ensure that the energy demands of customers are met, the utility also implement a 10-year electricity demand projection and a 3-year distribution network master plan, with studies on a regular basis. Ongoing and estimated expenses for the development of the distribution system this year are RM3.3 billion, an increase of 1.8% from last year. By 2018, this figure is expected to be RM3.7 billion.

The expenses will include distribution network development projects across Peninsular Malaysia, including the reinforcement of the 33kV distribution system network, which encompasses a total of 341 projects implemented between 2013 and 2015 and categorised as either System Development/Improvement or Supply to Customers. This year, 120 distribution network development ventures worth RM1.9 billion are planned, compared with 66 (RM897 million) and 155 (RM2.3 billion) in 2013 and 2014 respectively.

These efforts—the planning, managing and expansion of the transmission and distribution infrastructure—are essential to the continued advancement of the country's energy sector as well as the overall national economy. EM

Power Cache

Securing Supply with Energy Storage

One of the results of increased industrialisation is a higher demand for energy. In Malaysia, where economic development has intensified over the last few years as the country tries to achieve its goal of industrialised nation status by 2020, energy demand is expected to continue to rise. According to the Energy Commission, electricity demand is projected to grow from 17,697MW currently to 22,938MW by 2025.

Among the measures the government has implemented to meet this demand is raising the contribution of renewable energy sources – such as solar, hydro, biomass and biogas–to the national mix, to minimise the socio-economic impact of the country's rapid growth. However, power supply from fossil and sustainable sources are not always consistent or available when needed. This is where energy storage comes in.

Energy storage is not an entirely new concept and has been an essential component used in power generation, transmission and distribution for more than a century. This includes the storage and release of water to generate electricity in hydro dams and reservoirs, as well as batteries to power electronics.

However, with the increased awareness of cleaner power sources, the need for energy storage becomes even more important. For instance, a home or industry that depends on electricity from solar photovoltaic (PV) panels may run out of power when the sun intensity is low, skies are cloudy or at night.

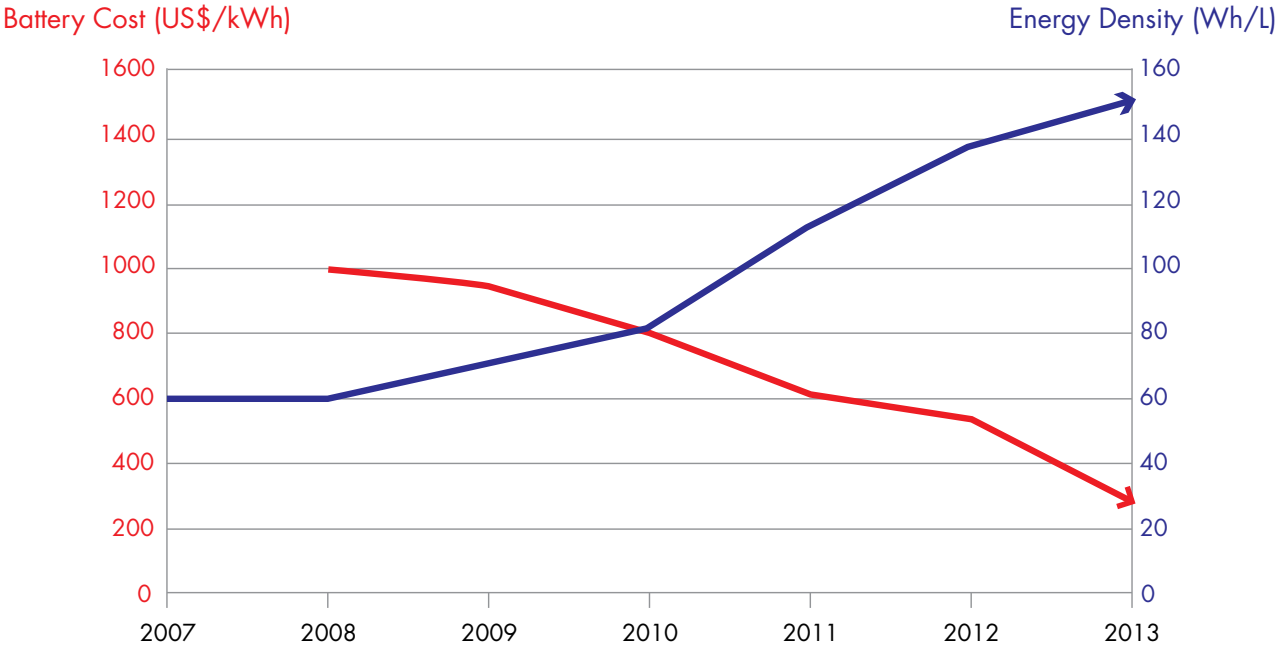
Another factor that is spurring the adoption of energy storage is the price, which has declined significantly over the last two decades. According to a study by Duke University, USA, the amount of energy that consumers and utilities can store for US$100 (RM426) worth of batteries increased by 11 percentile points.

This means that while energy density (the amount of power that can be stored per mass unit or volume) increased, the unit price declined, leading to commercially available products with capacities of 10kWh and 100kWh.

SMALL AND LARGE

For solar PV operators, energy storage helps by accumulating energy when sunlight is available and supplying the electricity to consumers when there is no direct sunlight. Other benefits for consumers and utilities are in cost savings and reduced demand during peak hours, particularly crucial as Malaysia tests a time-of-use charge system with higher tariffs during peak hours. Consumers can buy and store energy at night, during off-peak hours, and use the electricity during peak hours when prices are

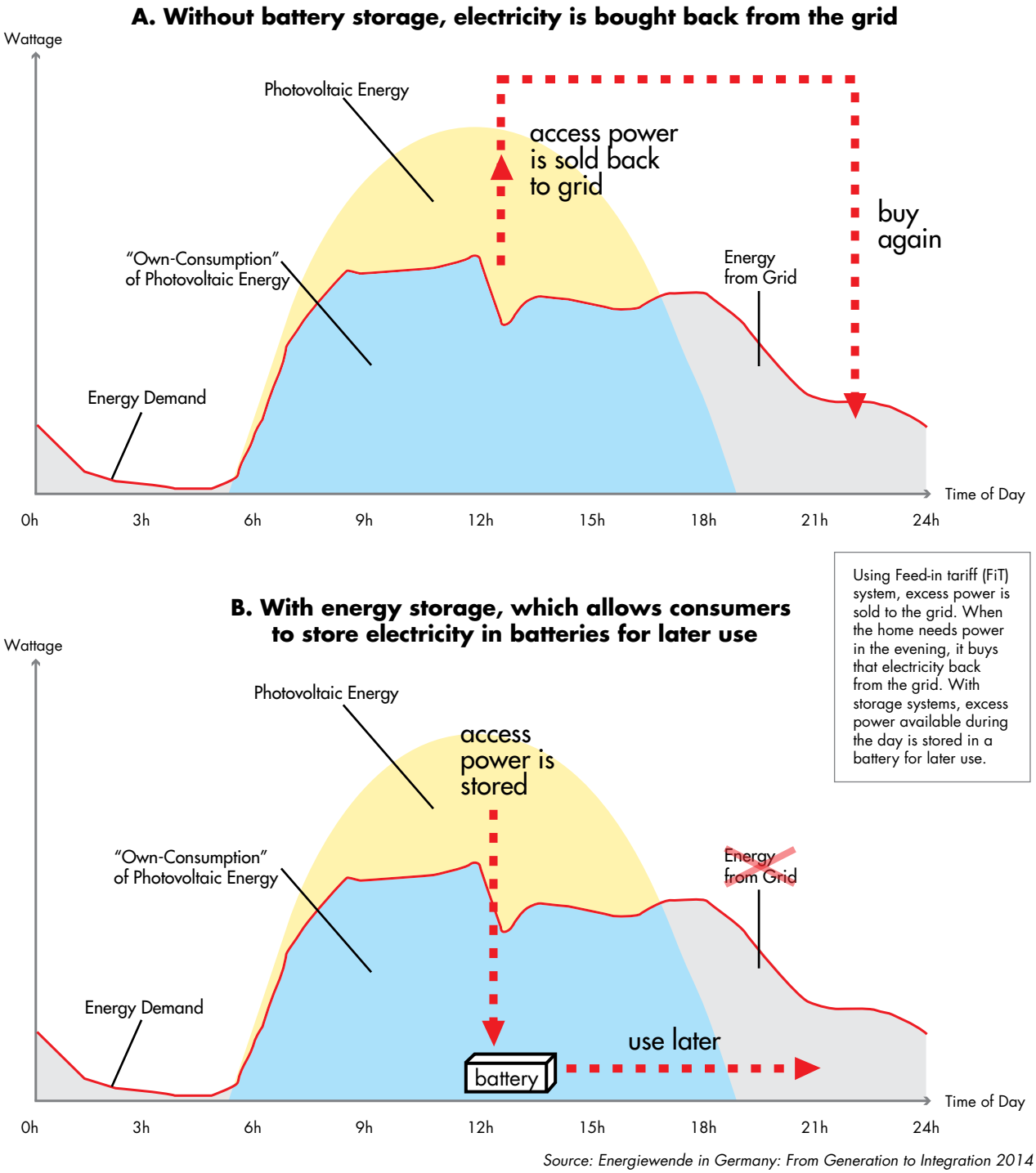
DECLINING COST OF BATTERIES



Between 2008 and 2013, battery costs declined from US$1,000 (RM4,324) per energy density of about 60 litre weight (wh/l), to US$300 (RM1,297) for 150 wh/l of battery, making the use of battery storage more attractive to consumers.

Source: US Department of Energy report

PRINCIPLE OF OWN CONSUMPTION



Using Feed-in tariff (FiT) system, excess power is sold to the grid. When the home needs power in the evening, it buys that electricity back from the grid. With storage systems, excess power available during the day is stored in a battery for later use.

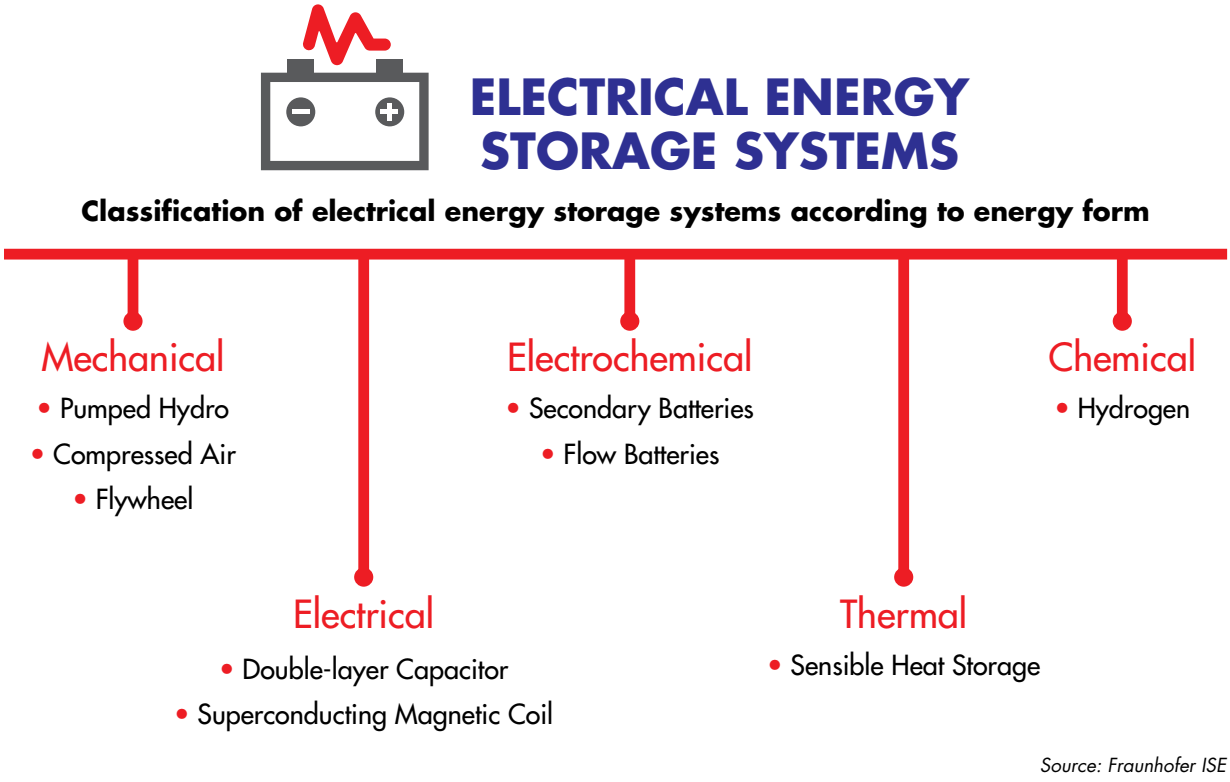
Source: Energiewende in Germany: From Generation to Integration 2014

higher. Generators get to work less and consumers can pay lower electricity bills.

Research has shown that it is also beneficial if utilities deploy energy storage units. In the study *The Value of Distributed Electricity Storage in Texas,* US electricity supplier Oncor found it would be cost-effective to station storage units close to the consumers. The research found that deploying energy storage units across the grid could slightly lower consumer bills, decrease incidences of blackouts and reduce the need to boost capacity by storing energy from non-peak hours.

On a larger scale in grids and industries, energy storage helps shift energy consumption into the future, by a few hours at least. This also translates to a safety net or bridge that ensures that there is no break in transmission. Furthermore, it can also be used by utilities to supply power to customers in remote locations—by storing and stabilising electricity in micro grids.

Among the challenges that are holding back the widespread use of energy storage systems is the cost. Despite declining prices for storage, it remains higher than the cost per unit of electricity obtained from the grid.



Source: Fraunhofer ISE

As technology advances, cheaper storage devices are expected to be widely available. In Malaysia, energy storage has not yet caught on. However, Datuk Loo Took Gee, Secretary-General of the Ministry of Energy, Green Technology and Water, revealed at the 33rd ASEAN Ministers on Energy Meeting that discussions are underway to implement a national energy storage system. This should also encourage more residential and industrial users to adopt the technology. EM

Special Industrial Tariff and Enhanced Time of Use System

On the 4th of November 2015, the Energy Commission invited representatives from the industry to its headquarters in Putrajaya for a briefing on amendments to the Special Industrial Tariff and the introduction of the Enhanced Time of Use tariff. The briefing was opened by the CEO Datuk Ir Ahmad Fauzi Hasan, followed by presentations by Tenaga Nasional Berhad (TNB) on the new system.

A question-and-answer session after the briefing enabled industry representatives to ask some questions about the new schemes with the Energy Commission and TNB representatives.

Introduced in 1995, the Special Industrial Tariff (SIT) was originally applicable to ice, iron and steel, glass, industrial gases, and cement factories with electricity consumption of 5% or more of their total operating costs. This was later extended to include all industrial customers of TNB.

Under the SIT, eligible companies enjoyed discounted rates at 42.70 sen/kWh as opposed to 44.10 sen/kWh for low voltage industrial (D) users and 33.60 sen/kWh for medium voltage industrial (E1) users compared with 33.70 sen/kWh.

As of January 2016, no new SIT applications will be approved. Although the current system of calculating eligibility where electricity consumption is 5% or more of operating costs will be retained that year, this will be changed in 2017 so that renewal will be granted upon assessment of the applicant's efficiency in either improving kWh per unit production or kWh savings.

Also, as highlighted by Datuk Ir Fauzi, companies seeking renewal of their SIT from 2017 onwards will need to have an Energy Manager who carries a valid Energy Manager certificate. Additionally, the discounts will be gradually reduced by 2% each year until they reach 0% by January 2020.

Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan giving the opening address at the briefing on the Special Industrial Tariff and Enhanced Time of Use scheme.

ENHANCED TIME OF USE

With the SIT being phased out, the Enhanced Time of Use (EToU) scheme is being introduced to further encourage greater efficiency in industrial usage of electricity. Under the current ToU system, there are two separate rates – Peak and Off-Peak – for medium and high voltage industrial customers.

However, there are certain time periods considered to be peak periods but are not necessarily so. For example, the hours between 8.00 a.m to 10.00 a.m is regarded as peak, but in reality, the machines are still being warmed up and production will just be starting.

The EToU addresses this conundrum by introducing a third rate, known as Mid-Peak, where tariffs during these time periods will be lower than Peak but higher than Off-Peak periods. This scheme will be open to medium and high voltage industrial customers by January 2016, with low voltage ones eligible to apply as of January 2017.

The phasing out of the Special Industrial Tariff and the introduction of the Enhanced Time of Use scheme are two means through which industrial consumers are being encouraged to become more energy efficient. By organising and hosting this briefing, the Energy Commission demonstrated its commitment to disseminating information on electricity regulations and charges, thus ensuring that affected stakeholders are aware of and prepared for any change. EM

Outlook for World Oil and LNG Market

Prof Ken Koyama (centre) with attendees of his talk on the World Oil and LNG Market.

Over the course of the past year and half, world oil and gas prices have dropped dramatically from more than US$100 per barrel in July 2014 to US$40 in December 2015. As Malaysia is an oil and gas-producing nation and a gas exporter, this decline has affected the economy and value of the currency. The Energy Commission hosted a talk by Prof Ken Koyama, the Chief Economist and Managing Director of the Institute of Energy Economics, Japan (IEEJ) titled *Outlook and Challenges for the World Oil and LNG Market* on the 8th of December 2015.

An expert on the oil industry, energy market analysis and policy development in the Asia-Pacific region, Prof Koyama has also sat on several Japanese government energy policy committees. He is also the Chair of Energy Economics at Universiti Tenaga Nasional (UNITEN) in Malaysia.

The Professor started his lecture by highlighting some of the developments and trends in the global oil and gas sector, such as an increase in energy demand from Asia. Coupled with crises such as the Syrian and Iraqi civil wars and sanctions on Russia, oil and gas prices should have gone up since supply has been tightened.

However, the shale gas revolution in the United States has resulted in the country gaining some form of energy independence from imported crude. It also pushed oil prices down, which in the past would have elicited a response from OPEC (Organisation of Petroleum Exporting Countries) where production is cut in order to force prices up again. This, Prof Koyama noted, is self-defeating.

This time though, OPEC – led by Saudi Arabia – has decided to keep the taps running, resulting in a supply glut. The strategy behind this is to create a new price equilibrium with Saudi Arabia relying on its vast foreign exchange reserves to withstand the negative impact of oil price deflation.

However, the lack of a foothold led the market and prices to plunge. "This is generally positive for the world economy as it strengthens energy supply security and benefits consumers and companies in energy-importing nations. On the flip side, it puts pressure on oil and gas exporters, raising the risk of economic instability and contagion," the Professor said during his talk.

On the topic of LNG, Prof Koyama said global demand will rise from 239 million tonnes in 2014 to 547 million tonnes by 2040, with Asia accounting for 70% of imports. He also noted that the LNG sector in the region will be affected by a number of factors such as environmental concerns and competition with coal and nuclear power, as well as with piped gas. EM

The Energy Efficiency Challenge 2015

Winners of the top three spots in the EE Challenge 2015, together with Ir Abdul Rahim Ibrahim, Dato' Abdul Razak Abdul Majid, and Datuk Ir Ahmad Fauzi Hasan in the back row.

Wong Ting Song of KeTTHA, together with Datuk Ir Ahmad Fauzi Hasan and Dato' Abdul Razak Abdul Majid of the Energy Commission, during Ir Abdul Rahim Ibrahim's explanation of the judging criteria of the EE Challenge 2015.

The Energy Efficiency Challenge 2015 (EE Challenge 2015) awards ceremony was held at the Cyberview Resort and Spa, Cyberjaya, on the 15th of December 2015. The first EE Challenge took place in 2014, and saw the participation of 7 schools from the Federal Territory of Kuala Lumpur, Putrajaya and Selangor. This year's challenge, which ran from May to October 2015, saw 29 schools taking part, with participants coming from the Federal Territory of Kuala Lumpur, Putrajaya, Selangor, Melaka, and Negeri Sembilan.

The EE Challenge awards ceremony was attended by Datuk Ir Ahmad Fauzi Hasan, Chief Executive Officer of the Energy Commission, Ir Abdul Rahim Ibrahim, Director of Energy Management Development and Service Quality Department of the Energy Commission, and Wong Ting Song, Undersecretary of the Energy Policy Division of the Ministry of Energy, Green Technology and Water (KeTTHA). Dato' Abdul Razak Abdul Majid, Chairman of the Energy Commission, provided his welcoming speech for the awards ceremony.

The EE Challenge 2015 participants were judged on several criteria, which included the comparison of electricity usage between the periods of May to October 2014 and May to October 2015. Participating schools were also evaluated on their comparative usage index of energy, in kilowatt-hours per class and in kilowatt-hours per person, between 2014 and 2015, in addition to their energy-saving activities conducted during the course of the competition.

SMK King George V emerged as the winner of the EE Challenge 2015. Mr Shangar Singodayan, teacher and rugby coach at the SMK King George V, accepted a commemorative plaque, a participation certificate and the first prize of RM15,000 on behalf of his school. The first and second runners-up were SMK Cochrane Perkasa and SMK (P) Methodist.

"One of the biggest takeaways from the EE Challenge 2015 is an enhanced level of awareness," said Shangar, in an interview after the ceremony. "When I first decided that our school would join the EE Challenge earlier this year, I felt that I needed to drive home the importance of preventing electrical wastage. To make this point, during one of our school assemblies, I brought out an RM50 note and asked for a volunteer to rip it apart and throw the pieces away. No one volunteered."

His daring approach set the stage for getting the entire school to participate whole-heartedly in the EE Challenge, a move he credits as the reason for the school's success. "I hope that there will be a much greater turnout for next year's EE Challenge. More people should become more aware of this event," he concluded. EM

Running for Energy Efficiency

Above: The runners for the 10 km Open and Veteran categories, running past the Energy Commission building at the start of the EE Run 2015.

Right: Winners of the Men's Open 10km Category with their cheque prizes, presented by Datuk Ir Ahmad Fauzi Hasan.

The Energy Commission held its third Energy Efficiency Run (EE Run) in Putrajaya, on the 14th of November 2015. The first two runs took place in 2011 and 2013 respectively. The main objective of the EE Run 2015 was to enhance public awareness of the importance of efficient energy use and consumption as a pro-active long-term initiative to overcome the depletion of natural fossil fuel resources.

Almost 1,500 runners from all over Malaysia, including 300 of the Energy Commission's staff and their family members, participated in this event. They also sponsored the participation of 53 students from 6 schools around Putrajaya. The EE Run 2015 was divided into 12 categories, with 6km and 10km routes. To ensure that the EE Run 2015 went smoothly, the Energy Commission engaged the assistance of the Federal Territory Amateur Athletic Association (FTAAA) to help with organising the run.

Apart from the EE Run 2015 event, the Energy Commission has also carried out several other energy efficiency drives. These include the enforcement of the Efficient Management of Electrical Energy Regulations 2008 (EMEER), as well as the Minimum Energy Performance Standards (MEPS) and the Energy Performance Contracting for public buildings. The Energy Commission is also collaborating with the government, through the Ministry of Energy, Green Technology and Water (KeTTHA) in executing energy efficiency efforts under the Economic Transformation Programme (ETP). EM

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.

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Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY and USE OF ENERGY

Established under the *Energy Commission Act 2001*, *Suruhanjaya Tenaga* (ST – The Energy Commission) is a statutory body entrusted with regulating the energy sector, in particular electricity and piped gas in Peninsular Malaysia and Sabah to ensure security, reliability, safety, efficiency and economy.

The Energy Commission...

Advises
Ministers on all matters concerning the national policy objectives for energy supply activities, the supply and use of electricity, the supply of gas through pipelines and the use of gas.

Regulates
electricity and piped gas tariffs and the quality of supply services, as well as promote competition and prevent misuse of monopoly power.

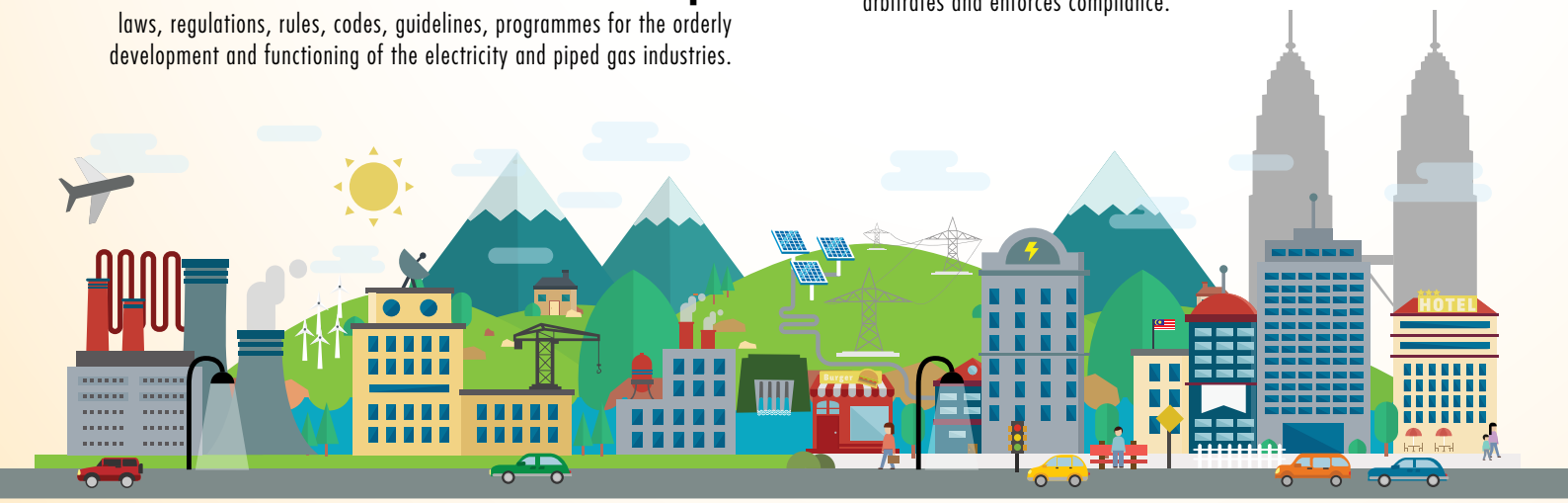
Promotes
good practices, as well as research, development and innovation in the electricity and piped gas industries.

Plans and develops
laws, regulations, rules, codes, guidelines, programmes for the orderly development and functioning of the electricity and piped gas industries.

Licenses and certifies
electricity and piped gas suppliers, competent electricity and gas personnel, training providers, contractors, equipment and installations, energy service companies and energy managers.

Monitors and audits
performance and compliance of licensed and certified suppliers, service providers, installations, equipment importers, manufacturers and retailers.

Investigates
complaints, accidents, offences and industry issues; arbitrates and enforces compliance.



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