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Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga
Energy Commission

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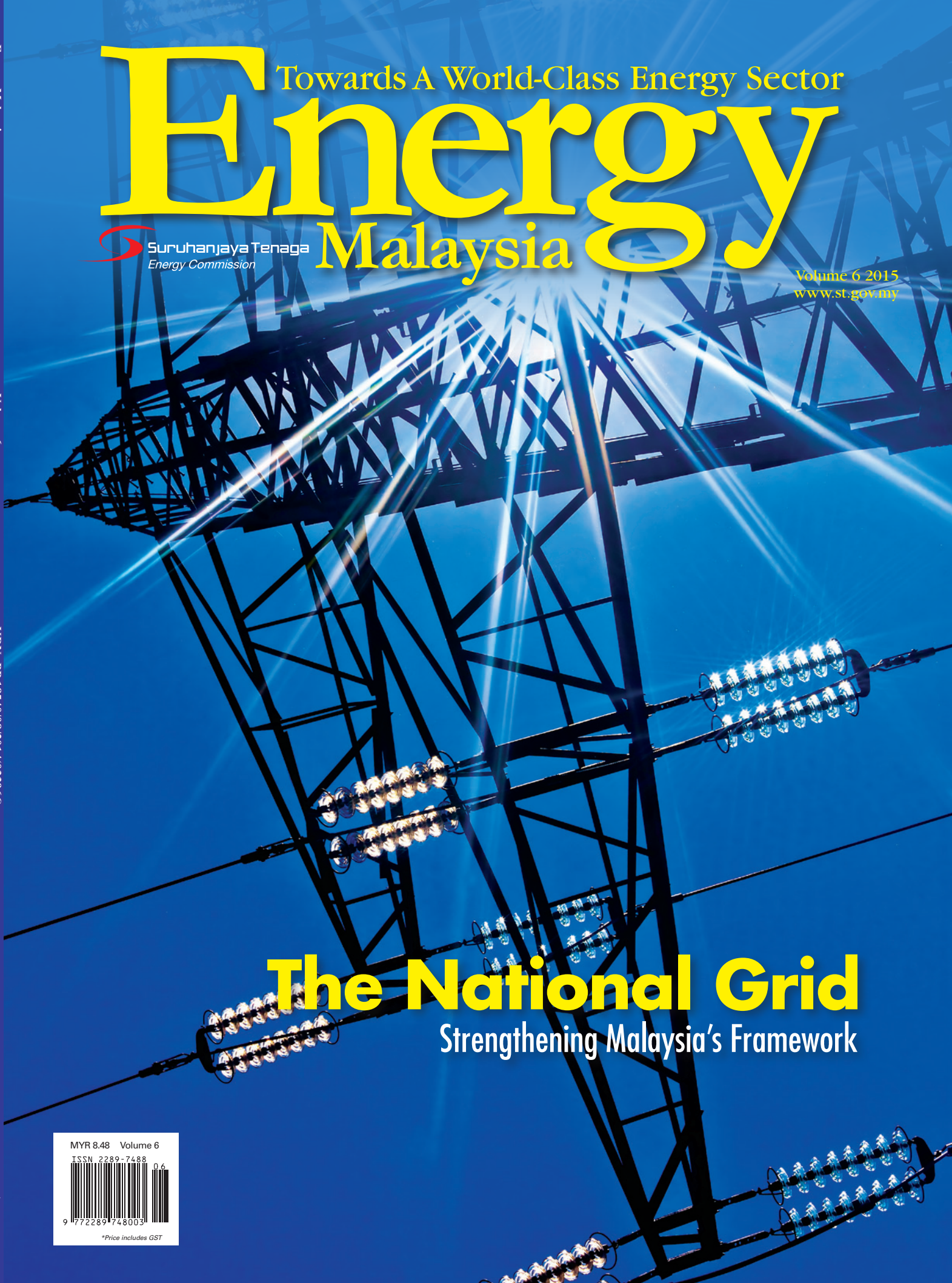

The National Grid

Strengthening Malaysia's Framework

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Energy Malaysia
Suruhanjaya Tenaga Energy Commission

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Strengthening the Grid

Over the last two decades, Malaysia has experienced a substantial increase in energy consumption, with electricity demand per person rising from 1,460kWh in 1993 to 4,110kWh in 2013. Rapid economic growth leading to an increase in industrial output and demand for electricity contributed to this.

As a visible outcome of a higher standard of living, more people now own and use energy-consuming technology-based appliances and devices. Urbanisation and commercialisation have also increased electricity consumption, particularly with more offices, factories, shopping malls and other entertainment outlets in operation.

The National Grid – the Peninsula-wide transmission network which acts as a super-highway for electricity – plays a vital role in delivering this energy demand. It connects more than 420 major substations to 11,000 km of transmission lines, linking them together into a single delivery system. As part of our mandate to regulate the safe and steady supply of electricity, the Energy Commission plays a key role in the planning and operations of the National Grid.

To coordinate the performance of these functions, Energy Commission chairs the Grid Code Committee (GCC) which oversees and ensures compliance with the Malaysian Grid Code, and is also tasked with maintaining safe, reliable and secure provision of power throughout Peninsular Malaysia. Admittedly, the grid has encountered a few incidents from the time it was set up in the 1960s. Industry records worldwide attest to this physical occurrence, as electricity demand and facilities expands; the system may experience undue stresses.

We are determined that electricity supply in the country will be maintained at an optimum level. Therefore, the Energy Commission is constantly working with other stakeholders to continually strengthen the National Grid by making sure that there is enough generation capacity, and upgrading the delivery system to cater for projected normal operations as well as foreseeable abnormalities.

To illustrate, we have approved the construction of two new 500kV transmission lines. One of these will encompass the southern region and run from Yong Peng East in Johor to Lenggeng in Negeri Sembilan, thus completing what has been described as 'the missing link'. The other stretch will be the second corridor from Air Tawar in Perak to Bentong South in Pahang.

Both these projects are expected to be completed by 2019, and will increase the efficiency of electricity transmission. At present, the main challenge is to obtain approval on land matters as the lines run through different states. Another means by which we are ensuring adequate supply of energy is through signing power exchange agreements with Thailand and Singapore which would facilitate buying and selling electricity as and when we need. This cooperation is also a primer for the ASEAN Power Grid, which will eventually realise the conceptual interconnection throughout ASEAN and strengthen the overall electricity sector in each member country.

These are some of the key initiatives towards a more efficient grid which will enable us to meet the demands of the future. Malaysia aims to move forward rapidly, and the Energy Commission is determined that there is sufficient power to fuel this national ambition.

Dato' Abdul Razak Abdul Majid
Energy Commission of Malaysia

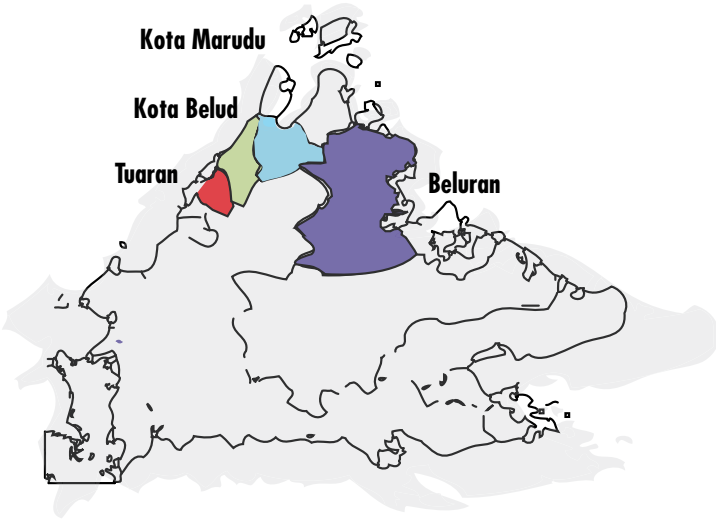
Self-Generating Power with NEM

Solar power users can now generate and use their own electricity, as well as sell the excess to Tenaga Nasional Berhad (TNB) with the new implementation of net energy metering (NEM). This is a type of distributed generation allowing consumers to outweigh the cost of their electric usage with energy they export to the grid, with an eligible power generator, in this case, solar panels.

With the approval of the NEM implementation by the Ministry of Energy, Green Technology and Water (KeTTHA), everyone will be able to generate electricity for their own consumption, using renewable sources, which is also a plus for the environment.

According to Sustainable Energy Development Authority Malaysia (SEDA) COO Datuk Dr Ali Askar Sher Mohammad, the suggested NEM quota is currently being looked into and will be reviewed in the medium term, should there be an increase in consumer demand.

The implementation of NEM allows solar power users to generate their own electricity and sell the excess generated power to the national electricity provider.



The districts Tuaran, Beluran, Kota Belud and Kota Marudu will soon have access to the gas being transported via the 350km pipeline.

The Gas Network

An initiative of a coast-to-coast gas pipeline that will fuel two planned gas-fired power plants in Sandakan is in the works, pending approval from the Malaysian government.

According to Datuk Seri Dr Maximus Johnity Ongkili, Minister of Energy, Green Technology and Water (KeTTHA), the 350km pipeline would pass through many communities, allowing them access to the gas being transported, boosting the development of the country. The districts that would benefit from this project include Tuaran, Kota Belud, Kota Marudu and Beluran.

With the Economic Council's approval of the Sandakan power plants, each with a capacity of 190MW which brings the total output to 380MW, all that is left is getting the pipeline project's approval from the Cabinet.

Incentive-Based Regulation for Gas Sector

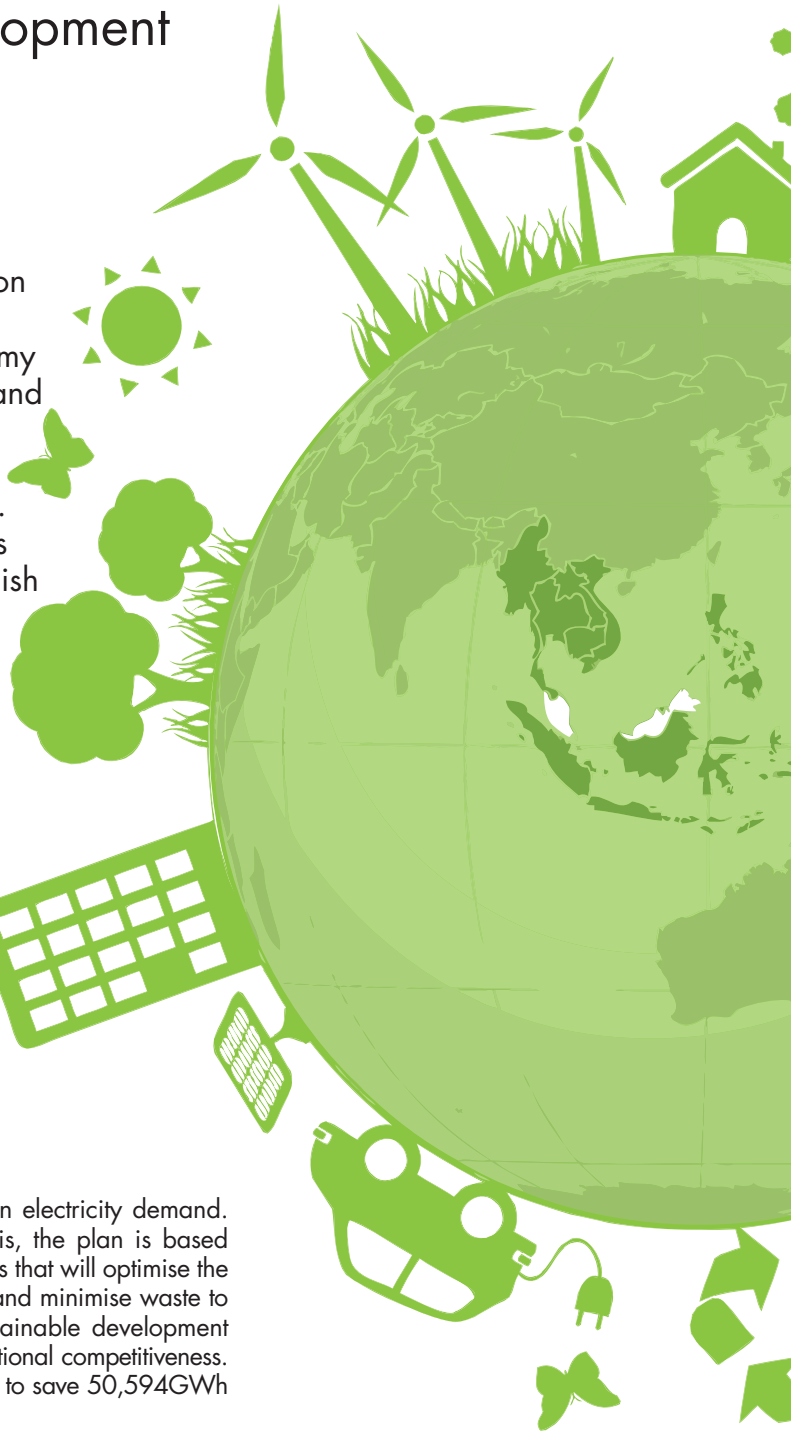
The implementation of the incentive-based regulation (IBR) framework on the gas sector is expected to encourage greater efficiency.

The natural gas sector in Malaysia will undergo a change on 1 January 2016 when the Government introduces the incentive-based regulation (IBR) framework. The main supplier of piped gas in Peninsular Malaysia, Gas Malaysia Bhd, will be subjected to the IBR, which aims to incentivise better operational performance through efficient allocation and use of resources.

Enforced by the Energy Commission, IBR in the gas sector will have a trial run of one year, followed by the first regulatory period from 2017 to 2019. In a statement to the media, Gas Malaysia said, "In support of the liberalisation of the natural gas industry, which is to gradually align current piped gas towards market prices, IBR is introduced to promote efficient resources allocation and usage, and sustainable financial performance."

Planning to Grow

Maximising National Development with Energy Efficiency



A rapidly developing country, Malaysia's economic growth and advancement is highly dependent on the cumulative efforts of all its sectors—from manufacturing and transportation to logistics and construction. As its population grows, development ramps up and the economy progresses further, the toll will be on the demand and consumption of more energy to boost production, and the environment, which will suffer the effects of pollution and degradation. This is where the efficient use of energy comes in—the aim is to apply less power to accomplish the same level of tasks, or grow the economy without increasing carbon emissions.

It is important to note that the efficient use of energy has been a national priority since the Ninth Malaysia Plan (9MP), implemented between 2006 and 2010. However, since the 2000s, the country's energy intensity ratio (which indicates the efficient use of energy, if less than one) has been over 1.0. It was with this consideration that the government—spearheaded by the Ministry of Energy, Green Technology and Water (KeTTHA)—introduced the National Energy Efficiency Master Plan (NEEMP) in 2010, a ten-year plan created after consultations with more than 60 industry stakeholders, including government ministries, agencies, industry associations and the private sector.

ACTION POINTS

To improve on the NEEMP, KeTTHA proposed the National Energy Efficiency Action Plan (NEEAP) in January 2014, a more-effective initiative intended to address several barriers on energy efficiency (EE). Also designed to be implemented over a 10-year period, the NEEAP aims to cut consumption through a 6% reduction in electricity demand. To accomplish this, the plan is based on five core thrusts that will optimise the use of electricity and minimise waste to contribute to sustainable development and increased national competitiveness. Among its aims is to save 50,594GWh of electricity.

In addition to the five thrusts (that includes implementing EE programmes and encouraging commercial financial institutions to support EE), the NEEAP also outlines five strategic actions and

five initiatives (such as energy efficient building designs, rating and labelling of appliances, and setting a Minimum Energy Performance Standard).

According to the *NEEAP Draft Final Report* published last year, the plan is expected to reduce CO_2 emissions by 40 million tonnes over 10 years and about 90 million tonnes of CO_2 equivalent over the lifetime of energy efficient equipment purchased as part of the initiative.

BREAKING BARRIERS

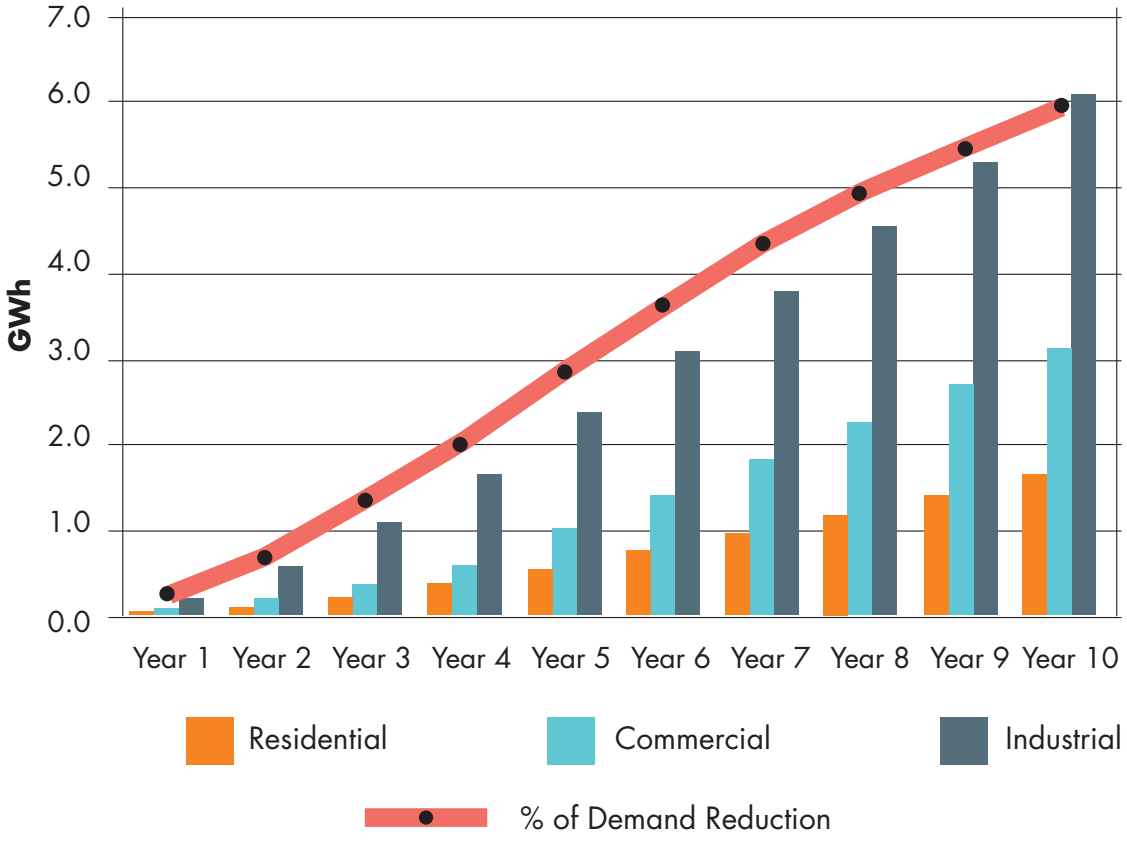
While the impact of EE strategies through the NEEAP is beneficial to the development of the nation, there are a number of challenges that need to be overcome to achieve these results. These include the low price of energy in the country owing to subsidies, and currently further enhanced by the global decline in oil prices. This translates to taking electricity for granted leading to higher consumption. A solution is the gradual removal of energy subsidies—forcing consumers to pay more attention to their power use.

According to the NEEAP report, other issues that affect the adoption of EE strategies in the country are the absence of a national plan or guideline to implement EE and achieving widespread adoption, and lack of dedicated financial support—in terms of loans and monetary packages for EE projects and appliances. The lack of consistency in the implementation of EE strategies is also the operational barrier that was identified and is to be resolved by the NEEAP.

ADVANCEMENT STRATEGIES

Unlike a number of ASEAN countries (such as Thailand, Singapore and Vietnam) that have already advanced the implementation of their national EE strategies, Malaysia's NEEAP is still relatively new. Nevertheless, it has good basic guiding principles

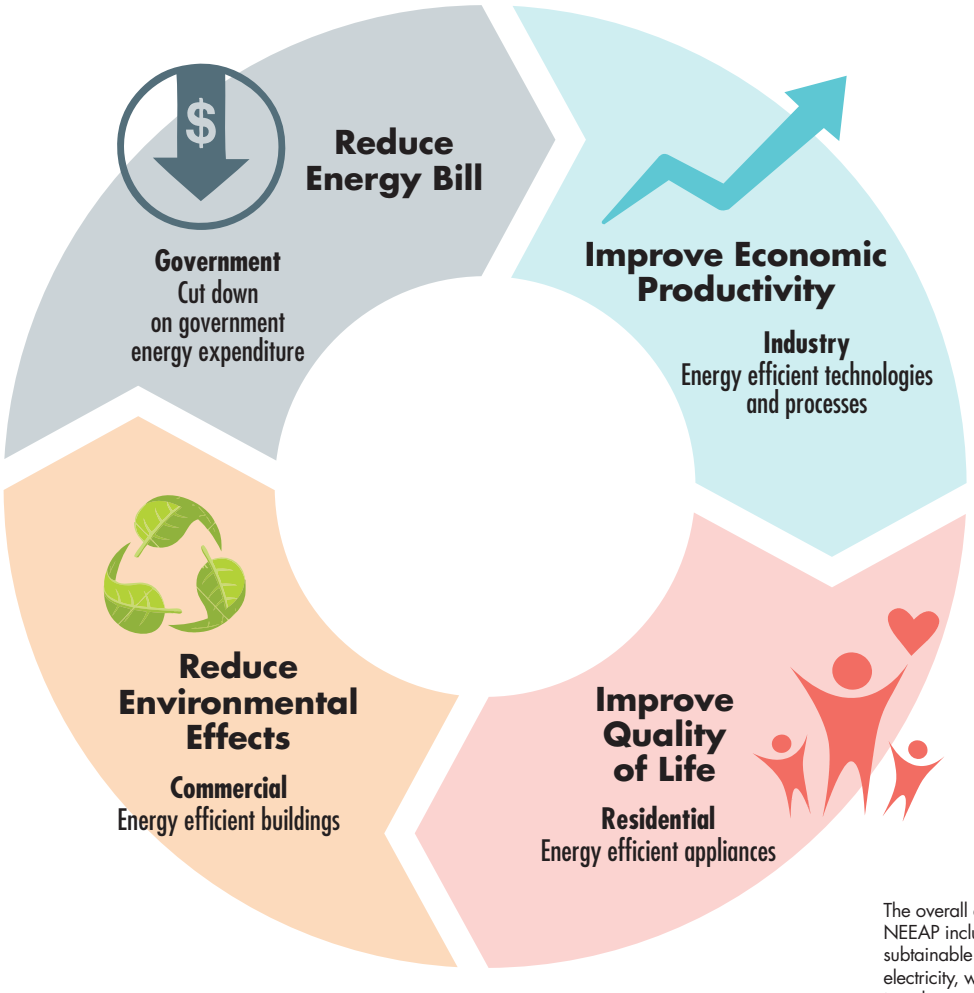
ENERGY SAVINGS AND DEMAND REDUCTION



Over a 10-year period, the National Energy Efficiency Action Plan (NEEAP) is expected to reduce electricity consumption by 6% across residential, commercial and industrial users.

Source: Energy Commission

THE BIG PICTURE



The overall aims of the NEEAP include encouraging subtainable consumption of electricity, which will result in enhanced economic productivity as energy-efficiency solution enable greater output with lesser input.

that will help promote and enhance awareness of EE and its benefits among consumers. One of these is making EE projects and appliances more cost-effective for users. For the NEEAP, the standard used is the Benefit-Cost Ratio (BCR) that measures the rate of energy savings in monetary gains in relation to the cost of the appliance. Applicable to government and private sectors, only BCRs of more than 1.0 will be considered effective.

Another principle the NEEAP is adopting is targeting and involving small and medium enterprises (SMEs)—as they constitute more than 99% of companies in the country, in the decision making and initiative-planning processes. Others include creating incentives to encourage consumers to adopt EE measures, as well as improving the competitiveness of EE appliances, which will help users save more on their energy consumption.

More than just encouraging users to reduce their demand for electricity, NEEAP and EE strategies aim to decrease Malaysia's carbon footprint, lessen its dependence on imported fossil fuels and the long-term cost of importing oil and gas. Adopting energy efficiency is also beneficial for consumers, who will be able to save on their monthly costs, as well as minimise the impact of economic development on the environment. EM

Allowing Access

New Policy to Enhance Malaysia's Gas Industry

In the decade between 2003 and 2013, piped natural gas consumption in the country increased by 44.3%, from 6,981ktoe to 10,076ktoe. As demand grows amid limited and declining supply, there is an urgent need to utilise available power as efficiently as possible while ensuring a sustainable and reliable supply, as well as energy security. One of the measures the authorities in Malaysia is taking to ensure the continued availability of natural gas in the country—and continued national development—is the liberalisation of the gas market.

The liberalisation of the industry through the Third-Party Access (TPA) aims to enhance the existing *Gas Supply Act (GSA) 1993*, which outlines the supply and distribution of gas at competitive prices in the country. Prior to the proposed opening of the market, the sole importer of gas into Peninsular Malaysia via the Peninsular Gas Utilisation (PGU) system was Petronas. Speaking to Energy Malaysia, **Ir. Roslee Esman, Director of the Energy Commission's Gas Development and Regulation Department,** notes that the proposed liberalisation of the industry will be beneficial to the sector's stakeholders, consumers and the continued development of the country.

"Although gas prices are currently regulated and subsidised by the government, such subsidies may be removed in future to make gas imports economically feasible. This will translate to higher costs for the consumers and the industry if measures are not taken ahead of time," Ir. Roslee explains.

He adds, "What the liberalisation of the market does is open the industry up for other players who are interested in importing gas using the regasification terminal or Peninsular Gas Utilisation (PGU) pipeline. With Petronas as the only player in the industry, pricing may not be as competitive for stakeholders, who adhere to a Petronas-set price. The idea behind the liberalisation is that with more players involved in gas importation, consumers will also be able to enjoy lower and competitive tariffs."

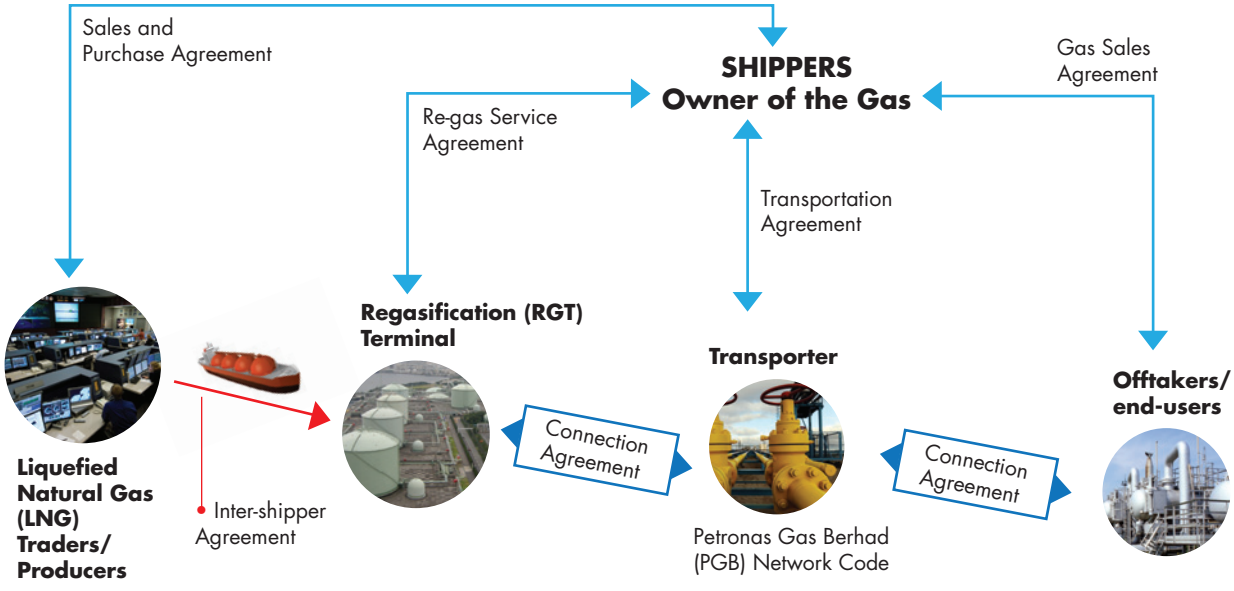
Ir. Roslee also notes that with gas reserves declining, the process of tapping and extracting from the energy source becomes more expensive. This highlights another reason for the TPA: a more open market means that industry players in the country can purchase gas at competitive prices.

With access to existing gas infrastructure, such as the Petronas Floating LNG Regasification Terminal, third-party operators can help boost the use of natural gas in Malaysia.

"One of the challenges is the strict implementation of subsidy rationalisation programme to reflect the actual cost of supply. People need to understand that adopting market prices will be a massive boost to the Malaysian economy, and will increase competitiveness in the gas industry."

- Ir. Roslee Esman
Director, Gas Development
and Regulation Department

THE THIRD-PARTY ACCESS (TPA) BUSINESS MODEL



The TPA will open the Malaysian gas market, making it more competitive as more players get involved in the importation and distribution of the commodity.

Source: Petronas 2014

TPA AGREEMENT PRINCIPLES

The TPA enables gas industry players access to the PGU and RGT based on these core principles.

Key Services	Peninsular Gas Utilisation (PGU) Pipeline	Regasification Terminal (RGT) Sungai Udang
Access to facilities	• Shipper Registration & Accreditation • Submit application to Petronas Gas Berhad (PGB) • First Come, First Serve basis	
Capacity Reservation	• Fixed / Variable Capacity • Submit application to PGB • Subject to availability	• Submit application to PGB • Subject to availability
Nomination	• Daily nomination process • Path-based nomination • Gas Day: 6am to 6am (24hours)	• Daily nomination process • Gas Day: 6am to 6am (24hours)
Agreement	• Gas Transportation Agreement (GTA) • Gas Connection Agreement (GCA)	• Regasification Services Agreement (RSA) • Inter-Shipper Agreement (ISA)
Sublet	• Not allowed	

Source: Petronas 2014

ATTRACTING COMPETITION

Stipulated under the fifth entry point project of the Economic Transformation Programme's (ETP) Oil, Gas and Energy sector, the proposed TPA will be regulated by the Energy Commission, and will require licenses encompassing import into regasification terminals (RGT), regasification, shipping and transportation, and distribution and retail. The Energy Commission will also oversee the Gas Code, which is a set of three TPA codes (for the Malaysian Regasification, Transmission and Distribution system infrastructure) expected to be ready for implementation after Gas Supply Act (amendment) approved by the Parliament.

Speaking at a workshop for the Liberalisation of the Malaysian Gas Market on the 23rd of April 2015, Dato' Abdul Razak Abdul Majid noted, "While the codes elaborate on agreements and services, a Competition Guideline for the Malaysian Gas Market encourages a conducive, transparent and fair gas industry environment. It does this by creating a level playing field without discrimination among the users of the facilities by the suppliers. In addition to that, the Guidelines also prevent anti-competitive behaviour and abuse of dominant position."

In essence, the TPA takes advantage of the completion of the Petronas LNG Regasification Terminal in Sungai Udang (RGTSU) in 2013 to encourage petroleum companies to commence supplying gas to the Malaysian market at global industry prices, to secure domestic availability and in anticipation of future increases in demand.

RENT TO USE

The big picture here is that liberalising the gas industry will create benefits for the country that are more than domestic. For one, the TPA will allow local and foreign companies compete on a level playing field in the country with the commodity sold and shipped at global market prices.

Ir. Roslee also notes, "Only the tariff for use of infrastructure such as: RGT, transmission and distribution, will be regulated. Other than that, the gas price will depend on the market supply-demand."

Expected to be tabled in Parliament later this year, the TPA has undergone a process of discussions and consultations with stakeholders in the gas industry to receive and incorporate feedback into the amendment since it was proposed two years ago. As subsidies and domestic gas sources fade, liberalising the Malaysian gas industry promises to boost the availability of the commodity at attractive and competitive prices. EM

Suruhanjaya Tenaga
Energy Commission

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Automatic circuit breaker switches found in the electrical distribution board in your home is to protect you and your family from the dangers of electric shock.

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A simple way to test the automatic circuit breaker is to press the test button (marked 'T'). Automatic circuit breaker switch that works well will trip when the test button is pressed and you can restore the switch to its original position.

If the automatic circuit breaker switch does not trip after the test button is pressed, you should immediately consult a Registered Electrical Contractor for inspection and replacement of the automatic circuit breaker switch.

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

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PRACTISE EFFICIENT WAYS OF USING ELECTRICITY

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

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

Use electrical appliances at moderate speed, temperature and load.

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

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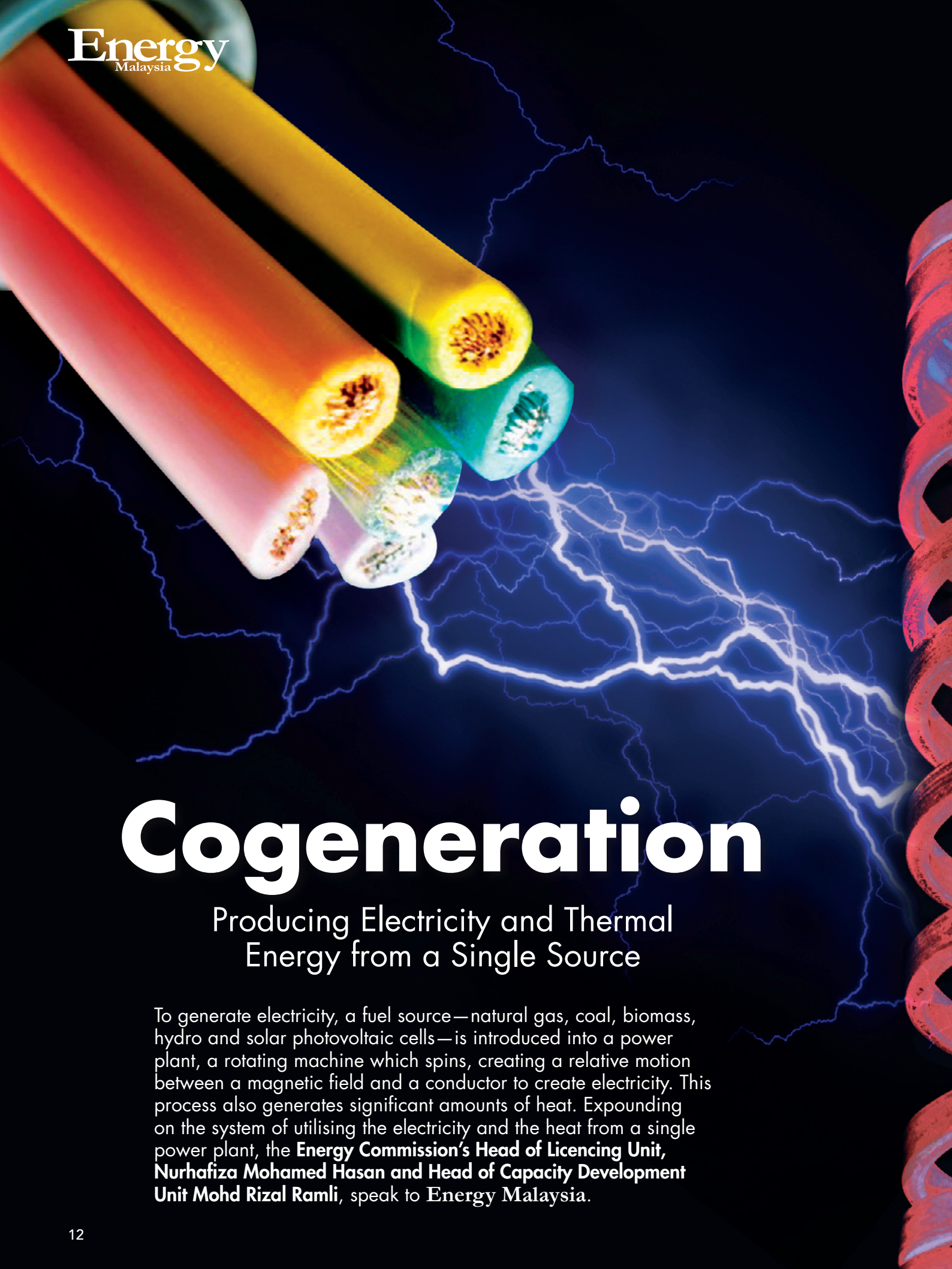
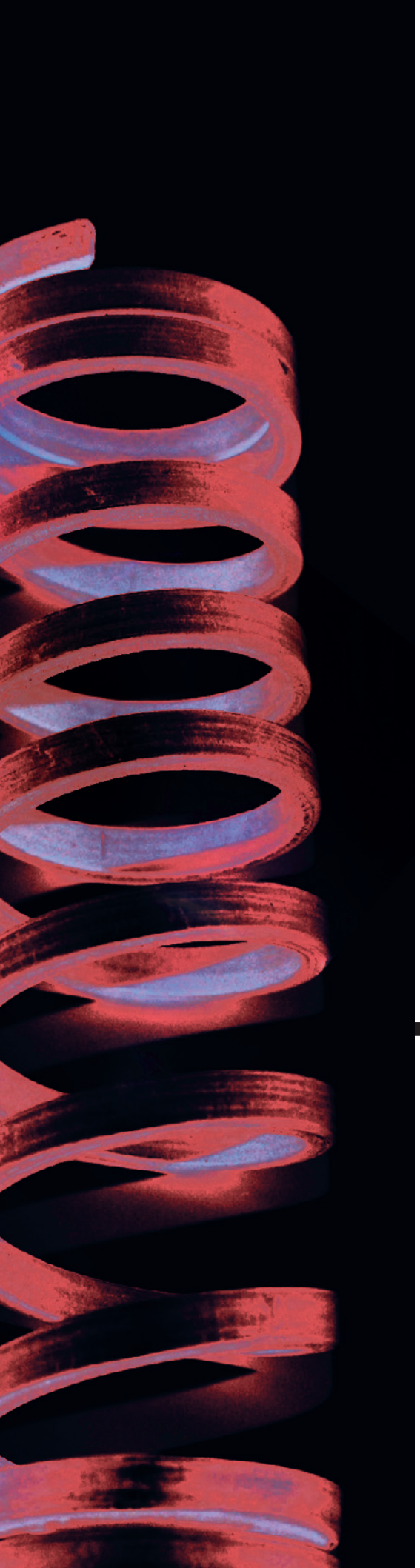


Cogeneration

Producing Electricity and Thermal Energy from a Single Source

To generate electricity, a fuel source—natural gas, coal, biomass, hydro and solar photovoltaic cells—is introduced into a power plant, a rotating machine which spins, creating a relative motion between a magnetic field and a conductor to create electricity. This process also generates significant amounts of heat. Expounding on the system of utilising the electricity and the heat from a single power plant, the **Energy Commission's Head of Licencing Unit, Nurhafiza Mohamed Hasan and Head of Capacity Development Unit Mohd Rizal Ramli**, speak to Energy Malaysia.



"Cogeneration offers a more efficient system of generating electricity and heat simultaneously. However, being more efficient does not always translate to being cheaper, particularly in initial investment costs."

- Mohd Rizal Ramli
Head of Capacity Development Unit

The process of producing electricity and heat simultaneously from a single power plant is called cogeneration or combined heat and power (CHP). It should however be noted that there are also combined cooling, heat and power (CCHP) plants that generate thermal energy and condenses steam to chilled water for heating, ventilation and air-conditioning (HVAC) systems. By putting the free heat 'waste' to use, utilising the same amount of energy required to produce only electricity, CHP systems offer a higher efficiency with less carbon emissions. It also provides a significantly cheaper alternative to having two different sources for electricity and heat.

For reliability and to maximise their benefits, cogeneration plants are sited proximate to industries that utilise the electricity and heat. These include industrial facilities, petrochemical plants, hospitals, schools, government buildings and large residential facilities. In Malaysia, one of the most notable is the 25-hectare Pengerang Cogeneration Plant (PCP). Slated to become operational in 2017, it will have an electricity generation capacity of 1,220MW and steam generation

capacity of 1,480 tonnes per hour. The electricity and heat will be used to power the Pengerang Integrated Complex (PIC). The PIC is the largest Refinery and Petrochemicals Integrated Development (RAPID) project in Malaysia, and will comprise petroleum cracking facilities, oil refineries, petrochemical plants, as well as liquefied natural gas (LNG) import terminal, power and regasification plants. It is also part of the larger, 20,000-acre Pengerang Integrated Petroleum Complex (PIPC) in Johor.

COMPETITIVE ADVANTAGE

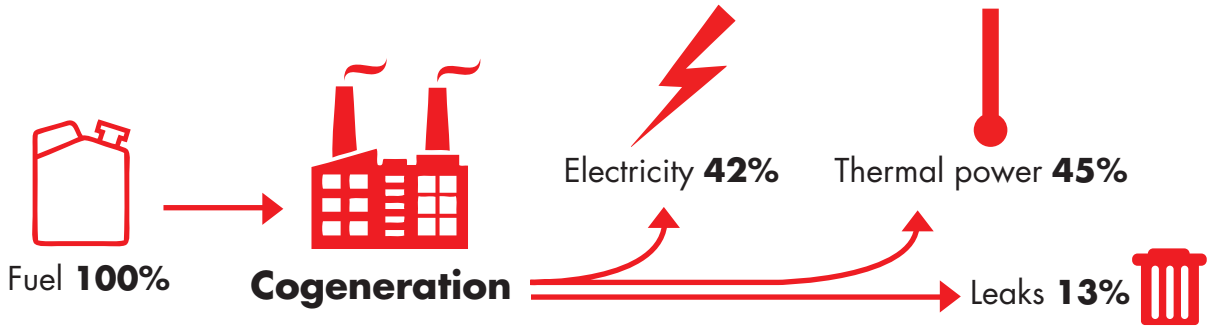
According to Nurhafiza, the Energy Commission has so far issued licenses for 19 public and 23 private cogeneration plants, with capacities of 747MW and 550MW respectively. Private plants are generators and companies that implement the system for their own personal use, while public licenses are issued to organisations that install CHP plants for their use, as well as to supply the national grid.

"Examples of CHP plants in Malaysia include the Pengerang Cogeneration Plant and Centralised Utility Facilities (CUF) in Kerteh, Terengganu and in Gebeng, Pahang," Rizal reveals. However, he explains that currently, the demand for cogeneration plants is driven by specific industries, and not as high as it should be. "While many industries require electricity and steam, many businesses are yet to understand the competitive advantage they can have from using CHP," he said.

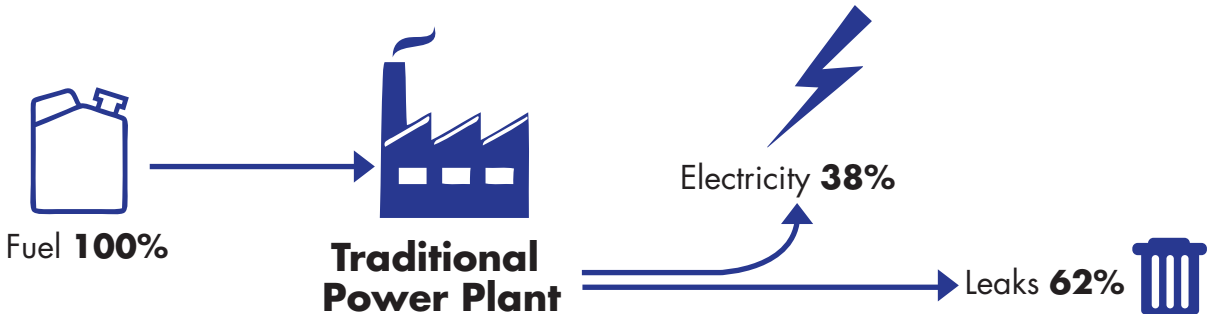
INDUSTRY-WIDE BENEFITS

A business case may not have to be made, as the overall advantages of implementing cogeneration plants cannot be overemphasised. One of such benefits is the higher efficiency of energy conversion and use – up to 80% with modern generators,

The cogeneration process offers a higher efficiency by producing electricity and thermal energy from the same amount of fuel as conventional generators, with less emission and wastage.



COGENERATION VS CONVENTIONAL PLANTS



Source: Cobbil.it

"In terms of policies to encourage the development of CHP plants, I believe KeTTHA is looking into that. However, even without a policy, applications keep coming, and we process them according to their financial viability and technical requirements. Under Section 14 of the Energy Commission Act, *one of our responsibilities is to encourage efficiency in energy generation—this translates to encouraging cogeneration."*

- Nurhafiza Mohamed Hasan
Head of Licencing Unit

Nurhafiza explains. For industrial and commercial users, CHP offers additional competitiveness with significant cost savings and increased employment. For instance, the PIPC is expected to require up to 2,000 workers from various industries and with different skill sets.

In many scenarios, CHP offers domestic energy supply security, as well as the opportunity to increase the diversity of generation plants. This however may not be the case in Malaysia, where the primary fuel source for cogeneration plants is natural gas. Still, Rizal points out that the predominant use of natural gas for fuel generation may be beneficial for the gas industry, as it will see the commodity become more widely used in the country, and reduce the importation of coal for power generation. It is important to note that Malaysia is currently the world's second largest producer of natural gas after Qatar.

Concurring, Nurhafiza added that in some Malaysian states, biomass is also used as a fuel source. She notes that another advantage of CHP plants is that licensees do not have to follow any special procedure, as "the process is exactly the same as conventional generators—with a 60-day processing period." However, the Energy Commission considers cogeneration plant applications more stringently, as "we don't want industries to develop CHP plants just to sell to the grid." Rather, the plants need to have been created for private use and the excess waste heat and steam should be what the operators want to distribute to other users.

In terms of national energy mix, Rizal explains that core areas of consideration are the security of supply, cost and the environment, "and cogeneration fits into these categories with cost advantage, supply security and lower CO_2 emissions." He adds, "This is one of the reasons why the PIPC project is significant. In addition to the power the complex generates and consumes, it will also sell electricity to the national grid at competitive rates." EM

DECODING The Code

Confused by the numerous terms from *The Malaysian Grid Code*? **Energy Malaysia** presents some of the commonly used terminologies, based on the Glossary and Definitions section of the Code.

- **Grid System:** Systems of generation, transmission and distribution of electricity covering larger network across countries or continents. The grid system ensures a continuous availability of sufficient energy supply for all consumers, with adequate margin between supply and demand. It also develops and maintains efficient, coordinated and economical transmission system for bulk delivery of electrical energy.

- **Grid Owner:** The party that owns the high-voltage backbone of the Transmission System, and is responsible for maintaining adequate grid capacity in accordance with the provisions of the Grid Code and license standards. In Malaysia, Tenaga Nasional Berhad (TNB) Transmission Division represents the Grid Owner.

- **Grid System Operator (GSO):** Ring fenced entity within TNB which is responsible for operational planning, real-time re-scheduling, dispatch and control of the grid system in compliance with the provisions of the Grid Code and coordinates all parties connected to the Grid System.

GENERATION

- **Generating Unit:** A plant and/or apparatus which produces electricity.

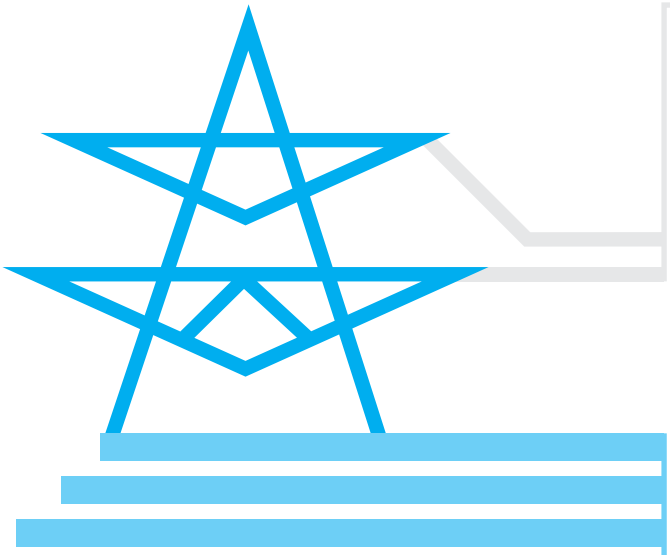
- **Plant:** Fixed or movable items used in the generation, and/or supply, and/or transmission of electricity.

- **Apparatus:** Equipment, such as devices and fittings, in which a conductor is used.

- **Generators**: Companies licensed by the Energy Commission to generate electricity in Peninsular Malaysia and Sabah. Currently, generators include TNB Generation Division, Sabah Energy and IPPs.

- **Independent Power Producer (IPP):** A power company (not affiliated with TNB) with a Power Purchase Agreement, such as YTL Power Generation and Pahlawan Power.

- **Power Purchase Agreement (PPA):** An agreement in the form of a contract between the one who generates electricity (the seller) and the one who is looking to purchase electricity (the buyer). In this case, generators are the sellers, and the buyer is the Single Buyer Department of TNB.



TRANSMISSION

- **Transmission Network:** Also knows as *Transmission System*, it consists (wholly or mainly) of high-voltage electric lines (transmission lines of 132kV and above) owned or operated by TNB Transmission and used to transmit electricity from one power station to a substation or to another power station. It can also be between substations or to or from any external interconnection, and includes any plant and/or apparatus and meters owned or operated by TNB Transmission in connection with the transmission of electricity.
- **Power Station:** An installation comprised of generating units owned and controlled by generators.
- **Substations:** Stations that take the electricity from power plants and from the transmission lines and transform it from high to lower voltage. They distribute electricity to consumers, as well as supervise and protect the distribution network to keep it working safely and efficiently.
- **National Load Dispatch Centre (NLDC):** This is the control centre from which the GSO directs the control of the Peninsular Malaysia Power System.

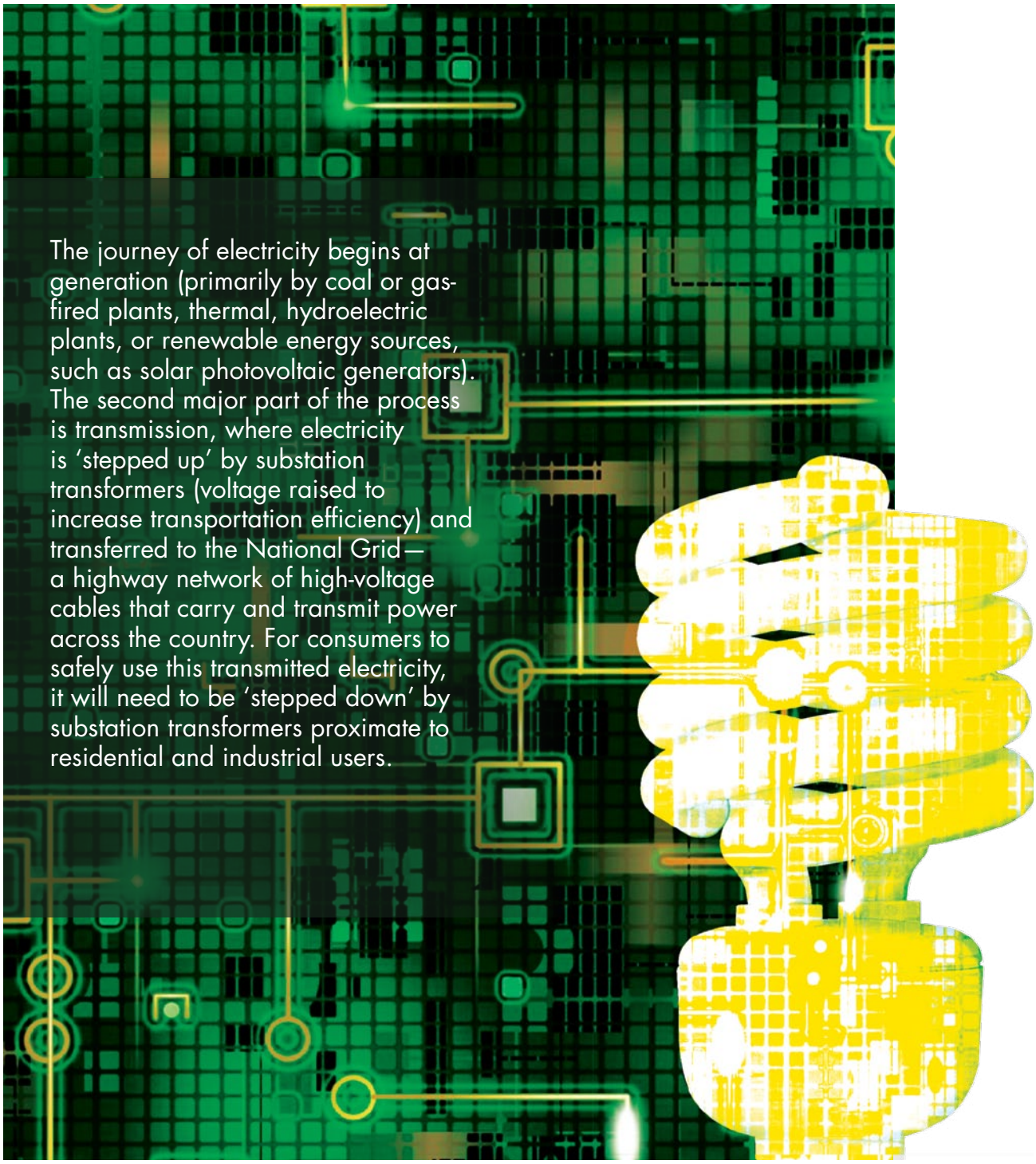
- **Single Buyer:** A ring fenced entity within TNB responsible for least cost dispatch scheduling, managing Power Purchase Agreements and settlement process.
- **Settlement:** Processes and procedures for calculation of payments under relevant agreements.
- **Connection Application:** An application made by a generator to the grid owner and grid system operator (GSO) for connection of plant and/or apparatus or user system to the grid system.
- **Directly Connected Customers (DCC):** A customer receiving electricity directly from the Transmission System.
- **Users:** Persons using the Transmission System; the users in the grid system are the grid owners, DCC, and people controlling and maintaining the grid system.
- **User Network:** Also known as *User System*, it is any system owned or operated by a user.

DISTRIBUTION

- **Distribution Network:** Also known as *Distribution System*, it consists (wholly or mainly) of electric lines which are owned or operated by a distributor, and used for the distribution of electricity from supply points or generating units to customers and other distributors.
- **Distributor:** A person licensed to distribute electricity, who operates, maintains, and distributes electricity through a distribution network. They own and manage the power poles and wires which deliver power to homes and businesses.
- **Consumer:** A person supplied with electricity.

The National Grid

A Framework for Advancement



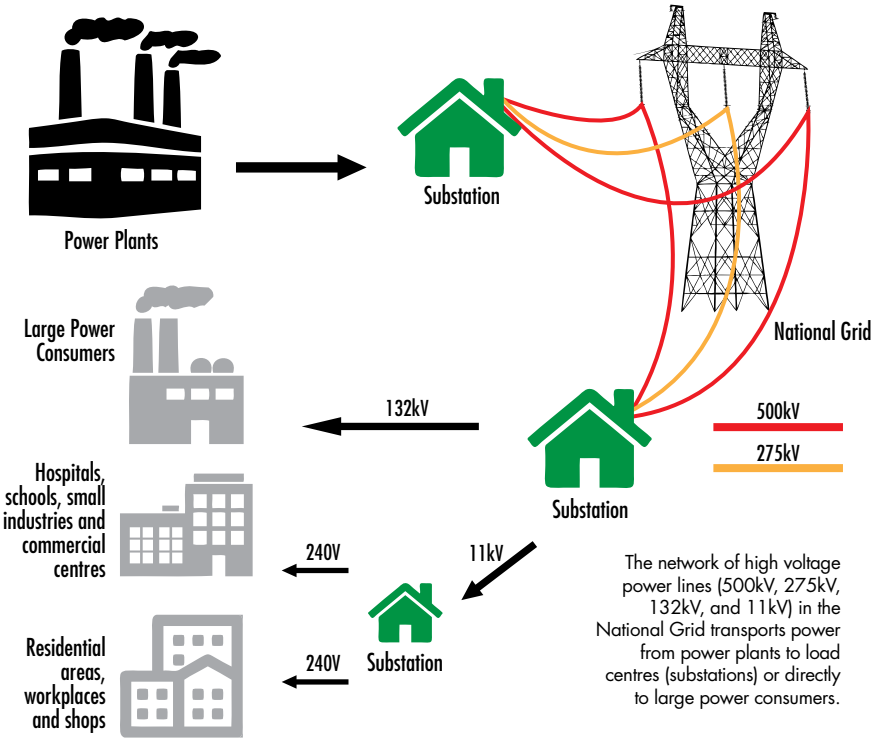
The journey of electricity begins at generation (primarily by coal or gas-fired plants, thermal, hydroelectric plants, or renewable energy sources, such as solar photovoltaic generators). The second major part of the process is transmission, where electricity is 'stepped up' by substation transformers (voltage raised to increase transportation efficiency) and transferred to the National Grid—a highway network of high-voltage cables that carry and transmit power across the country. For consumers to safely use this transmitted electricity, it will need to be 'stepped down' by substation transformers proximate to residential and industrial users.

The journey from generator to consumers occurs almost instantaneously, and the National Grid is one of the main reasons and most important infrastructures that makes this process possible. In play are a number of key components that work hand-in-hand to ensure that consumers—across various economic sectors, including residential, industrial and transportation—have access to a stable and reliable supply of electricity.

SYSTEM DRIVERS

These components include the Energy Generators, Network Operators, Grid System Operators (GSO), Grid Owners, Interconnected Parties, Single Buyers, Distributors and Directly Connected Consumers. In Malaysia, the National Grid refers to the transmission system across the peninsula (with interconnections in Khlong Ngae and Sadoa in Thailand, and Woodlands, Singapore), while Sarawak, Sabah and Labuan have separate grid networks. In Peninsular Malaysia, the 20,950 circuit km high-voltage network comprises 500kV, 275kV, 132kV, 33kV and 11kV supply cables, while in Sabah and Sarawak, the network comprises 275kV, 132kV and 33kV cables.

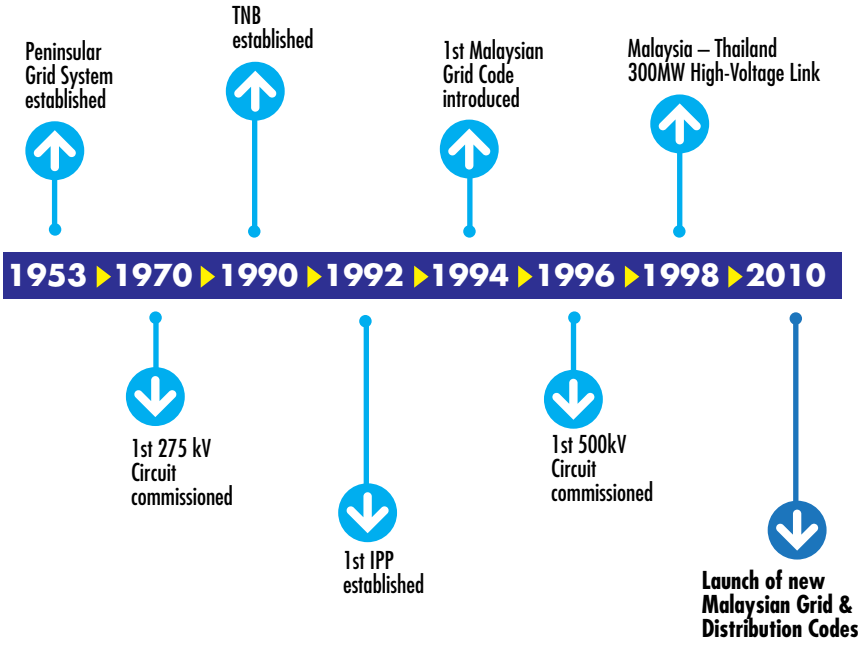
Grid Network



The network of high voltage power lines (500kV, 275kV, 132kV, and 11kV) in the National Grid transports power from power plants to load centres (substations) or directly to large power consumers.

Source: Tenaga Nasional Berhad

Development of the Grid System



Source: Energy Commission

Power generation in the National Grid is done by licensed independent power producers (IPPs) and Tenaga Nasional Berhad (TNB)—Malaysia's largest energy utility—which also generates, transmits, manages and distributes electricity along the grid. In Sabah and Sarawak, Sabah Energy Sdn Bhd (SESB) and Sarawak Electricity Supply Corporation (SESCO) respectively generate, transmit and distribute electricity in their respective State Grids.

INDUSTRY REGULATIONS

With several processes and users involved in the energy generation and distribution chain, it is essential that they have and recognise a common base to ensure that service delivery is at pre-determined standards.

This benchmark is the Malaysian Grid Code (MGC) and the Malaysian Distribution Code (MDC), created by their respective regulators – Energy Commission for the peninsular, Sabah and Labuan, and the State Electrical Inspectorate for Sarawak.

First introduced in 1994, more than four decades after the establishment of the Peninsular Grid System, the MGC was later revamped and the MDC officially created in 2010, and both effected on 1st January 2011. The overhaul of the MGC aimed to update the previous standards to be in line with the current state of the electricity supply industry (ESI), separate the roles of the various players, and ensure the continuous development and operation of the grid.

DEVELOPING DISTRIBUTION

Concurrently, the MDC was created because there were no regulations to guide the parties involved at the distribution level of electricity supply at that time. In addition, the MDC provided guidelines on the relationship between the Distributors, the Energy Commission and users of the electricity distribution network.

To ensure that the opinions of all parties involved in the ESI are considered, a Grid Code Committee and a Distribution Code Committee were constituted. The former comprises the Energy Commission as its Chairman, with 9 representatives from TNB, 6 from IPPs, 1 from a Network Operator, 2 from the Energy Commission and 1 independent technical expert.

On the Distribution side, the Energy Commission also sits as its Chair, with 5 delegates from TNB, 4 from other distributors and 1 from the Energy Commission. It also includes 2 members from distribution generators, 1 consumer, 2 observers from TNB, as well as additional members if required by the Distribution Code Chairman (DCC).

5 Benefits of Grid & Distribution Codes

1 Encourages healthy competition in the electrical supply industry (ESI)

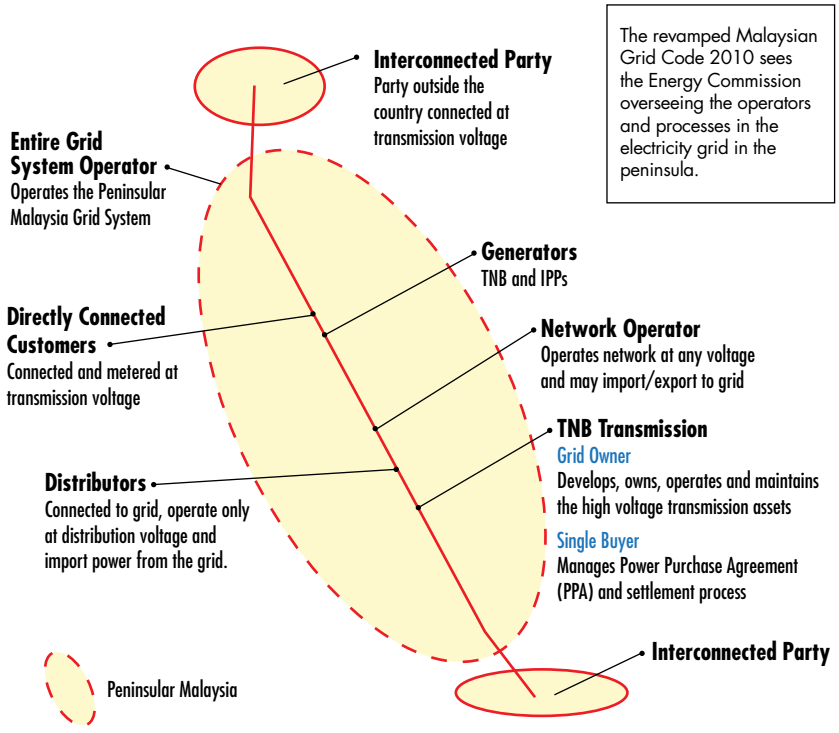
2 Promotes enhanced development, maintenance and operations of the country's grid network

3 Furthers the interest of consumers

4 Helps ensure uniform high quality of electricity generation and supply

5 Facilitates systematic and operational planning for the development of the ESI

PARTIES IN THE NEW CODES

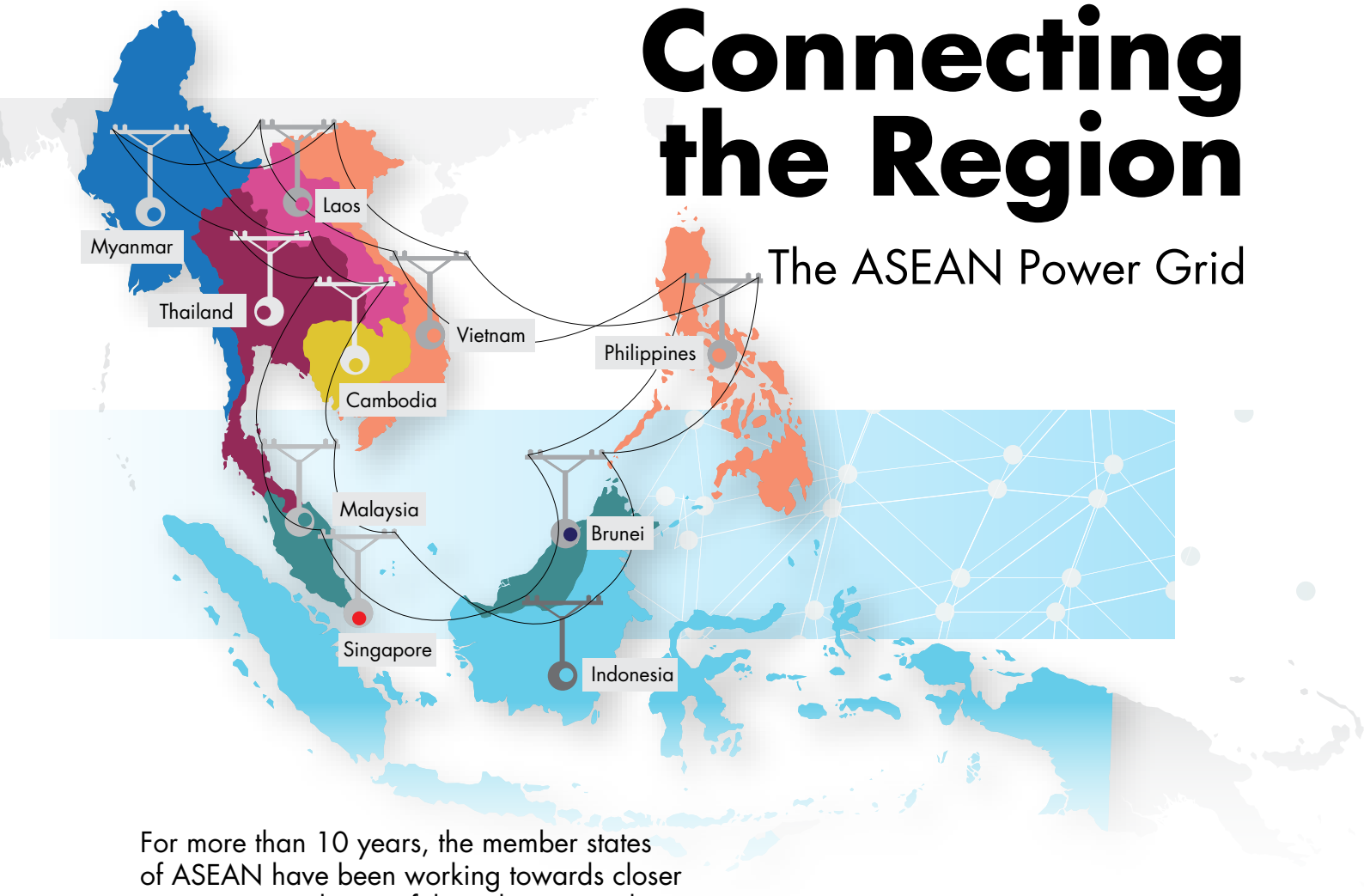


Source: Energy Commission

Equally as important as the National and State Grids that serve as backbones of electricity supply, ensuring that industries and the national economy continues to thrive and grow, the MGC and MDC are crucial components that regulate the ESI. The regulations also promote healthy competition between all the players involved in the generation, transmission and distribution of electricity, while securing the interests of consumers—from large industries to residential users—who can be assured of reliable and stable power supply and minimal incidences of electricity lapses. EM

Connecting the Region

The ASEAN Power Grid



For more than 10 years, the member states of ASEAN have been working towards closer integration, with one of the milestones – the single-market ASEAN Economic Community (AEC) – due to come into force by the 1st of January 2016. In addition to seamless movement of goods, services and people across ASEAN, there is also an initiative to link the electricity supply, transmission and distribution networks of member states into a single ASEAN Power Grid (APG).

The initiative for ASEAN-wide collaboration in energy matters can be traced back to June 1986 and the signing of the *Agreement on ASEAN Energy Cooperation* in Manila. Then, slightly more than 10 years later, the APG was mooted at the Second ASEAN Informal Summit 1997, held in Kuala Lumpur.

According to **Abdul Razib Dawood, Head Market Operations Unit** at the Energy Commission, one example of the APG at work is a recent interconnection between Sarawak and West Kalimantan in Indonesia. In addition, national utility company Tenaga Nasional Berhad (TNB) has been in talks with its counterparts in Indonesia to connect power lines between Melaka and Sumatra.

Perhaps the most ambitious project under the APG is the Laos, Thailand, Malaysia and Singapore Power Integration Project (LTMS-PIP), which was mooted during the 32nd ASEAN Ministers of Energy Meeting in Vientiane in September 2014.

As explained by Razib, the project aims to enable the sale of electricity from Laos to Singapore using transmission lines running through Thailand and Malaysia. "That agreement will be signed in 2016, with operation date starting in 2018," he explained.

According to the Joint Statement on the LTMS-PIP, which was issued in September last year, a Working Group has been set up to "study the technical viability of cross-border power trade of up to 100MW from Laos to Singapore, using existing interconnections."

DRIVING FORCES

Part of the driving force behind the LTMS-PIP is Laos' aim to become the "Battery of Southeast Asia" via its hydropower projects. The country already generates 3.2GW worth of power through such sources, and exports around two-thirds of that to neighbouring countries such as China, Myanmar, Thailand, Cambodia and Vietnam. By the year 2030, that capacity is expected to reach 24GW.

As reported by Li Yanfei for the Indonesia-based Economic Research Institute for ASEAN and East Asia (ERIA), the LTMS-PIP could result in all countries involved saving as much as US$26 billion (RM108 billion). Li explained that while the trade is mainly between Laos and Singapore, "Thailand and Malaysia would also benefit because the power goes through their territories and they can carry out some sort of relay power trade in between."

From an overall ASEAN point of view, the success of the LTMS-PIP will go a long way in ensuring the realisation of the APG. Technically, the project is helped by the fact that Peninsular Malaysia already shares interconnection with both Singapore in the south and Thailand in the north.

OBSTACLES IN SIGHT

That being said, several challenges still need to be overcome. As Razib Dawood explained, "This includes self-sufficiency policy adopted by each country where export is only allowed when there is excess energy."

Razib also pointed out that, "Unlike the European Union, where there is uniformity in taxation and other regulations, in ASEAN, we still respect the individual rights of member states." He went on to highlight that efforts are being made to overcome these obstacles, mainly through the harmonisation of regulations and technical performance standards, so as to ease cross-border electricity trading.

Above: With an expected capacity of 2,400MW, Bakun Dam in Sarawak is expected to not only generate power for Sarawak's needs but also to be sold to Peninsular Malaysia and neighbouring countries through interconnections, thus contributing to the ASEAN Power Grid.

Below: Industries in countries like Singapore, such as this mould factory, will benefit greatly from the ASEAN Power Grid as it will allow them to access more affordable means of electricity.

ASEAN INTERCONNECTION PROJECTS

	Expected Completion Date
1 **Peninsular Malaysia - Singapore (New Extension)**	2018
2 **Thailand - Peninsular Malaysia**	
• Sadao - Bukit Keteri	Completed
• Khlong Ngae - Gurun	Completed
• Sungai Kolok - Rantau Panjang	2015
• Khlong Ngae - Gurun (2nd Phase, 300MW)	2020
3 **Sarawak - Peninsular Malaysia**	2023
4 **Peninsular Malaysia - Sumatra**	2018
5 **Batam - Singapore**	2015-2017
6 **Sarawak - West Kalimantan**	2015
7 **Phillippines - Sabah**	2020
8 **Sarawak - Sabah - Brunei**	2020
• 2016 Sarawak - Sabah	
• Sarawak - Brunei	2012
9 **Thailand - Lao PDR**	
• Rel Et 2 - Nam Theun 2	
• Sakon Nakhon 2 - Thakhek - Then Hinboun	Completed
• Mae Moh 3 - Nan – Hong Sa	Completed
• Udon Thani 3 - Nabong	2015
• Ubon Ratchathani 3 - Pakse - Xe Pian Xe Namnoy	2018
• Khon Kaen 4 - Loei 2 - Xayaburi	2018 2019
10 **Lao PDR - Vietnam**	2011-2016
11 **Thailand - Myanmar**	2016-2025
12 **Vietnam - Cambodia (New)**	2017
13 **Lao PDR - Cambodia**	2016
14 **Thailand - Cambodia (New)**	2015-2020
15 **East Sabah - East Kalimantan**	2020
16 **Singapore - Sumatra**	2020

Another potential stumbling block with regards to the LTMS-PIP is the stability of power grids in the member countries. This was raised by Malaysia's Minister for Energy, Green Technology and Water (KeTTHA) Dato' Sri Dr Maximus Ongkili, who said, "We need to have a proper grid within our countries first, before we can export to each other within the ASEAN belt."

This is where the Energy Commission, as the national regulator, comes in. Through proper oversight of the grid system and coordination with the various parties involved in transmission, it is able to ensure that Malaysia has the right infrastructure to be a key participant in cross-border electricity trading.

LONG-TERM BENEFITS

The long-term benefits of LTMS-PIP and the APG as a whole outweigh any challenge brought about by implementation. By ensuring ASEAN-wide power trading, member states can purchase electricity when needed, such as during times of high-demand but low-capacity, or sell it when they have too much in reserve but not enough demand locally.

This could even prove cheaper than depending on local generation, as different countries may have more affordable ways of producing power. For example, in Malaysia, coal-fired power plants depend on imported coal for fuel. However, with the APG and electricity trading in place, Malaysia would be able to buy electricity from Indonesia, where coal is locally available.

Ultimately, the integration of an ASEAN Power Grid will go a long way in bringing together the ASEAN region as a cohesive and united economic market. Definitely there is some way to go but each step taken in the right direction is a step towards a better and more energy-secure future. EM

Intelligent Networks

Multi-Impact Monitoring

Across all economic sectors around the world, technology is enhancing the execution of processes, and in the energy sector, innovative systems are already delivering on its promise to improve operations. One of such examples is the smart grid, which encompasses the entire electricity network including generation, transmission and user stages of energy supply. In developed nations, as well as emerging ones—where growth is occurring rapidly—such systems are essential to ensure that advancement is economically and environmentally viable.

BENEFITS OF HAVING A SMART GRID

	AMI*	Distribution Automation	HEMS* / BEMS*	Energy Storage	Demand Response
Increasing Renewable Generation	✓	✓		✓	✓
Improved Grid Reliability	✓	✓		✓	✓
Reduce Non Technical Losses	✓	✓			
EV* Integration			✓	✓	
Rising Peak Demand	✓		✓	✓	
Ageing Infrastructure	✓	✓	✓	✓	✓

*EV – Electric Vehicle
*AMI – Advanced Metering Infrastructure
*HEMS – Home Energy Management System
*BEMS – Building Energy Management System

Some factors that can catalyse the adoption of smart grids include an increase in peak demand, ageing conventional infrastructure, and the rising adoption of electric vehicles (EV) by households.

Source: Bloomberg New Energy Finance 2012

"Smart meters provide real-time online readings for both the consumer and supplier."

– Abdul Razib Dawood
Head of Market Operation Unit

As a rapidly advancing economy, Malaysia stands to benefit tremendously from the implementation of smart grid systems. More so, the government plans to incorporate more renewable sources of power into the national energy mix. In addition, as the nation transitions into a high-income, industrial nation, customers will increasingly demand a higher level of reliability of supply, which translates to a need to increase the operational efficiency in the generation, transmission and distribution of power.

A smart grid is an infrastructural system of power generation, transmission and supply that utilises ICT to enable a bi-directional communication between the end-users and the distributors, in contrast to existing systems where information only flows from the generators to the users. Tapping into the available data, the consumption patterns of electricity users are more accessible to power producers, who can determine peak times more accurately.

It comprises equipment that can be implemented in various stages of the generation to consumption chain, from intelligent meters (that provide real-time usage information and can turn on appliances at off-peak periods) to smart substations that can process consumer usage statistics before sending to the generators.

REAL TIME

Following Tenaga Nasional Berhad's (TNB) launch of its 1,000-unit smart meter pilot smart grid project funded by the government across Melaka and Putrajaya (800 and 200 respectively) in 2013, **Razib Dawood—Head of Market Operation Unit at the Energy Commission**—notes that while this is an experimental programme, it is expected to form the basis for future development. "The expected outcome currently is the situational awareness and consumers' behaviour," he explained.

The smart meters allow bi-directional communication between the grid and the consumers, while enabling the latter to monitor their current and past electricity consumption in real-time on a display panel. "Will that motivate users to save more?" Razib asks, adding, "By the middle of the month users with financial constraints can monitor their overall consumption in real time, and decide whether they want to turn off appliances that consume high amounts of electricity."

In the future, however, smart meters will be used to encourage consumption of electricity during off-peak hours, in addition to monitoring and managing usage. According to Razib, under the concept of Time-of-Use (TOU) electricity pricing, a higher tariff may be introduced for peak times—for instance, between 12 noon and 3:00PM, when it is most expensive to generate and supply electricity—and a lower tariff for off-peak periods to encourage consumers to only turn on their power-intensive appliances then.

On a larger scale, a smart grid will allow grid owners to monitor and curb power proliferation and theft. "With a smart meter for instance, communication between the consumer and supplier is two-way, and it is easier for electricity distributors to detect occurrences of theft," Razib points out. He also notes that an additional benefit for electricity utilities is that they reduce the time and cost

required to physically travel around to read conventional meters. "Smart meters provide real-time online readings for both the consumer and supplier," he said.

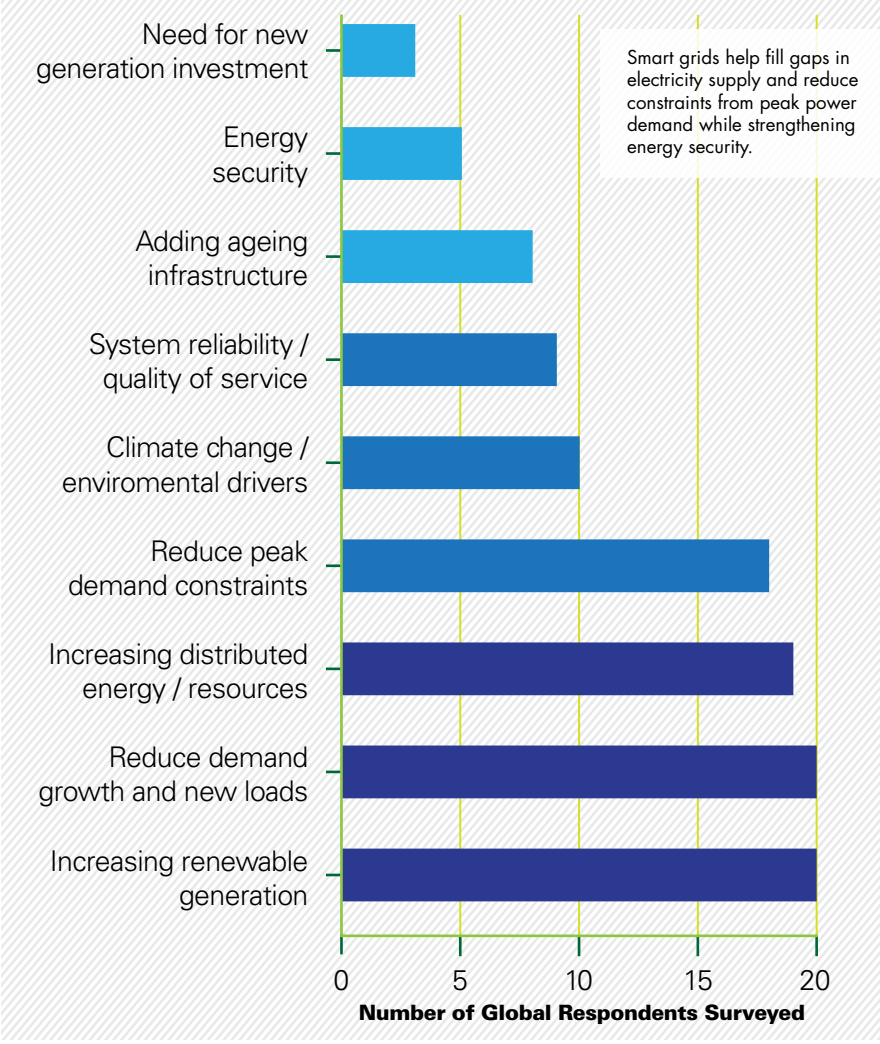
A BIGGER PICTURE

These are beneficial results for the energy industry—generators, distributors and users—accomplishing one of the primary tasks of the Energy Commission, which is safeguarding the interest of the consumers, while ensuring a healthy sector. For TNB's RM8 million pilot smart meter project, capital was raised from the Malaysian Electricity Supply Industries Trust Account (MESITA or *Akaun Amanah Industri Bekalan Elektrik* – AAIBE). MESITA is a trust fund formed under Section 9 (3) of the *Financial Procedure Act 1957* for a number of purposes, including energy efficiency projects, development and promotion of the electricity supply industry, rural electrification programmes and advance for projects approved by the Trustees of the Electricity Trust Fund.

The trustees, in a special committee—Electricity Supply Industries Trust Account Committee (*Jawatankuasa Akaun Amanah Industri Bekalan Elektrik* – JAAIBE)—manage the fund and comprise representatives from the Performance Management & Delivery Unit (Pemandu), the Energy Commission, TNB, Independent Power Producers (IPPs), and the Ministry of Energy, Green Technology and Water (KeTTHA), which also chairs the committee. Contributions to MESITA are from power generating companies, including IPPs, and are voluntary, representing 1% of their electricity sale to the national grid or the transmission network.

In 2014, the Energy Commission and Pemandu, as well as other energy industry stakeholders (such as equipment suppliers, vendors and system integrators) organised a MiniLab to discuss, share information and knowledge, and gather input from industry players. One of the outcomes of this is the planned formulation of a smart grid policy. According to Razib, while there is none yet, "KeTTHA is in the process of formulating a smart grid policy based on the outcome of the current pilot project by TNB."

HOW SMART GRIDS HELP



Source: Bloomberg New Energy Finance 2012

In addition to the smart meters, TNB has already implemented its Phasor Measurement Unit (PMU), which forms a core part of smart grids, and helps protect the grid and prevent massive blackouts from the cascading impact of a single error. In essence, the aims and benefits of implementing a smart grid is multi-faceted and favourable to the entire energy industry, as well as the economic development of the nation—including operational and network efficiency, reliability, emission reduction and customer empowerment. EM

BE ENERGY SMART

The habit of using electricity and gas safely and efficiently should be nurtured from an early age. This practice should begin at home and parents should show their children good practices such as:

- ☑ Turn off all electrical and gas appliances when not in use.
- ☑ Get the services of registered electrical and gas contractors for repairs and regular checks.
- ☑ Do not overload a socket outlet with multiple electrical appliances.
- ☑ Use electrical appliances that have ST-SIRIM safety label and energy efficiency label.
- ☑ Press the 'T' button on the automatic circuit breaker switch in your home once a month to ensure it functions satisfactorily.

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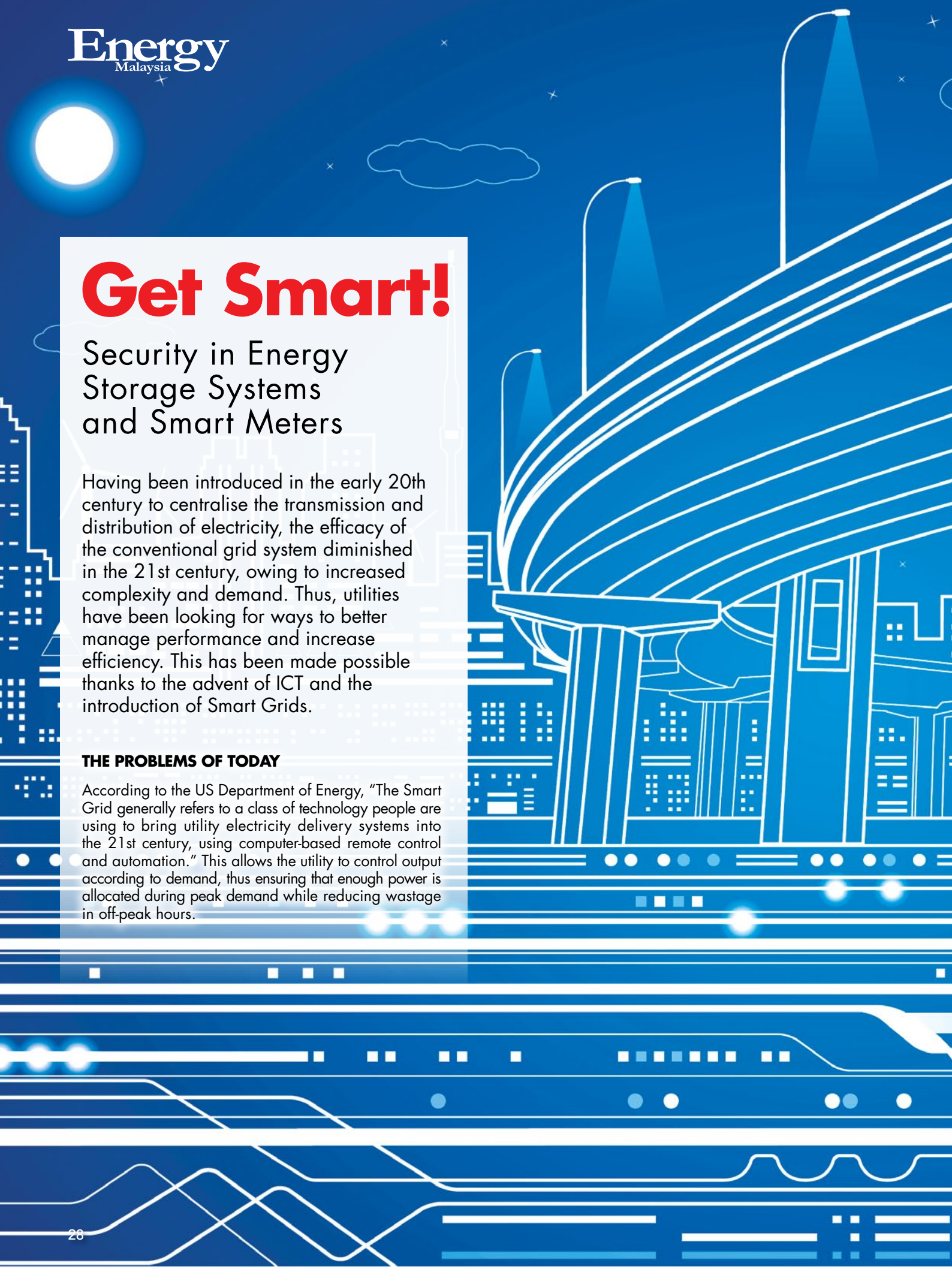


Get Smart!

Security in Energy Storage Systems and Smart Meters

Having been introduced in the early 20th century to centralise the transmission and distribution of electricity, the efficacy of the conventional grid system diminished in the 21st century, owing to increased complexity and demand. Thus, utilities have been looking for ways to better manage performance and increase efficiency. This has been made possible thanks to the advent of ICT and the introduction of Smart Grids.

THE PROBLEMS OF TODAY

According to the US Department of Energy, "The Smart Grid generally refers to a class of technology people are using to bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation." This allows the utility to control output according to demand, thus ensuring that enough power is allocated during peak demand while reducing wastage in off-peak hours.

Hydroelectric stations such as Chenderoh Power Station, Perak, can utilise stored water collected to produce power, which can be used when there is a higher demand of electricity.

As mentioned, conventional power grids are facing a number of problems, with efficient distribution being one of the most pressing. This is because populations are increasing, and so too is demand – especially from urban areas. As such, what has resulted is near infinite demand with finite supply.

Of course, demand varies according to time and date. For example, in Malaysia, home air-conditioning – which consumes a lot of power – will usually be on during the evening and night as that is when most people are at home.

The conventional grid system is not able take into account such changes. But Smart Grids can. They can help the utility better handle demand by enabling it to ascertain when more power should be allocated to a certain neighbourhood through calculations of usage history.

WHAT MAKES THE GRID SMART?

Real-time monitoring of electricity usage is made possible through the employment of a smart meter. These devices are advanced versions of traditional electricity meters, and use transmission control protocol/internet protocol (TCP/IP) to communicate with the utility.

Aside from measuring electricity consumption and collating information on power quality, load management and outages, smart meters can also be upgraded automatically through the internet connectivity they have with the utility. Also, they help cut down on fraud and electricity theft as any attempts at tampering will be detected immediately.

Smart meters also play an important role in the Smart Grid, as they can detect surges and outages in individual homes and units. These are usually the earliest signs of grid failure, and the sooner they are detected, the faster the utility and other relevant bodies can work on rectifying them.

They are part of what is known as an Advanced Metering Infrastructure (AMI), which aside from allowing the utility to remotely read users' meters, also provides the necessary information for consumers to better manage their own electricity consumption. Thus, they can set certain appliances such as

Malaysia's largest utility, Tenaga Nasional Berhad, rolled-out smart digital meters, a key component of smart grids which enable real-time two-way communication between the meter and the provider.

washing machines to only run during off-peak hours so as to cut down on costs.

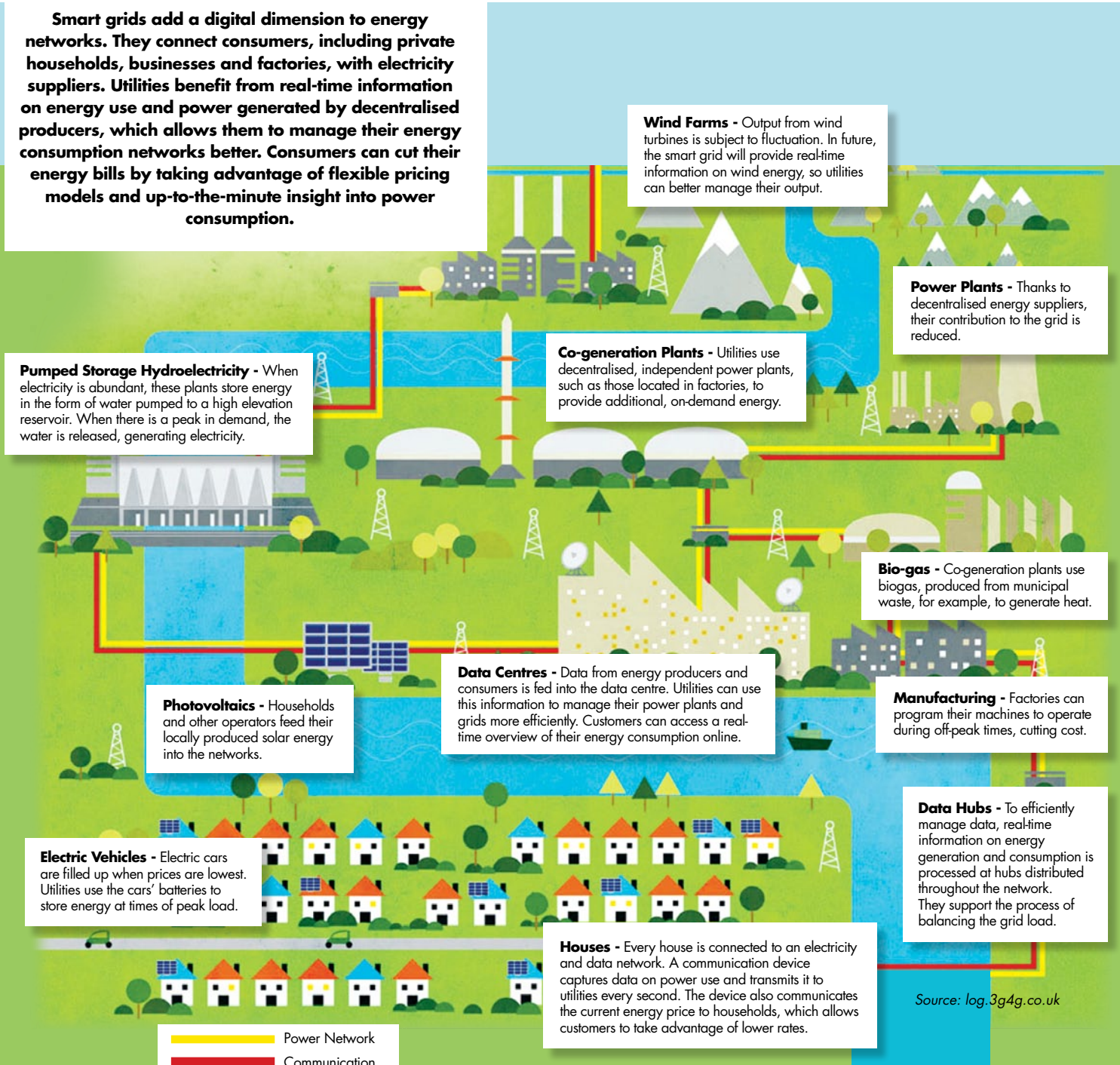
The Smart Grid system enhances the drive to embrace green energy. This is because it also allows consumers to decide the type of power source their electricity comes from. For example, people can choose if they want to have most of their energy supply coming from renewable sources such as solar photovoltaic and hydropower.

STORING POWER

Another advantage of the Smart Grid is that it helps decentralise the distribution of electricity, thus strengthening energy security. For example, under the present

THE POWER GRID OF THE FUTURE

Smart grids add a digital dimension to energy networks. They connect consumers, including private households, businesses and factories, with electricity suppliers. Utilities benefit from real-time information on energy use and power generated by decentralised producers, which allows them to manage their energy consumption networks better. Consumers can cut their energy bills by taking advantage of flexible pricing models and up-to-the-minute insight into power consumption.



Source: log.3g4g.co.uk

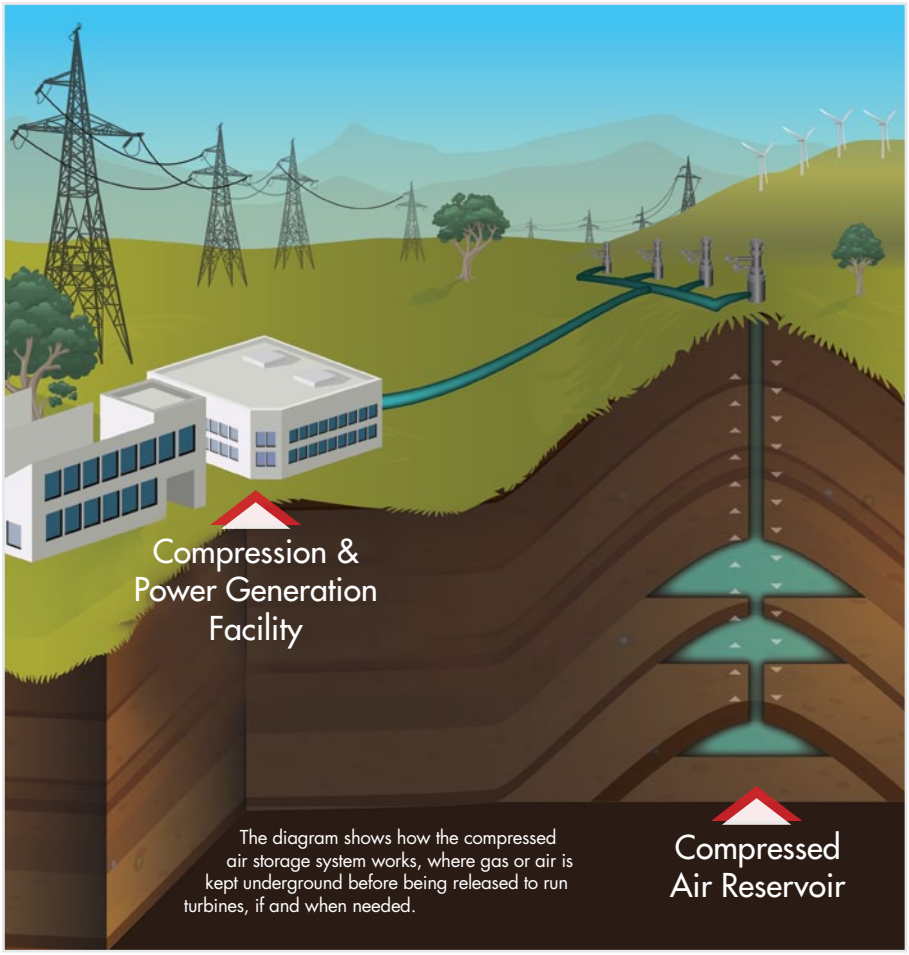
system, a fault anywhere in the grid could lead to a domino effect that knocks out power stations and substations. This was what happened in Malaysia in 1996, when a transmission line tripping resulted in a peninsula-wide blackout.

Smart Grids address this problem by utilising grid energy storage, where power is stored on the grid as reserve rather than being constantly produced by power stations, and then used (or wasted as the case may be). Through grid energy storage, the strain on power plants can be lessened. In situations where the bulk of power is produced through fossil fuels, this leads to lowered emissions of greenhouse gases.

There are several ways to store electricity on the grid, most of which is dependent on the type of power station from which the energy is derived. For example, hydroelectric stations can use pumped storage, where water from a lower altitude is pumped (via turbines powered by low-cost, off-peak electricity) to a higher altitude and then stored. When there is a need, the water is released and produces electricity. According to the Electric Power Research Institute, they make up 99% of electricity storage capacity or 127GW.

Natural gas power plants, which make up nearly half of all stations in Malaysia, are the best suited for compressed air energy storage (CAES). This works when a power station is located on an entrance to an underground tunnel or hole. During off-peak times, electricity is produced to power a compressor that compresses air and stores it under the gas-powered turbines. So when it is needed, such as when there is a surge in demand, it can be released to significantly increase the generation of electricity.

COMPRESSED AIR ENERGY STORAGE SYSTEM



The diagram shows how the compressed air storage system works, where gas or air is kept underground before being released to run turbines, if and when needed.

Source: caes.pnnl.gov

THE PRICE OF SECURITY

While there are other forms of energy storage, these two are the most suitable for Malaysia. However, it should be said that energy storage systems are quite costly. For example, according to Imre Gyuk, the manager of the Energy Storage Research Program at the US Department of Energy, CAES can cost as much as US$700 per KW of energy, while pumped hydroelectric can be as costly as US$2,250 per KW.

Of course, one also needs to take into account that Gyuk was speaking from an American context and using energy prices commensurate with the United States. Nevertheless, it is highly doubtful that such systems will be much cheaper in Malaysia.

But they are worthwhile long-term investments, especially taking into consideration Malaysia's rising population and increased urbanisation, which have led to the surge in demand. That being said, there is not much movement in plans to implement grid energy storage in the country.

That is not to say that Malaysia is not embracing the Smart Grid. Already the country's largest utility, Tenaga Nasional Berhad (TNB) has been replacing its old analogue meters with smart digital meters, and it has allocated more than RM8 billion over the next four years to enhance transmission networks. It is inevitable: the Malaysian grid is on the road to getting smart. EM

Becoming a Distribution Licensee

Proper licensing and application steps need to be adhered to if a party wishes to establish an electrical connection to the distribution grid in order to become a distribution licensee. These connection requests are subject to approval by the Energy Commission and the utility, which examine each application to ensure that all required standards are met. Energy Malaysia talks to **Nurhafiza Mohamed Hasan**, **Head of Licencing** at the Energy Commission to learn more about these procedures.

PARTIES INVOLVED

When a bulk supply connection to the distribution grid is required, the Distribution Code must be consulted to ascertain that all the requirements for safe and appropriate work are met. The Code applies to both the utility and licensees who are seeking a connection to the distribution grid.

Although most buildings are linked to the grid via electrical sub-stations and feeder poles, some large ones such as steel mills and shopping malls, as well as some townships source their power directly from the grid as they require large amounts of electricity to run. They then channel this electricity to their customers via their own distribution network.

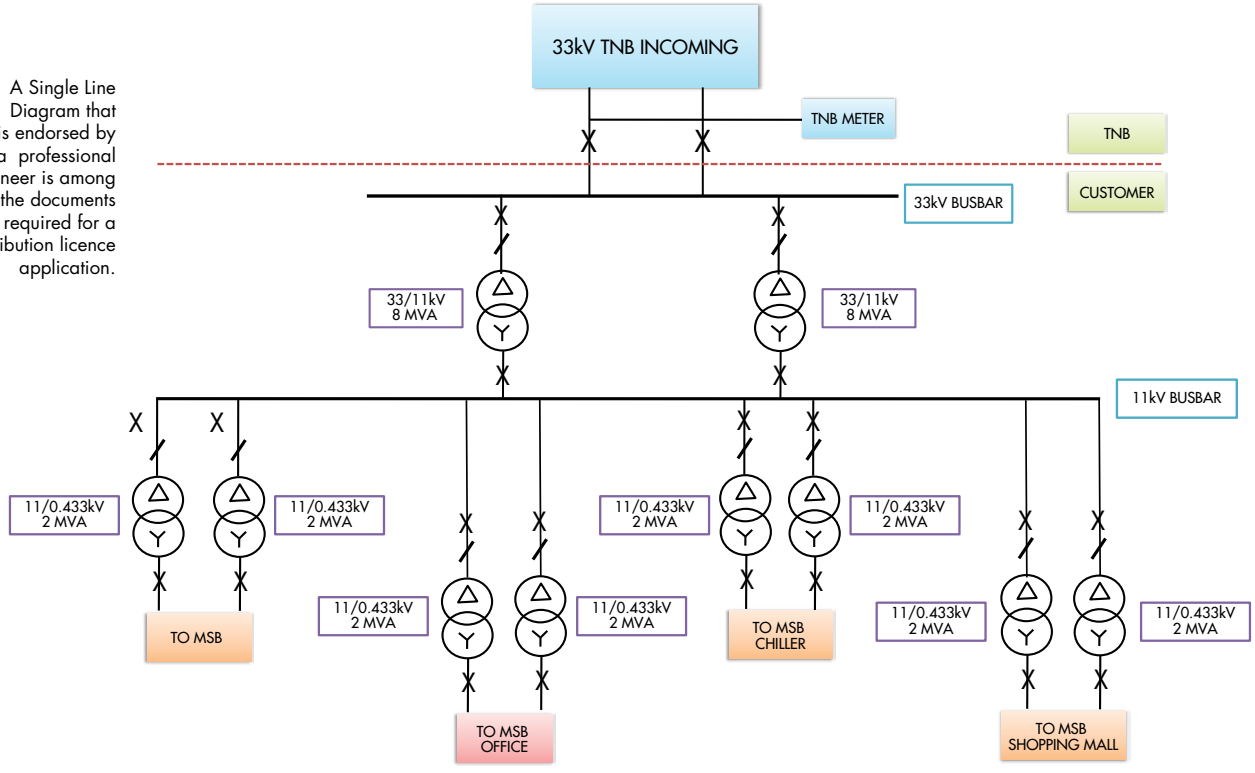
"Shopping malls usually receive a bulk supply from TNB, for example at 11 kV, before distributing the electricity to its various tenants. In this case, the mall is required to procure a distribution licence," Nurhafiza explained, adding that this is subject to the Distribution Code.

LICENSING

"Under Section 9 of the Electricity Supply Act, users of electricity need to be licenced, with some exemptions given such as to users of less than 5 kW," she said. Licensing rules are governed by the legislation and

SINGLE LINE DIAGRAM FOR TYPICAL BULK SUPPLY SCHEME

A Single Line Diagram that is endorsed by a professional engineer is among the documents required for a distribution licence application.



LICENCE APPLICATION PROCEDURE

Applicants who are interested in applying for a bulk-supply distribution licence should observe the following steps:

1 Applicant applies to undertake the planning and installation of the electrical systems (including overhead lines, switchgears, cables, according to TNB's specifications and requirements) with the assistance of Electrical Consultant Engineer(s) and Electrical Contractor(s)

2 Applicant procures the Development Order (approved by local authorities) and the Bulk Supply Agreement (approved by TNB)

3 Applicant pays a connection charge to be linked to the grid

4 TNB grants approval for the application

5 Applicant initiates the licence application process online at www.oas.st.gov.my (RM100 application fee)

6 Applicant uploads the following to be attached with the online application form:

- Company statutory documents
- Documents in Step 2
- Draft agreement between the licensee and consumer stating tariff rates
- Financial analysis to evaluate the licensee's business viability
- Copy of the Single Line Diagram (endorsed by a professional engineer)
- Copy of the Electrical Service Engineer's Certificate

7 Applicant's application is reviewed to be given final approval

8 Licence and System Ready

9 Electrical Service Engineer submits Forms G & H to TNB to energise the system

Approval for the licence application takes around 60 working days. For application exceeding 30 MW, approval from the Minister of Energy, Green Technology and Water is needed.

regulations set out in the Electricity Supply Act 1990 (Amendment 2001), Electricity Regulations 1994 and Licensee Supply Regulations 1990. The Distribution Code, on the other hand, serve as guidelines for electricity distribution and connection.

"Licensees that provide electricity to users need to submit sample of contract between them and their customers to the Energy Commission," Nurhafiza revealed. The Energy Commission then checks the contract for compliance with the Licensee Supply Regulations.

OPERATION

According to Nurhafiza, it is the responsibility of the licensee to engage a competent person, in this case a chargeman, to inspect installations on the site. The chargeman is required to record and direct all findings, recommendations and instructions to the Energy Commission and licensee. Additionally, there is also a visiting engineer, who is responsible to inspect the installations regularly and provide their independent opinion to both parties.

The Energy Commission also keeps an eye on the activities of these licensees by monitoring their monthly reporting, endorsing their standard operating procedures (SOP) and complaint handling, performing site inspections, and ensuring that the right tariffs are imposed. If cases of tariff overcharging surface, the licensee is given a period of one month to revert the charges to the correct amount. Failure to do so will result in action being taken against the licensee under section 37 of the Electricity Supply Act 1990 (Amendment 2001), which includes fines.

Other penalties include a fine of not more than RM100,000 for operating without a licence, and RM1,000 daily for every day the offence continues after conviction, a fine of not more than RM10,000 for operating without a competent person, and RM1,000 daily for every day the offence continues after conviction, as well as a fine of not more than RM5,000, or up to 1 year imprisonment, or both, for non-compliance with electricity regulations.

The Energy Commission has spelled out several steps and requirements that need to be adhered to for the distribution licence application process, as well as during the day-to-day operations of a distribution licensee. These prerequisites and stipulations ensure that only qualified and competent parties are allowed to distribute electricity, providing peace of mind for their consumers, and the utility as well. EM

Supplying Electricity

When an Independent Power Producer (IPP) wishes to connect to the grid in order to sell its supply of electricity, it has to adhere to several conditions and criteria set by the Energy Commission and the grid owner, Tenaga Nasional Berhad (TNB). These stipulations are usually set before any actual connections are made to help ensure that the IPP meets all the requirements necessary, which include producing a supply with acceptable power quality and keeping the cost of tariff at a reasonable level. **Energy Malaysia** spoke to **Abdul Razib Dawood, Head of Market Operation Unit** at the Energy Commission to learn about these connections.

CONNECTION PROCESS

When it is being considered for a licence to produce and sell electricity to the grid, an IPP is usually looked at for a number of tender packages, such as for interconnection facilities. "There is certainty in this interconnection facilities tender package. However, when it comes to connecting to the grid, the IPP still has to enlist the help of TNB as it is the grid owner," Abdul Razib said.

Therefore, the task of dealing with interconnection facilities is handed over to TNB by the IPP. The IPP's responsibility, meanwhile, is to ensure that it builds a robust generation and supply of electricity to the grid. The public licence will only be given to the IPP once the project details are finalised.

Hence, the current model of connection is as follows:

IPP BUILDS TRANSMISSION LINES
IPP secures assistance from TNB to get right of way, which grants it permission to build transmission towers on land belonging to others, with compensation to the land owner.

TNB COMES IN
Once the transmission lines from the IPP are ready, the task of interconnection to the grid is handed over to TNB.

IPP RECOVERS COST BY TARIFF
The IPP will start to regain the project cost by charging the tariff already set with TNB when the project details were discussed.

THE GENERATION DISPATCH PROCESS IN 3 STEPS

1 **Release of Generation Schedule:** Issued by single buyer, it is the assignment of power generation to meet anticipated demand. It includes information from the user (IPPs) in accordance with the power purchase agreement (PPA), to ensure that security and quality of supply is sufficient to meet demands.

When to Send: Done every day, 1 day before Actual Dispatch Time, at/before 5pm, and done every day

2 Generation Scheduling and dispatch is conducted based on the least-cost principle, which requires cheaper plants to be dispatched first, followed by the more expensive ones.

3 **Actual Dispatch Time of Electricity:** The generator's availability to provide supply according to demand through the redeclaration from the schedule is being monitored in real time. The GSO (in this case TNB), checks the dispatch time and parameters.

- If GSO is OK with the time of delivery and parameters, a report of dispatch information is recorded by the GSO and single buyer provides settlement information such as processes and procedures for calculation of payment.

- GSO conducts the dispatch based on real time information and guided by the schedule.

- Settlement will be done by the single buyer based on the metered energy at the plant.

- SIf GSO is not OK with the time of delivery and parameters, IPPs have to redispatch another generator in their system to meet the demand, then once it can already provide the needed power, a report of dispatch information is recorded by the GSO and single buyer provides settlement information such as processes and procedures for calculation of payment.

ASSESSING APPLICATIONS

Regardless of the type of power generation, be it from coal, gas or open cycle power plants, there is an open bidding system in selecting the most suitable IPP candidate to supply power to the grid. With international competitive bidding, supply quality among the power producers is assured, which in turn gives rise to a stable, high quality power supply at a sensible cost.

"To be eligible for consideration, the bidding party must be a consortium consisting of at least 51% Malaysian stakeholders," Abdul Razib revealed.

The IPPs under consideration must then present their details of the project and their offers for the tariff. Selection is then based on criteria such as project cost, power output capacity and tariff rate offered by the bidder.

ENSURING QUALITY

In making sure that the IPP's power plant is running at stated capacity, the Energy Commission requires that it declares its output capacity on a daily basis. As Abdul Razib explained, "For example, if the power purchase agreement (PPA) between the IPP and TNB is 1000 MW, but for some reason the IPP's output is lowered to 800 MW for a particular day, the IPP has to declare this lower output rate so that payment adjustments can be made."

"If a failed dispatch instruction occurs, where the IPP dispatches electricity at a lower capacity than agreed upon in the PPA, a penalty is meted out to the IPP," he added. In short, the PPA details all the requirements that have to be followed by the IPP, such as the forced outage rate and planned outage rate not exceeding a 4% - 6% limit. Failure to adhere to these conditions will be tantamount to a breach of the agreement between the IPP and TNB, and penalties will be issued to the IPP.

The Energy Commission plays a significant role in safeguarding a secure, reliable and efficient connection between the power plant of an IPP and the main grid. This not only ensures a safe transmission of electricity to the grid, but helps to keep tariffs in check, minimising the cost load along the line right up to the grid's end-users-the average TNB customer. EM

Malaysian Electricity Demand and Supply

As Malaysia faces a continually-expanding population and an industrial growth spurt fuelled by the nation's quest to attain a developed status, the need to provide a stable, reliable and adequate supply of electricity to energise this progress has become a top priority. *The Electricity Supply Industry Outlook 2015* by the Energy Commission shed some light on the electricity demand and supply landscape in the country in the near future.

DEMAND AND SALES

In Peninsular Malaysia, the growing demand for electricity is driven by two main categories of the economy, the industrial and commercial sectors. For the forecast, Gross Domestic Product (GDP) growth rate for 2014 was estimated to increase from 5.0% to 5.3%, with a bullish long-term economic projection of around 5.0%.

"Economic development and population growth play a major role in the rise of electricity demand in Malaysia, although energy efficiency measures are being put in place, including technologically advanced appliances which lessen the consumption of electricity," shares **Mohd Rizal Ramli**, **Head of Capacity Development Unit** at the Energy Commission.

In addition to this, there is also the advancement of transportation, particularly the upcoming Mass Rapid Transit (MRT), which is due to start operating next year. As it will also be powered by electricity, it will add a big chunk to an already huge consumption of electricity.

In terms of electricity sales, an average growth rate of 2.5% was recorded in 2014. Forecasted sales broken down according to sectors indicate that the largest customer is still the industrial sector with 42%. The commercial sector is not far behind at 35%, while the domestic sector (21%) and others comprising mining, public lighting and agriculture sectors (2%) bring up the rear. However, by 2030, the commercial sector is forecast to experience higher growth, taking over the largest customer title from the industrial sector.

Looking east, Sabah's electricity sales are also expected to climb. Prepared by the Load Forecast Unit of Sabah Electricity (SESB), the demand forecast for Sabah concentrates on the annual total sales, energy generation and peak demand with a line of sight up to 20 years ahead. The forecast is conducted on an annual basis and with a mid-year revision, which is in line with the License Condition of SESB.

Average sales growth recorded in the state from 2007-2014 was 6.85%, while an average electricity sales growth of 6.0% per annum (p.a.) and 5.3% p.a is forecasted for the periods of 2015-2017 and 2018-2023 respectively, surpassing 8,000 GWh by 2024. The electricity generation meanwhile is expected to grow at the average rate of 5.4% p.a. and 5.0% p.a. respectively for the two periods, compared to a growth rate of 6.1% in 2007-2014. Peak demand is also predicted to register strong growth with an average of 5.2% and 4.9% for the respective periods, versus 6.2% in 2007-2014, exceeding the 1,000MW mark in 2017 and 1,500MW in 2025.

SAFEGUARDING SUPPLY

It is clear from the forecasts that the need for electricity is set to soar to ever-increasing heights. Therefore, the need to secure a future where the supply of electricity is pegged favourably against its demand is a pressing one, necessitating measures and steps to be taken in this regard.

There are regulations used by the Commission to ensure that the supply of electricity meets the demand of the consumers. "Generators who are connected to the Grid system, have a power purchase agreement or service level agreement that oversees their level of operation, reliability, revenue and penalty, if any," says Rizal.

From the Central Planning perspective, the Commission sets a reserve margin of a minimum 20% in the Peninsula. "We cannot depend too much on a single source," Rizal says. This is where the Herfindahl-Hirschman Index (HHI) comes in place, which

states that there should be less than 0.5, where the lower the HHI, the more diversified the sources are.

FUTURE GENERATION PLAN

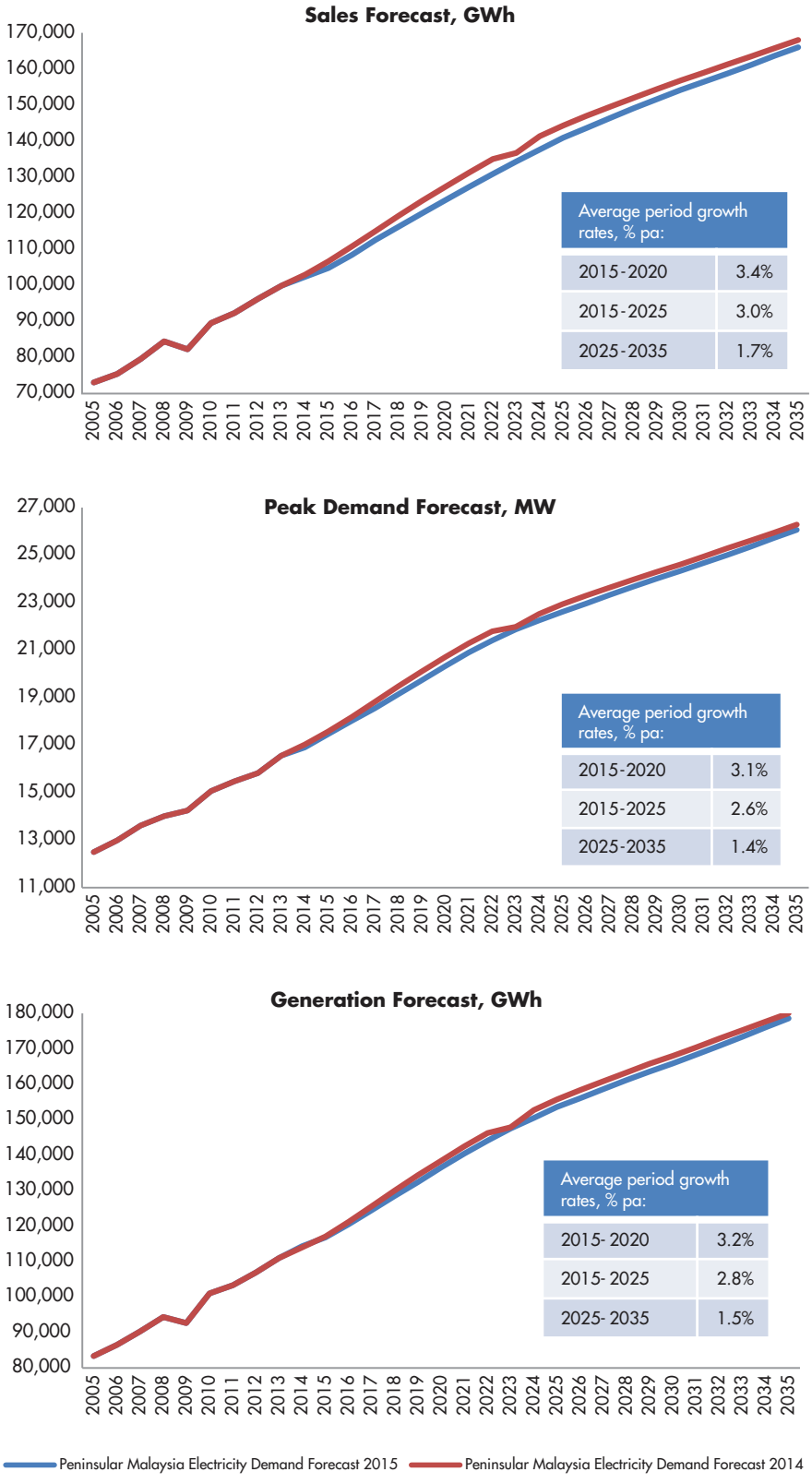
The original Generation Development Plan was amended as a result of higher demand forecast, and to take into account an expected delay of interconnection with Sarawak, a project to link the electricity grids between East and West Malaysia. Under the revised plan, the combined cycle gas turbine (CCGT) power plant that was initially planned to be commissioned in 2020 will be put into operation in 2018 instead. This move is also to reduce the strain of meeting power demand in the short term.

"Without the Sarawak Interconnection, we still have gas and coal as our fuel of choice." Rizal says. "However, commercial and technical aspects have to be addressed first, including the international boundaries, as majority of the cables to be used will go through international water."

An additional 2,000 MW worth of CCGT plants are also required to come online in 2021, as a direct replacement of the Sarawak Interconnection. However, the power transfer from Sarawak Interconnection has been delayed further to 2024. As a result, a 1,000 MW coal-fired power plant will be built in 2023 to take up the slack in supply.

In Sabah, Generation Development Plan studies for the state are carried

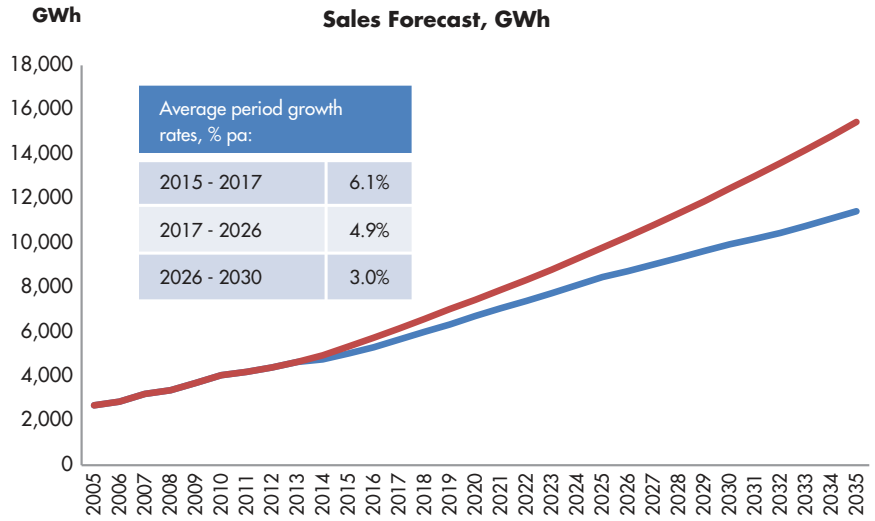
ELECTRICITY DEMAND FORECAST FOR PENINSULAR MALAYSIA 2015 –2035



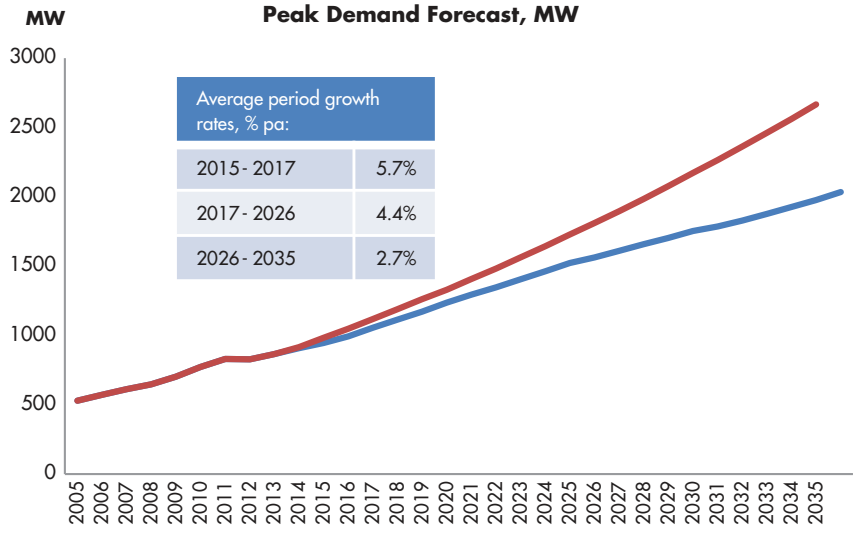
The demand for electricity in Peninsular Malaysia in the years to come exhibits a distinct uphill trend, with both electricity sales and generation registering a steady climb on a year-on-year basis.

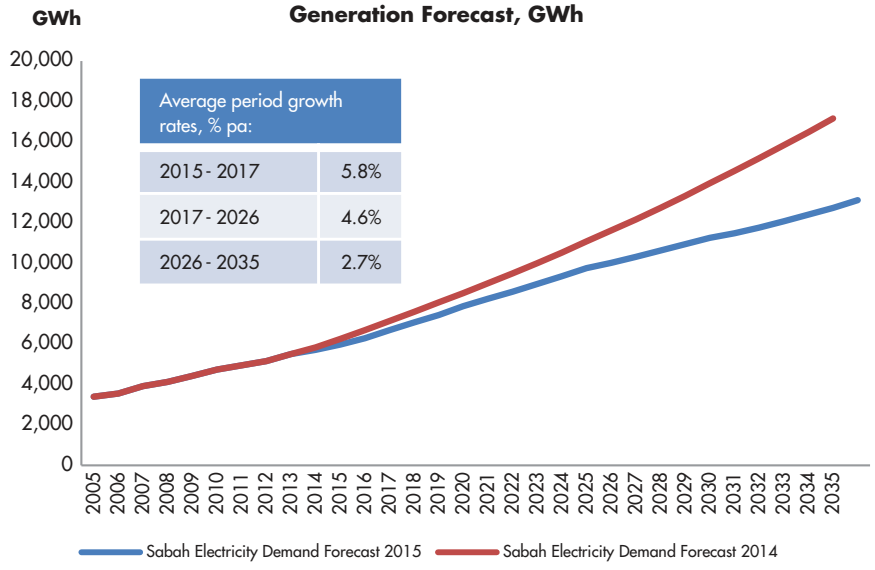
Source : Peninsular Malaysia Electricity Demand Forecast 2015.

ELECTRICITY DEMAND FORECAST FOR SABAH(2015 –2035)



The electricity demand for Sabah has been forecasted to rise rapidly, with growth percentages that are higher than Peninsular Malaysia during the same time periods.





Source : Sabah Electricity Demand Forecast 2015.

out from time to time to assess the adequacy and robustness of generation recommendations in the planning of future capacities. The planning criteria are based on a Loss of Load Equivalent (LOLE) of no more than 1.5 day/year, while analysis scrutinises important parameters such as fuel price, fuel mix, technology used and demand profile.

In line with the Malaysian government's effort to reduce direct fuel subsidy to the power sector, the approved Generation Development Plan takes into consideration the gradual removal of the diesel and medium fuel oil (MFO) subsidies by the end of 2015. Currently, diesel and MFO prices of 49.5 sen/litre and 42 sen/litre respectively for the power sector in Sabah are heavily subsidised. Piped gas is sold at the rate of RM6.40/mmBtu, compared to RM15.20/mmBtu in the Peninsula.

It is apparent that the requirement for a sufficient electricity reserve in both the Peninsula and Sabah will climb as the country heads into a highly- developed future. Therefore it is pertinent that the detailed Generation Plan be followed to feed this much-needed power into the grid, in order to ensure that the electricity demand does not exceed supply. EM

Leading Public Adoption

The Government Implements the Energy Saving Programme

With Malaysia's rapid economic growth, the government has since recognised the importance of optimising its energy consumption. This is evident from policies—such as the *Energy Commission Act* and the *Electricity Supply Act (ESA) 1990*—to initiatives, including the Minimum Energy Performance Standards (MEPS), as well as a pledge to adopt an indicator of a voluntary reduction of up to 40% in terms of emissions intensity of GDP by 2020 compared to 2005 levels. While a public-wide adoption of energy efficiency (EE) measures will be required for the nation to reach its EE goals successfully, the government is leading by example to boost awareness and encourage power and financial savings.

According to **Zulkiflee Umar**, **Head of Demand Side Management Unit** at the Energy Commission, "One of the core tasks of the Commission is promoting the efficient use of energy to minimise the rising demand for electricity in the country." In the last decade, energy consumption in Malaysia has risen sharply, from 85,260GWh in 2005 to around 116,087.5GWh. So are tariffs, which are expected to continue to increase as gas subsidies are removed. Optimising energy use therefore, will also save the government financially in the long run.

TARGETS ACQUIRED

To do this, the Malaysian government proposed energy audits at selected ministry buildings to identify measures that can help conserve electricity use and reduce power consumption. Between 2010 and 2014, a number of government buildings underwent the analysis, including the *Jabatan Perkhidmatan Awam* (JPA - Public Service Department), the Malaysian and Management Planning Unit

"Something that everyone has to understand is that reducing energy consumption with EE must never compromise comfort. The first rule of efficient consumption is enjoying the same or better amount of comfort with reduced consumption of energy."

- Zulkiflee Umar
Head of Demand Side Management Unit

EXECUTING EE

No-Cost EE Measures :
Energy Management System

– Introduction of energy management policy
– Establishment of internal energy management committee
– Plan and implement energy saving measures
– Monitoring and verification
– Review results for continual improvement

Energy Efficient Practices

– Switch off equipment when not in use
– Optimum temperature settings (24°C)
– Utilisation of day lighting
– Use the stairs instead of an elevator

Standard Measures

– Technologies or projects proven to save energy and that have high benefit-cost ratio payback period for the measures

– Amount of support assessed based on payback period for the measures

Measures for the Industrial Sector

– Energy Audits for medium and large industrial facilities

Mandate industrial facilities to implement energy management

– Cogeneration and Tri-Generation: To maximise utilisation of fuel

Measures for the Building Sector

– Energy Audits for large government facilities, and large and medium commercial facilities

Mandate government and large commercial facilities to implement energy management

New buildings designed and built with EE features (MS1525/GBI)

(MAMPU), the Ministry of Human Resources (MOHR), Ministry of Health (MOH), Ministry of Domestic Trade and Consumer Affairs, Ministry of Agriculture and Agro-Based Industry and Ministry of Youth and Sports.

In addition, several of these government buildings have been retrofitted with EE equipment and appliances to enhance energy savings. These initiatives have already seen savings of between 4% and 19% in buildings such as MAMPU, MOH and MOHR.

In December 2013, the Malaysian government announced plans to achieve up to 5% of savings on the electricity consumption of government buildings. As part of this initiative, the Energy Saving Programme (ESP) was established and aims to promote EE in 25 ministries in Malaysia, encompassing 54 buildings.

As the primary sources of energy consumption in buildings are from lighting and thermal loads—with air-conditioning accounting for the lion's share, particularly in a tropical climate such as Malaysia—the ESP also encourages government buildings to set their air-conditioning temperatures to 24°C.

Effectively accomplishing the task of minimising energy consumption

also required monitoring data from the building on a monthly basis, provided by Tenaga Nasional Berhad (TNB). "As the agency tapped by the Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA) to administrate the initiative, we also requested monthly consumption data from each Ministry so that we could make the comparison," said Zulkiflee.

He added that the Commission has been monitoring the data since January 2014, accompanied by monthly meetings with the Ministries to discuss which buildings were more efficient, and what they can do to improve. By the end of last year, the ESP had accomplished savings of 5.6%, more than the set target.

ENERGY PERFORMANCE CONTRACTING

To help with the implementation of ESP, the government has adopted Energy Performance Contracting (EPC) concept, a financial technique performed by Energy Service Companies (ESCOs), which allows the payment of the installation cost of EE measures from the cost benefits of savings made. This means that building owners and operators can achieve energy savings without paying up-front capital.

Adjustment to Electricity Tariffs for Domestic Consumers in Peninsular Malaysia

Amount of Electricity Use (kWh)	Number of Consumers		Current Electric Bill	New Electric Bill	Difference (RM)
	Million	Percentage %			
0 - 200	3.25	50.37	3.00 - 43.60	3.00 - 43.60	No increase
201 - 300	1.31	20.30	43.93 - 77.00	43.93 - 77.00	No increase
301 - 400	0.72	11.1	77.40 - 117.00	77.52 - 128.60	0.12 - 11.60
401 - 600	0.67	10.44	117.40 - 198.80	129.12 - 231.80	11.71 - 33.00
601 - 800	0.26	4.03	199.23 - 285.10	232.35 - 341.00	33.12 - 55.90
801 - 1000	0.11	1.75	285.55 - 375.80	341.55 - 452.70	55.99 - 76.90
1001 - 5000	0.13	1.98	376.25 - 2,191.80	453.27 - 2,736.70	77.02 - 544.90
> 5000	0.002	0.03	2,192.25 and above	2,737.27 and above	545.02 and above
Total	6.45	100%	Subject to the 1.6% Feed-in Tariff from the consumer's monthly electricity bill		

Source: Tenaga Nasional Berhad Pricing and Tariff

According to Zulkiflee, "The concept is catching on, in Melaka and Kuala Lumpur. We have to do more to promote the concept and make building owners and operators understand what it is about. We do not have a lot of ESCOs yet, only about 50 have been registered, and we have asked them to do more marketing and awareness boosting to promote EPC in the country." To undertake EPC projects as a consultant, contractor or supplier, ESCOs have to be registered with the Ministry of Finance (MoF) for projects involving government buildings and the Energy Commission under the Green Technology Services Code.

Zulkiflee explained that buildings have to have a target if they want to reduce their energy consumption, and said that before any EE measures start, building owners and operators hire an *Energy Auditor* to perform an energy audit to determine their baseline. They should also have committees, sub-committees and coordinators that remind the staff to switch off appliances that they do not need, or when they are going home after work. "These low-cost measures and behavioural changes can easily help buildings save up to 5%. These are the points that Ministries are advised to start from," Zulkiflee stated. EM

World Forum on Energy Regulation

Above and below: The 6th World Forum on Energy Regulation (WFER6) held in Istanbul, Turkey provided a platform for key players in the global energy sector to exchange views and knowledge on energy regulation in their respective countries.

Hosted by the Energy Market Regulatory Authority, the 6th World Forum on Energy Regulation (WFER6) was held at Istanbul Lutfi Kirdar International Congress and Exhibition Centre on the 25th to 28th of May 2015.

The conference drew in 941 people from 77 countries of five continents, including Energy Commission Chairman Dato' Abdul Razak Abdul Majid and Energy Management Development and Service Quality Department Director Ir. Abdul Rahim Ibrahim. The Commission's attendance aims to strengthen its position as an energy regulator in Malaysia by exchanging knowledge and experience in the energy sector and learning from best practices around the world.

With the theme Bridging the World of Energy Regulation, WFER6 focused on the many issues of energy regulation. The conference was divided into 24 sessions, with 117 moderators and speakers for discussion. Views and experiences in different energy regulation models were exchanged in the conference, with solutions suggested for ways to supply good quality and sustainable energy to consumers. The challenges being faced as well as the important role of the social and environmental concerns in the decision-making process were also brought up.

Among the topics discussed in the conference included consumer protection, the regulatory reform process in terms of dependence and accountability of the regulatory

John Mogg, President of the Council of European Energy Regulators (CEER) and Chair of the Board of Regulators at the Agency for the Cooperation of Energy Regulators (ACER, speaking during one of the sessions in the forum.

authorities, the complex energy markets, the predictability of the energy markets, the reliability of the regulatory authorities, the effect of new technologies on the operation of grids and on the business models of regulated companies, and the challenges of establishing a secure energy supply.

The International Confederation of Energy Regulators (ICER) Distinguished Scholar Awards were also presented during the conference to acknowledge the important contributions made in enhancing electricity and gas regulation around the world. ICER aims to enhance public and policy-maker awareness as well as the understanding of energy regulation and its role in addressing issues of socio-economy, the environment and the market. Every three years, a winner for each category is awarded during the WFER. The two categories are *Impact on Developing Countries* and *Next Practices*.

Winners of the *Impact on Developing Countries* category were Katelijn Van Hende and Carmen Wouters, both from the School of Energy Resources, University College London, Australia, for their paper, "The Role of Microgrids within Future Regional Electricity Markets". Meanwhile, Carlos Battle, Pablo Rodilla and Paolo Mastropietro, from the Institute for Research and Technology, Comillas Pontifical University won in the *Next Practices* category for their paper, "Capacity Remuneration Mechanisms in the Context of the European Internal Energy Market."

Other activities that the delegates took part in included a high level panel on Engaging with Consumers in Increasingly Complex Markets which was led by the International Confederation of Energy Regulators Women in Energy Initiative (ICER WIE), group meetings which allowed for the delegates to exchange knowledge, and joint workshops.

The next conference, WFER7, will be held in Mexico in 2018.

The 26th World Gas Conference

Held in Paris from the 1st to the 5th of June, the 26th World Gas Conference was organised by the French International Gas Union (IGU), focusing on the crucial role that gas will play around the world. This is the second time the conference was held in Paris, the first being in 1937.

Organised every three years, it is the world's largest and most prestigious conference in the global gas industry. It provides a platform for leading experts and decision-makers in the gas industry to exchange experiences and ideas on furthering the role of natural gas as a sustainable global energy.

For this triennium (2012-2015), a Strategic Framework has been established with the theme Growing Together Towards a Friendly Planet to reinforce the IGU's role in the gas industry. The framework pushes towards obtaining recognition for natural gas as a fuel for sustainable development, improving its availability in new areas of developing countries, and also attracting human resources and to reduce staff turnover in the gas industry.

The delegates attended workshops led by a panel of experts in the gas industry on topics such as long term measures to increase energy security and reducing the overall demand of gas through energy efficiency, technology ulitisation and conservation measures. There were also discussions on various topics during the gala dinner at the end of each day of the event. The topics discussed were Natural Gas: A Core Pillar for A Sustainable Future of the Planet, Gas Together with Renewable and Electricity: A Perfect Combination, Natural Gas: A Growing Factor for New Economies, and Human Capital for the Future of the Gas Industry.

Energy Commission Chairman Dato' Abdul Razak Abdul Majid, Director of Gas Development and Regulation Ir Roslee Esman, and Head of Capacity Development Unit Mohd Rizal Ramli, attended the conference along with the over 3, 700 professionals in the global gas sector from 90 different countries. Aside from networking opportunities, the Energy Commission's representatives

International Gas Union (IGU) President Jérôme Ferrier addressing hundreds of delegates from around the world.

also participated in various activities which enabled them to learn the latest technologies and trends in the energy sector.

Along with the conference, an exhibition was held for delegates to display their products and do business with thousands of buyers and sellers under one roof, in which trade visitors were allowed access for three days. With a total of 350 exhibitors, it successfully attracted over 14, 000 visitors.

A village dedicated to "Natural Gas for Transportation" was also featured within the exhibition for the first time to showcase natural gas as a rapidly growing fuel in the transportation sector. It included a free-to-attend seminar, providing education opportunities to complement the topics featured in the main conference agenda.

Other activities during the event included technical tours which offered first-hand experience of technical sites, specialised pavilions showcasing the latest industry updates, ideas, technology and products, as well as networking events such as interactive networking lunches, dinners and receptions for key business leaders to meet and exchange their experiences.

Hosted by the French International Gas Union (IGU), the 26th World Gas conference focused on furthering the role of natural gas as a sustainable global energy. The event featured sessions with top industry players (left), as well as booths (right) of major petroleum companies around the world.

Dialogue with Stakeholders

With the increased tariff for natural gas, the Energy Commission engaged with its stakeholders to discuss the methods and details for determining Gas Malaysia Berhad's (GMB) natural gas tariff as well as the issues that would surface from the increase.

With Gas Malaysia Berhad (GMB) increasing the tariff – effective on the 1st of July 2015 – for natural gas, the Energy Commission engaged with its stakeholders in several sessions to discuss the issues that would surface from the increase. The main objective of the sessions was to explain the method and details for determining GMB's natural gas tariff.

Among the sessions the Energy Commission had with its stakeholders included Dialogue Sessions with the Federation of Malaysian Manufacturers (FMM) Committee on the 19th of May and the 4th of June 2015, and The Malaysian Iron & Steel Industry Federation (MISIF) on 15 July 2015.

The implementation of the Gas Cost Pass-Through (GCPT) mechanism was also part of the agenda, with a briefing on the mechanism to the FMM members on the 4th of August. The GCPT mechanism cushions the fluctuations in international prices of fuel, such as gas, coal or medium fuel oil by revising the prices only once every six months. The mechanism is also designed for consumers to know the actual increase of fuel prices.

With an increase in electricity tariff, Tenaga Nasional Berhad (TNB) absorbs the initial cost and once in every two months, the average increase will be removed, leaving only the real rise in fuel for which the consumers are charged. With that, consumers will be aware of the actual rise in fuel prices.

The revised tariff was increased to RM21.80 per million British thermal units (mmBtu) from RM19.77 per mmBtu due to higher purchasing price of the fuel procured by GMB from PETRONAS.

New Enhanced Dispatch Arrangement Launch

A significant development in the Malaysian energy sector took place on the 1st of October with the start of the transition period of the New Enhanced Dispatch Arrangement (NEDA). NEDA was launched on the 29th of September at the Energy Commission's headquarters, in an event attended by the Ministry of Energy, Green Technology and Water (KeTTHA), senior members of the Energy Commission, the Single Buyer, Grid System Operator, Tenaga Nasional Berhad (TNB) and Independent Power Producers (IPPs).

Energy Commission Chairman Dato' Abdul Razak Abdul Majid, and CEO Dato' Ir Ahmad Fauzi Hasan along with members of the energy industry during the launch of NEDA.

Under NEDA, IPPs with Power Purchase Agreements (PPAs) and TNB Generation – which has a Service Level Agreement (SLA) – can tender optional heat rates and variable operating rates (VOR) for daily dispatch with prices that are lower than that in the PPA/SLA.

In his opening remarks, Energy Commission Chairman Dato' Abdul Razak said that NEDA will "incentivise the PPA and SLA generators to be more cost-efficient in their operation by rewarding the efficient plants with more energy dispatch and hence more revenue."

The Energy Commission Chairman also revealed that the transition period will run from the 1st of October with full implementation by the 1st quarter of 2016. During this timeframe, only IPPs and TNB Generation will be allowed to submit alternative VOR. In addition, the transition period will also allow stakeholders to fine-tune and update any processes.

Following his speech, Dato' Abdul Razak together with Energy Commission CEO Dato' Ir Ahmad Fauzi Hasan presented copies of the new NEDA Rules and the Single Buyer Rules to representatives of TNB Generation IPPs present at the briefing. This was then followed by a presentation by the Single Buyer, giving further details on the procedures for tender submission under NEDA.

International Greentech & Eco Products Exhibition and Conference

Prime Minister, YAB Dato' Sri Mohd Najib Razak (Center) inspects packaging made out of biomass from paddy husks handed to him by Free the Seed Tan Sri Dato Seri Dr Salleh Mohd Nor. Looking on is KeTTHA Minister Datuk Seri Panglima Dr Maximus Johnity Ongkili (Left). The agreement between the paddy planters and Free the Seed is set to increase the income of over 1,000 farmers in the area.

Organised by the Ministry of Energy, Green Technology and Water (KeTTHA), the 6th International Greentech & Eco Products Exhibition and Conference Malaysia (IGEM) was officiated by Prime Minister Dato Sri Najib Razak on the 11th of September 2015 at the Kuala Lumpur Convention Centre. With the theme *Powering the Green Economy*, IGEM 2015 centred around five key areas – green energy, green transportation, green buildings, solid waste technology and management, as well as clean water technology and management.

In his speech, Dato Sri Najib said, "Malaysia's transition to a green economy has the potential to create enhanced trade opportunities by opening new export markets for environmental goods and services, increasing services and greening international supply chains." The opening ceremony also saw the signing of a Memorandum of Understanding (MoU) to fortify co-operation between the Malaysian and Cambodian governments in the green technology field.

Two other MoUs followed; one of them between Prasarana, the asset owner and operator of the country's two LRT and the KL Monorail networks, and CMS Consortium on the expansion of the COMOS Electric Car Sharing Programme. The other MoU involved Pertubuhan Peladang Kawasan (Area Farmers' Association) Pendang Selatan in Kedah and Free the Seed – a company specialising in paper production using biotechnology – to convert biomass sourced from paddy husks into biodegradable packaging products.

KeTTHA Minister Datuk Seri Panglima Dr Maximus Johnity Ongkili welcomed the partnerships, saying, "We are pleased with the numerous collaborations established today in line with the Ministry's efforts to further pursue growth in the green technology sector. It also reaffirmed the role of IGEM 2015 in encouraging co operation as well as trade and business in green technology among the member countries."Spread across six halls, the four-day event featured conferences, seminars and over 400 exhibition booths with exhibitors from 20 countries.

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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 Ennergy 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...

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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.

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

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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.

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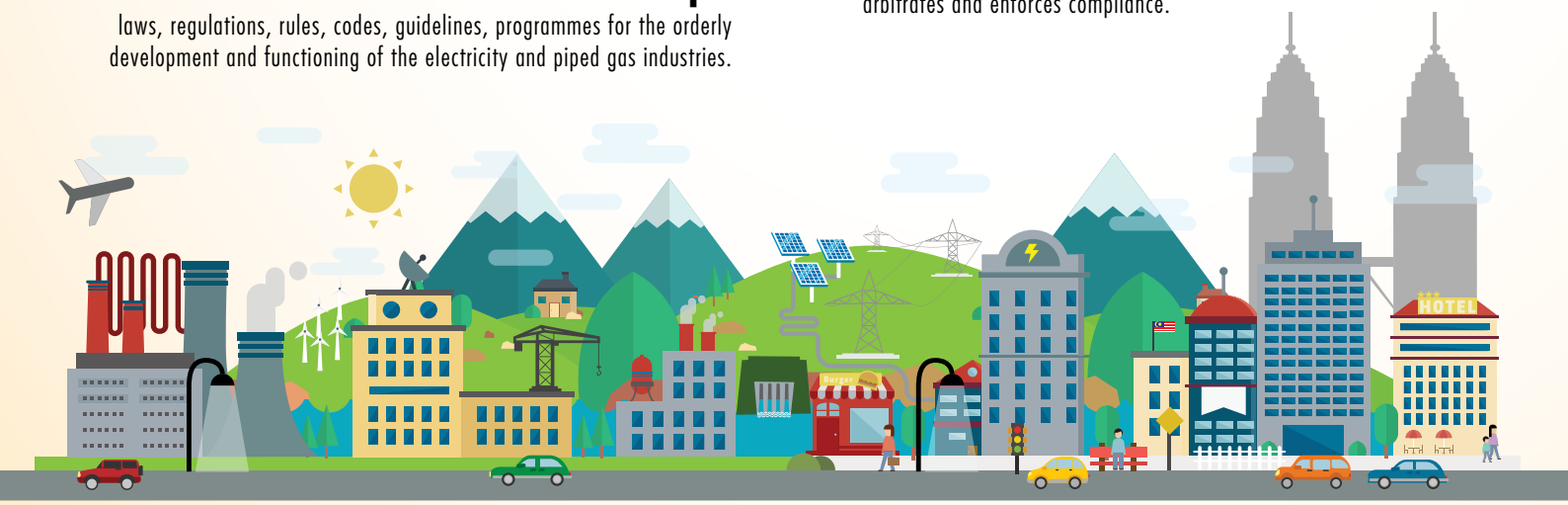
complaints, accidents, offences and industry issues; arbitrates and enforces compliance.



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