Energy Malaysia Volume 14 KDN: PP 18540/08/2014(033966) www.st.gov.my

Towards a World-Class Energy Sector

ENERGY MALAYSIA

Suruhanjaya Tenaga
Energy Commission

Volume 14 | 2018
www.st.gov.my

The Transition

Strengthening the Future of Energy in Malaysia

PROPELLING WITH SUSTAINABILITY

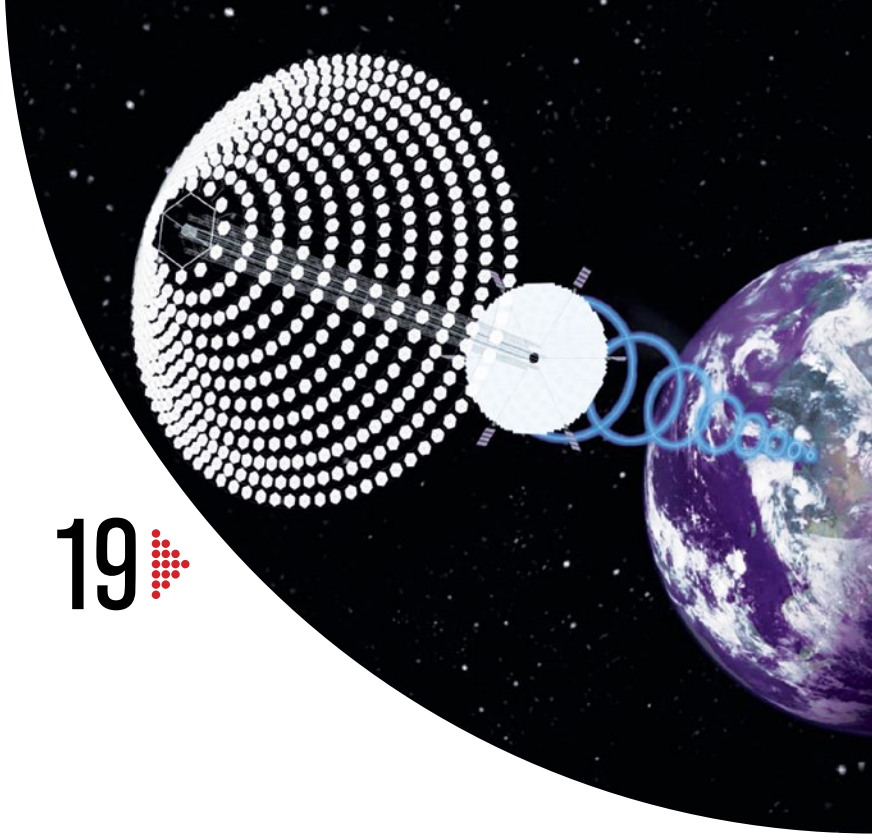
Energy Malaysia looks into how the industry is aligning itself with the Pledge of COP 21 to ensure a sustainable future.

ONE BUYER TO RULE THEM ALL

Delve into the liberalisation of Single Buyer and its impact on the energy industry as a whole.

MYR 8.00 Volume 14
ISSN 2289-7488
9 772289 748003 14

CONTENTS



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ST Publication No: ST(P)10/04/2017

Conceptualised, Produced and Published for

SURUHANJAYA TENAGA
(ENERGY COMMISSION)

by

The IBR Asia Group Sdn. Bhd.
(770255-U)

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Website: www.ibrasiagroup.com

Printed by
Percetakan Skyline Sdn. Bhd.
(135134-V)

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

Ushering in *New Changes*

The nation is moving towards green energy development in line with the pledge made at the 2015 United Nations Climate Change Conference (COP 21). The Energy Commission, in upholding this pledge, is taking the relevant initiatives under the National Green Technology Master Plan in educating the public at large to take the necessary steps to fulfil their part in contributing to the overall cause.

The Energy Commission has taken on this challenge through our ability to balance the needs of different stakeholders, namely the government, energy industry and consumers. The translation to reality however, must always ensure a secure and reliable electricity supply at affordable prices, safeguarding public interest and nurturing economic development in an environmentally sustainable fashion as we endeavour to achieve the targets expressed under the COP 21 framework.

Malaysia's energy supply industry is being programmed on an evolution in order to align itself with this national mission and has also interwoven such initiatives with the Economic Transformation Plan (ETP) and National Green Technology Master Plan. The aim of ETP in achieving liberalisation, however, is to warrant fair play among competitors whilst pushing the agenda on energy efficiency.

In line with this proclaimed objective, the Malaysian energy supply industry has successfully completed Regulatory Period 1 under the Incentive-Based Regulation (IBR) framework and has just entered Regulatory Period 2 which has deliberately incorporated special elements to further enhance our green initiatives. Amongst others, we would highlight the provision for the introduction of automated metering interfaces which would facilitate the roll-out of smart meters to all consumer segments and a special allocation to cater for conversion to the LED fittings on a significant portion of street lighting. These examples would invariably encroach into the lifestyles of the general populations, which were previously exposed only to indirect involvement.

It is hoped that these initiatives would initiate escalating awareness and willingness of the public to participate in other such programmes. As a case in point, the recent roll-out of Transformasi Nasional 2050 (TN50), the country's long-term development programme to transform Malaysia into a top 20 nations and a model state for the rest of the world by 2050, also recorded a strong desire from the youngsters for an environmentally sustainable nation. This augurs well with our objectives and we are truly encouraged to pursue on the objectives of our mission. EM

Dato' Abdul Razak Abdul Majid
Energy Commission, Malaysia

Suruhanjaya Tenaga
Energy Commission

Safe And Efficient Usage Of Electricity

Test the automatic circuit breaker switch in your home today!

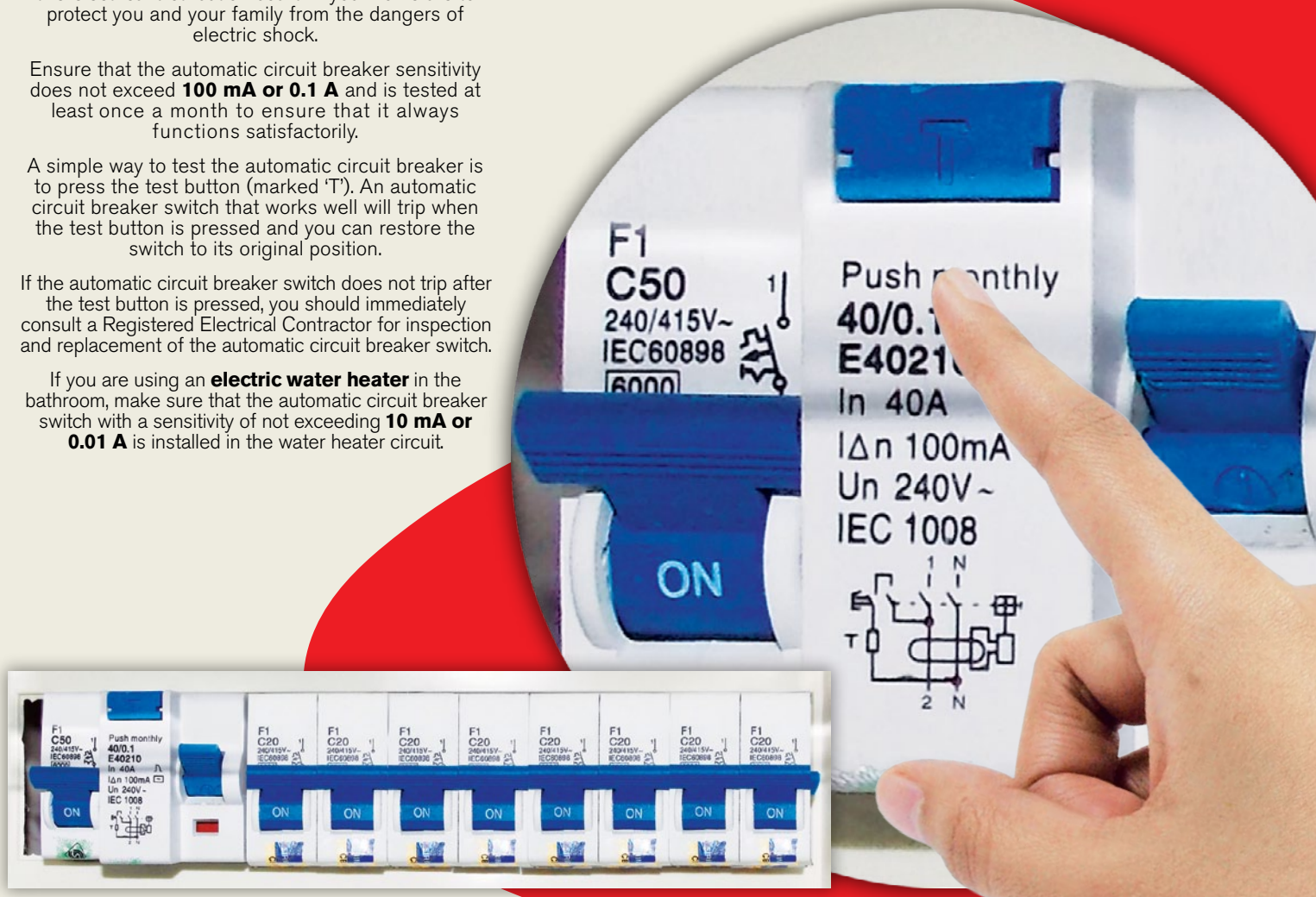
Automatic circuit breaker switches found in the electrical distribution board in your home are to protect you and your family from the dangers of electric shock.

Ensure that the automatic circuit breaker sensitivity does not exceed **100 mA or 0.1 A** and is tested at least once a month to ensure that it always functions satisfactorily.

A simple way to test the automatic circuit breaker is to press the test button (marked 'T'). An 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.



VALUE OUR LIVES. AVOID ACCIDENTS AND WASTAGE!

PRACTISE EFFICIENT WAYS OF USING ELECTRICITY

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

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

Use electrical appliances at moderate speed, temperature and load.

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

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Project Takes the Newton Prize

Researchers from Malaysia and the United Kingdom have won the Newton Prize worth £112,000 (RM611,760) for developing a project that generates sustainable electricity from effluent waste processing.

The team consisted of researchers from the University of Malaya and University of Cambridge who successfully developed an integrated microbial fuel cell prototype using tropical algae from wastewater. Their groundbreaking project will be able to contribute to the ongoing developments to meet the demands for sustainable energy and cleaner wastewater in rural areas such as Sabah and Sarawak.

The Newton Prize recognises excellent research and innovation in support of economic development and social welfare in partnering countries.
– The Malaysian Insight

"With this Newton Prize, we are going to see part of our dream realised. We are going to come up with a working prototype. After that, we hope to get an industry partner to join us in bringing this technology to palm oil mills and remote villages in Malaysia,"

– Phang Siew Moi,
University of Malaya Professor

The Alternative Energy Dilemma

On the turn of the century, the development of new technologies and the growing entry of new players have caused an increase in the alternative energy space. There is, without a doubt, a need to switch from fossil fuels to alternative energy sources. There is also universal consensus that the supply of fossil fuel is becoming limited as well as is harmful to the environment.

However, renewable energy brings with it a fair share of challenges as well. Wind power, for example, has to compete with conventional energy generation sources on a cost basis. Depending on the frequency of wind in certain locations, the construction of a costly wind farm may not be price competitive. Though the cost of harnessing wind energy has decreased significantly in the past decade, the technology still demands a higher investment than fossil fuel-powered generators.

Solar energy is another viable power source as well. However, it is still anywhere from five to eleven times more expensive to produce electricity sourced from the sun than it is from coal, hydro or nuclear sources.

The future still looks bleak for renewables. Will the nation, who is heavily dependent on oil to fund their fiscal expenditure, be willing to allow a decline in fossil fuels? Only time will tell. *–The Star Online*

Investors Turn Against Fossil Fuels

Major investors vowed to move away from earth-warming fossil fuels as world leaders met in Paris seeking to unlock new cash to save humanity from climate "doom" Two years to the day since 195 nations sealed the Paris Agreement to avert worst-case climate change, banks and companies announced billions of dollars of intended divestments from coal, oil and natural gas at a finance-themed climate summit.

But conference host France, as well as the United Nations (UN) and the World Bank, said efforts to shift the global economy into a green energy future were too little and too slow, as a report warned about unprecedented Arctic warming. "We are losing the battle" against climate change, French President Emmanuel Macron told delegates. "We are not moving fast enough."

The Paris Agreement, which took more than two decades to negotiate, seeks to limit average global warming to under two degrees Celsius (3.6 degrees Fahrenheit) over pre-Industrial Revolution levels. Under it, countries have pledged nonbinding cuts in greenhouse gas emissions from the burning of oil, coal and natural gas. French insurer Axa, meanwhile, said it would speed up its divestments from the carbon sector, pulling 2.5 billion euros ($2.9 billion) from companies which derive more than 30 percent of their revenues from coal.

Developing nations need the money to ease the costly shift away from fossil fuels and to shore up defences against weather disasters induced by climate change. Rich nations, who have polluted more for longer, pledged in 2009 to muster $100 billion per year in climate finance from 2020.

Macron called for a yearly gathering to take stock of progress. "We started today to make ground on the battle field," he said. "I hope that in the coming weeks and months we can accelerate." *–AFP*

Some of the most significant harm are from the air emissions that occur when fossil fuels are burned leading to very wide health and environmental concerns.

Though the production would be expensive, the long term investments would see positive growth in terms of the environment and the economy.

Hydro-powered Buses in Sarawak

In what would be the first for Malaysia – Kuching will deploy hydrogen-powered buses on its roads by July 2018, once its order from China arrives. The project will be headed by Sarawak Energy Berhad (SEB) with the state government allocating RM10 million for the research programme to be carried out by the company under its Hydrogen Research Unit.

The funds allocated would also include the cost of setting up a plant with foreign expertise to produce hydrogen gas to power the buses. The acquisition of the emission-free buses is part of a long-term plan to ensure that Sarawak's public transportation system runs on clean energy to reduce carbon emissions in accordance with the 2015 Paris Agreement on Climate Change. *– The Borneo Post*

LOOKING AHEAD INTO THE FUTURE

With the implementation of Regulatory Period 2 already in the works, it is inevitable to wonder what holds for the future of the energy supply industry in Malaysia. Alongside the implementation, various government policies have been realised to facilitate a smooth transition within the sector. ***Energy Malaysia*** sheds some light on the policies and what to expect for the future in the Malaysian electricity supply industry.

Setting Regulatory Period 2 in Motion

Currently in transition, the energy sector is moving forward from Regulatory Period 1 of the Incentive-Based Regulation (IBR) implementation to the next phase which is the Regulatory Period 2. This transition within the energy supply industry is in line with the Transformasi Nasional 2050 (TN50) initiative.

TN50 is a fitting successor to two earlier bold visions that had steered Malaysia's national development – the New Economic Policy (NEP) (1971-1990) and Vision 2020 (1991-2020). The NEP has succeeded in eliminating the statistical correlation between race and economic function. TN50 will scale up the Vision 2020 goals to transform Malaysia into a top 20 nation and model state for the rest of the world by 2050.

According to Dato' Seri Ir. Dr. Zaini Ujang, Secretary General of KeTTHA, along with other members of the United Nations, Malaysia has also adopted the 2030 Agenda for Sustainable Development. Agenda 2030 is summarised by 17 Sustainable Development Goals (SDGs) that expressed a shared global commitment towards improving issues such as climate action, affordable and clean energy and reduced inequalities by 2030.

Dato' Seri Zaini further added that the ministry has already implemented 10 series of dialogue sessions and related programmes in support of TN50 and SDG's goal. The ministry also managed to compile aspirations from different target groups such as students, civil servants, academicians and private sector with the main focus of energy, green technology, water and waste water.

Going Green with National Green Technology Master Plan

With Malaysia's efforts in moving towards a sustainable nation in mind, the Energy Commission has initiated several programmes over the past few years in support of the National Green Technology Master Plan. Dato' Abdul Razak Abdul Majid, the Energy Commission's Chairman mentioned that the introduction of Large Scale Solar Photovoltaic can contribute a substantial amount of energy. Coupled with Net Energy Metering (NEM), it would supplement about 2,000 megawatt (MW) of renewable energy technology. The installation of NEM would create necessary awareness and benefits from the consumers' participation.

The National Green Technology Master Plan aims to generate revenue of RM 180 billion and creating 200,000 green jobs by 2030. However, the Energy Commission isn't emphasising too much on the revenue generation as the main driver of the energy sector but instead is placing their utmost priority on serving the public. Ultimately, the Commission's main objective is to supply the consumers with a reliable and secure electricity supply.

Until there is a breakthrough, conventional methods must be relied on to complement green technology in such a manner that the consumers would not be affected by interruptions and inconsistencies. Additionally, Dato' Abdul Razak noted that the Commission will attempt to balance the power supply system in such a way that there would not be much overdependence on a single form of technology.

Apart from the new infrastructure project, Tenaga Nasional (TNB) is also embarking on the Smart Meters whereby approval for the installation of the 1.5 million units of meters over a period of three years was given the green light. The rationale behind the Smart Meters is to disseminate information between both distributor and customers.

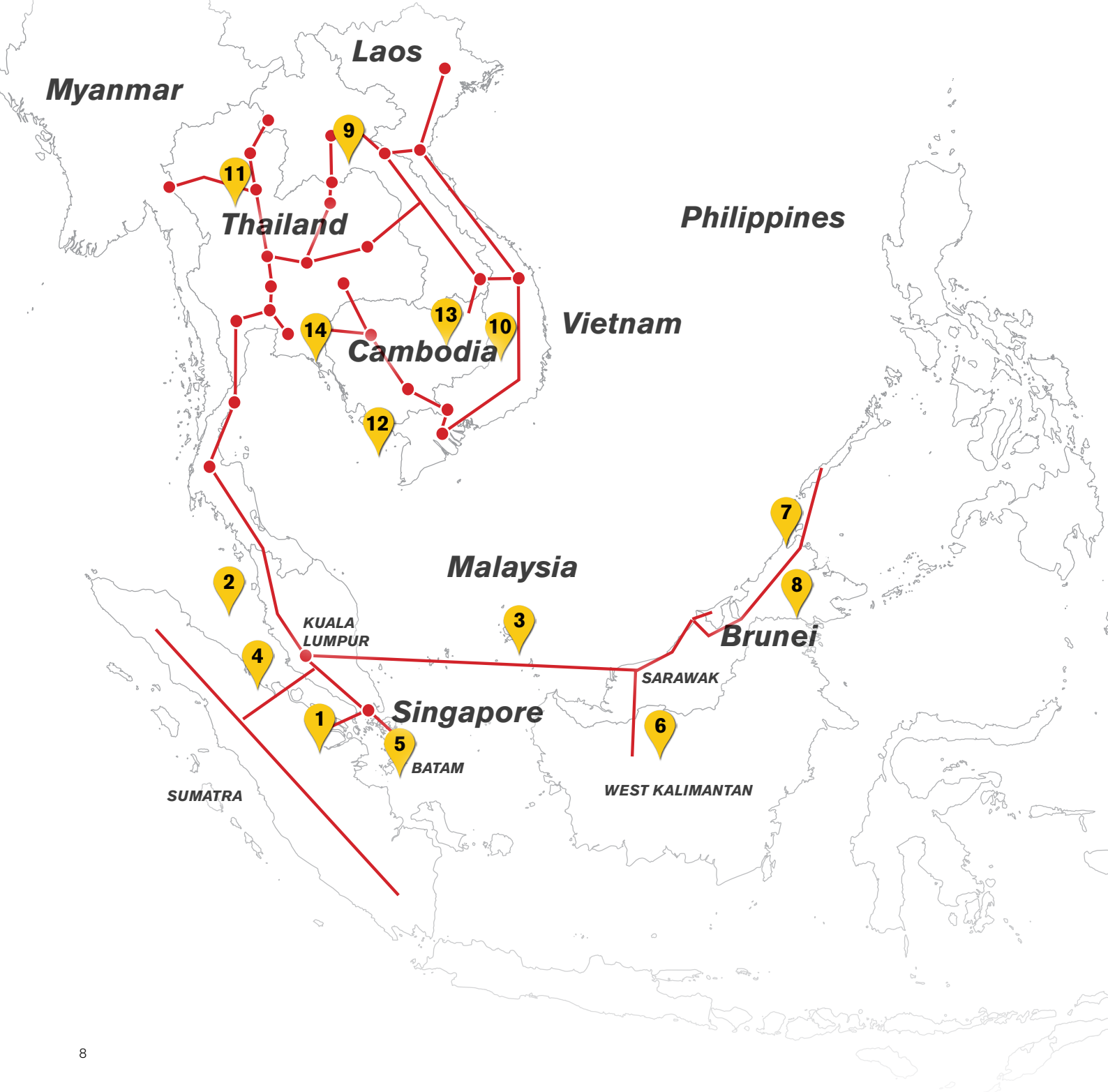
"Moving forward, disruptive technologies and digitalisation may change the demand pattern, as well as the landscape of the electricity sector."

– Dato' Seri Ir. Dr. Zaini Ujang,
Secretary General of Ministry of Energy, Green Technology and Water (KeTTHA)

"The Commission is ensuring that there will be a sufficient and reliable supply with the incorporation of green agenda as part of the energy planning."

– Dato' Abdul Razak Abdul Majid,
Energy Commission's Chairman

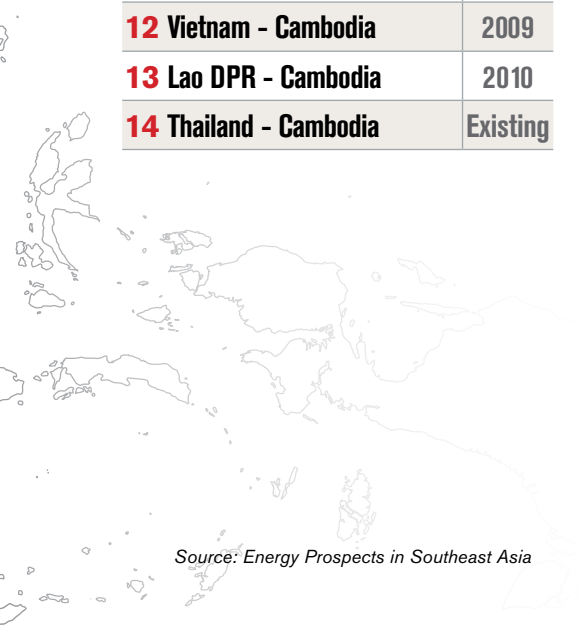
Existing and Proposed ASEAN Power Grid Interconnections



"In ensuring the continuity of the developments, Malaysia should strengthen its policy framework and maintain the financial attractiveness including pricing, support and funding mechanism for both EE and RE."

– Ir. Dr. Sanjayan Velautham,
Executive Director of the Asean Centre for Energy (ACE)

1 P. Malaysia - Singapore	Existing
2 Thailand - P.Malaysia	Existing
3 Sarawak - P.Malaysia	2015
4 P.Malaysia - Sumatra	2012
5 Batam - Singapore	2015
6 Sarawak - West Kalimantan	2012
7 Philippines - Sabah	2015
8 Sarawak - Sabah - Brunei	2015
9 Thailand - Lao DPR	
- Roi Et - Nam Theun 2	2009
- Udon - Nabong	2010
- Mae Moh - Hog Sa	2013
10 Lao DPR - Vietnam	2010
11 Thailand - Myanmar	2014
12 Vietnam - Cambodia	2009
13 Lao DPR - Cambodia	2010
14 Thailand - Cambodia	Existing



Source: Energy Prospects in Southeast Asia

The Smart Meters allow consumers to set a limit on their electricity consumption and also monitor it every 30 minutes. This automated metering interface is launched in Putrajaya and Melaka and is offered to various types of consumers which include residential, commercial and industrial.

Moving Towards Sustainable Future

The high dependence on fossil fuels is raising concerns and as a result, ASEAN has encouraged its member states to put in place various strategies and action plans to enforce energy efficiency (EE). The strategic plans are expected to contribute to meeting one of ASEAN Plan of Action for Energy Cooperation (APAEC) targets, which is reducing ASEAN energy intensity by 20% by 2020 and 30% by 2050.

All of ASEAN Member States (AMS) have embarked in establishing various energy efficiency & conservation (EE&C) policies and regulations which was proven to be the key driver in achieving energy savings across all sectors. These policies have also interlinked benefits concerning economic growth, energy security and environmental impact in ASEAN. According to Ir. Dr. Sanjayan, Executive Director of ASEAN Centre for Energy (ACE), Malaysia is one of the top AMS in terms of EE&C policy. Based on ACE's data, Malaysia has currently implemented more than 15 policies that target on commercial, industrial and residential sectors. The policies include energy audits, minimum energy performance standards (MEPS) and energy labelling.

In terms of renewable energy (RE), most AMS have policies enforced to boost RE deployment and Malaysia is identified as one of the most successful in reaching the specified targets. Specific Feed-in-Tariffs (FiT) for different RE technologies, incentives for RE projects, permit and license procedures in addition to technical standards are all part of Malaysia's effective deployment. Dr. Sanjayan pointed out that among Malaysia's remarkable include is doubling its RE installed capacity within the last decade. The current RE installed capacity of 1.2 gigawatts (GW) as of 2015 even surpasses the national target of 985 megawatts (MW) which was set in 2010.

Manufacturers' Green Action Plan

Attempting to achieve a sustainable development,

"There should be greater coordination and better planning by authorities on a holistic approach for greater efficiency and in ensuring economic viability for industrial stakeholders to participate in RE and EE initiatives."

– Steve Aroki,
Chairman of FMM Energy Management Committee

the Malaysian manufacturing sector has also been moving into clean energy particularly with the utilisation of natural gas as natural gas gives a more consistent quality in terms of firepower and reliability in supply compared to other fossil fuels. Clean energy also promotes greater energy cost competitiveness in respect of fossil fuels and savings in operation costs. This is derived from efficient use of energy especially in industries which are able to optimise energy efficiency through co-generation.

Steve Aroki, Chairman of FMM Energy Management Committee opined that one of the other reasons the manufacturing industry is moving towards a cleaner energy is to meet increasing market demand for cleaner and more sustainable production. In the global production especially, it demands sustainability throughout the supply chain as well as ISO50001:2011 energy management certification. Adhering to the *Efficient Management of Electrical Energy Regulation (EMEER) 2008* through the compliance of environmental regulation on clean air, waste management and Sustainable Development Goals is absolutely crucial to reduce carbon footprint.

The Energy Commission's soon to be implemented initiative - a web-based Energy Management System which could carry out analysis, performance tracking and benchmarking. This initiative is highly applauded and would be useful in helping industries benchmark and learn from each other. However, initiatives under the National Energy Efficiency Action Plan (NEEAP) 2016-2025 directed at promoting industry investments in EE such as the energy audit conditional grant and green technology incentives need to be reviewed and strengthened to ensure that financial support is accessible and adequate to the stage of development.

Since EE implementation is still at an infancy stage in Malaysia, helping industries which are ready and already on their journey ahead would ensure good role models to inspire other businesses to invest. Once there is momentum, the government could scale back assistance and incentives on a graduated scale and shift focus to newer and higher end initiatives. Continual training and awareness programmes for industry, engagement with top and senior management to increase commitment to EE programmes and subscribing to energy management standards also helps to promote sustainable energy practices.

Balancing the Fuel Mix

Malaysia still utilises a large amount of coal in its fuel mix to fulfil its electricity demand as pointed out by Ir. Azhar Omar, the acting Chief Executive Officer of the Energy Commission. In 2015, Malaysia imported almost 25 million metric tonnes of coal, an 8 times increase as compared to year 2000. As of now, 50-59% in the energy mix is coal due to the price advantage and security of supply.

To combat this, the energy supply industry is planning a transition into a low carbon energy sector with the integration of more renewable energy in the mix in line with TN50. The implementation of

Green Technology Master Plan (GTMP) for Energy Sector

ELECTRICITY GENERATION

RE MIX (INSTALLED CAPACITY)	2016	2020	2025	2030
	18.4%	**20%**	**23%**	**30%**

- **Electricity Generation Diversity:** Maintaining Herfindahl-Hirschman Index (HHI) **below 0.5**
- **Carbon Emission from Power Plants:** Imposition of **clean coal technology requirement** for new coal-fired plants
- Reinvigorating **co-generation** policy

ENERGY EFFICIENCY

REDUCTION IN ELECTRICITY INTENSITY	2014	2025	2030
	1.5%	**10%**	**15%**

Source: Green Technology Master Plan

regasification terminal with Liquefied Natural Gas (LNG) calls for the diversification of the fuel mix with coal. With the change in the economy and industry, slow growth of the energy demand is observed.

Ir. Azhar stated that it is vital to relook at the policy to attain a holistic integrated planning. A fair balance of the coal and gas in the fuel mix is expected though it has been predicted that without proper intervention, 70% of coal may be used in the fuel mix.

In the meantime, Clean Coal Technology is adopted to cope with the emissions from coal burning. Clean Coal Technology with flue-gas desulphurisation (FGD) for example, is a set of technology used in the removal of sulphur dioxide (SO2) from exhaust flue gases of fossil-fuel power plants and from the emissions of other sulphur oxide emitting processes. Power plants must also adhere to the Clean Air Regulations enforced by the Department of Environment.

ASEAN has been endowed with a lot of natural resources and Malaysia especially has been blessed with a huge reserve of oil and gas to last for the next 40 years. To be prudent in managing and utilising the resources, Malaysia intends to achieve a sustainable and cost-efficient energy supply without depriving future generations. Therefore, Malaysia plans to gradually move away from subsidies consequently ensuring adequate connectivity and social safety net for the country.

The next agenda set by Malaysia is to transform and ensure the sustainability of the rural electrification system, as well as delivering reliable and affordable electricity supply to

its people. This coupled with the recent multilateral electricity purchase from Lao People's Democratic Republic could be the required catalyst to spur the multilateral electricity trade within the region to drive the aspects of energy security, accessibility and affordability to the people of ASEAN.

The Demand for Energy

The 5th ASEAN Energy Outlook was launched during the 35th ASEAN Ministers on Energy Meeting (AMEM) last September.

According to the data, almost 40% of total energy demand is petroleum products, driven by the high demand from the industry and transport sector. It can be deduced that ASEAN still heavily relies on fossil fuels and thus challenges will be faced in relation to energy saving and efficiency in these sectors. Similarly in Malaysia, around 56% of national energy demand is oil products while the transport sector is the largest energy consumer with 45% of total energy consumption.

In general, it is very challenging for AMS to ensure a constant

"The government must look into the policy and intervene to strike a fair balance in the fuel mix in ensuring a reliable, affordable and sustainable supply."

– Ir. Azhar Omar,
Acting Chief Executive Officer
of Energy Commission

Launched during the 35th ASEAN Ministers on Energy Meeting (AMEM), the 5th ASEAN Energy Outlook (AEO5) was developed based on the energy policies and targets of 10 ASEAN Member States (AMS). Country leaders are seen here officiating the launch in working toward achieving their national expectations of the future economic and population growth.

demand for energy. Most of the AMS are developing nations where the economy is still firmly corresponding to energy consumption and the Gross Domestic Product (GDP) is closely linked to the electricity growth. Other factors that influence increasing demand in ASEAN countries which include energy subsidies, rapid urbanisation, industrialisation and the growth of private vehicle ownership. As of now, rather than ensuring a constant energy demand, ASEAN is aiming to reduce its regional energy intensity up to 20% by 2020 and 30% by 2025 through EE efforts.

In the long run, the application of more EE programmes will aid ASEAN in achieving a constant or even lower energy demand. Towards this end, there is a need to have a comprehensive whole-of-government approach to EE and especially in Malaysia to ensure it covers the thermal usage and transport sectors.

The implementation of Regulatory Period 2 holds exciting things for the future of the energy supply industry. In line with government policies, the energy supply industry has been moulding itself to cater to the rapid development of the nation in hopes of creating a better, smarter nation. EM

Several sectors within the energy supply industry are undergoing a transition alongside the implementation of Regulatory Period 2 (RP2). ***Energy Malaysia*** takes a closer look at how Tenaga Nasional is gearing up for the upcoming transition within the industry.

RESHAPING ELECTRICITY SUPPLY INDUSTRY

Mandated by the Energy Commission, Tenaga Nasional (TNB) is working hand in hand with the energy regulator to realise the Regulatory Period 2 (RP2) by digitalising the electricity supply sector. In line with that, Smart Grid System and Smart Meters are being implemented to achieve a more efficient and sustainable energy development for the nation.

The electricity supply industry is embracing digitalisation to keep up with the rapid change within the industry and nation as a whole.

The Smart Grid System is self-healing and self-sustaining with the placement of sensors on the grid system itself. The sensors are capable of identifying total electrical load and it also prevents overload in the system. Additionally, the sensors predict system malfunction or failure prior to its occurrence. This predictive maintenance feature will significantly reduce outage time of the grid system and as a result, it will maximise the overall efficiency of the sector.

The Smart Meters on the other hand, allow consumers to set a limit on their electricity consumption and monitor their consumption every 30 minutes. According to the latest regulatory submission carried out by the Energy Commission, the implementation of about 1.5 million Smart Meters has been achieved nationwide.

TNB Energy Services – a wholly owned company of the national utility giant also introduced the "Making Electric Visible" (MAEVI) application which can be downloaded via the Apple Store or Google Play. According to Datuk Roslina Zainal, Vice President of Regulatory Economics & Planning at TNB, the MAEVI application aims to engage and empower consumers to better manage their home energy

use through real-time monitoring of electricity consumption. It also tracks energy cost calculation of electrical appliances and notifies users when consumption exceeds the targeted bill.

However, along with the uprising of digitalisation in the sector comes several other challenges. One of which is in maintaining the security of the Smart Grid and Smart Meters system. TNB is working closely with software developers to ensure that the system is ironclad against attackers and intruders. Apart from that, one of the challenges that TNB is also facing is a talent shortage. Seeing as the execution of the Smart Grid and Smart Meters system is fairly new, the current employees are still unfamiliar with the system. In combating the talent shortage, Datuk Roslina suggested that a more holistic approach be implemented in the syllabus of courses in tertiary institutions with a further specialisation in the operational field to create a new generation of specialised technicians, analysts and engineers.

The "Making Electric Visible" MAEVI App allows consumers to monitor and manage their electric consumption through their mobile devices.

"Through Reimagining TNB 2025, we're trying to embrace the challenges with specific strategies and turn them into opportunities."

– Datuk Roslina Zainal,
Vice President of Regulatory Economics & Planning at TNB

Reimagining TNB 2025

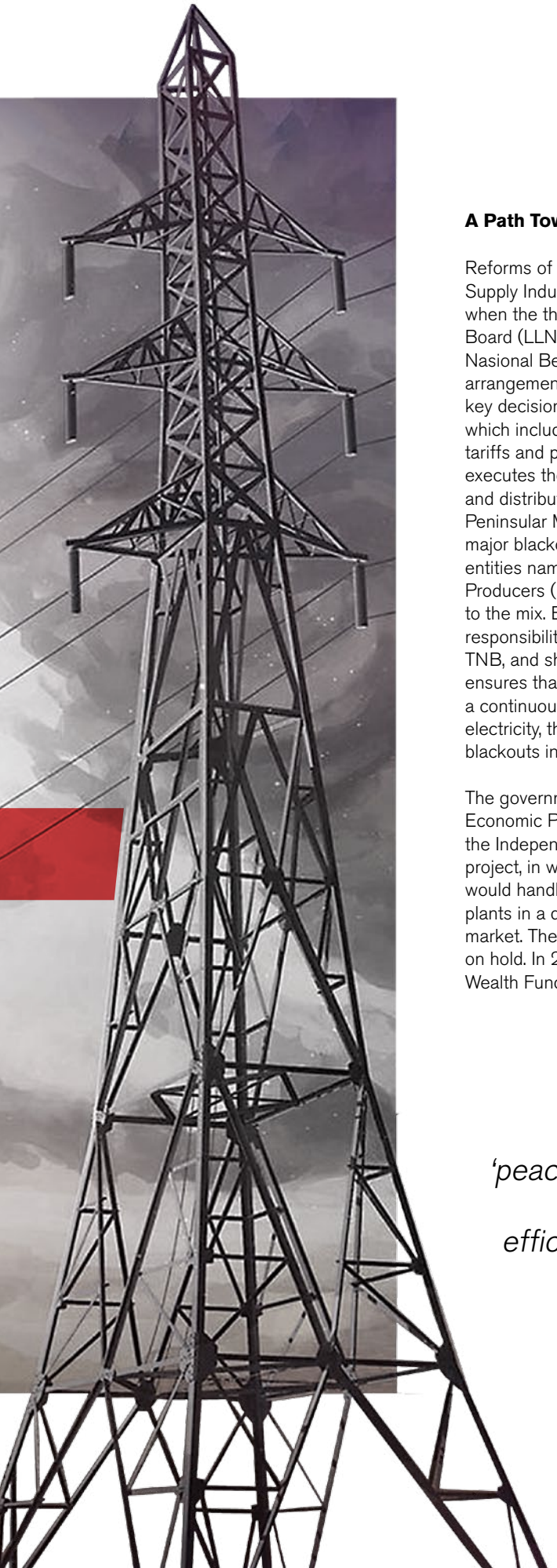
As for the future of TNB, it is embarking on a transformation programme named "Reimagining TNB 2025" that consists of four main pillars. The first pillar of the programme relates to alternative source generation where TNB is attempting to rely more on renewable energy sources instead of fossil fuels. In line with the National Transformation 2050 (TN50) initiative, TNB's 'Grid of the Future' pillar is set to cater to the digitalisation of the industry. Following that, TNB is also emphasising on winning over its customers with new and enhanced services and products. Lastly, TNB also hopes to assist the government in the execution of regulations and policies related to the energy industry.

In moving towards the era of digitalisation, TNB is adapting to new ways to improve its overall system coming into Regulatory Period 2. Ultimately, this utility company's main objective is to provide the best services not only to their customers but also to stakeholders of this industry. EM

PUT A RING(FENCE) ON IT

Single Buyer's Journey Towards Transparency and Efficiency

The energy industry has undergone major changes to remain competitive and transparent. The industry aims to do away with its traditional vertical market model to a more modern managed market model. Since then, one of the key reform initiatives that has been carried out is the establishment of the ring-fenced Single Buyer (SB).



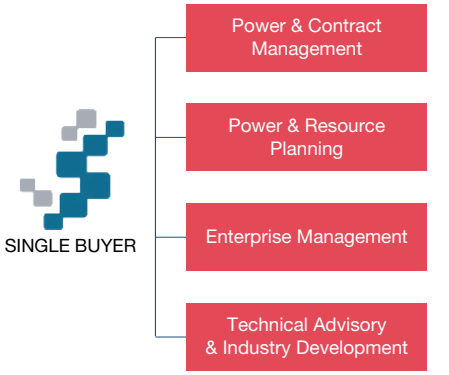
A Path Towards Reformation

Reforms of the Malaysia Electrical Supply Industry (MESI) started in 1990 when the then National Electricity Board (LLN) was privatised as Tenaga Nasional Berhad (TNB). Under the arrangement, the government makes key decisions for the energy industry, which include capacity plant-ups, tariffs and power supply while TNB executes the generation, transmission and distribution of power throughout Peninsular Malaysia. After several major blackouts in the mid-90s, new entities namely Independent Power Producers (IPPs) were introduced to the mix. By alleviating the sole responsibility of power generation from TNB, and sharing it with the IPPs, this ensures that consumers would receive a continuous and efficient supply of electricity, thus preventing any further blackouts in the nation.

The government has also tasked the Economic Planning Unit, to undertake the Independent Grid System Operator project, in which the market operator would handle the dispatch of power plants in a deregulated electricity market. The study however was put on hold. In 2010, National Sovereign Wealth Fund Khazanah Nasional Berhad (KNB) and the Ministry of Energy, Green Technology and Water (KeTTHA) embarked on a power sector transformation programme, which entails to the ring-fencing of Single Buyer (SB) and Grid System Operator (GSO).

In 2012, the Single Buyer was created. This ring-fenced entity, along with GSO would enhance transparency and market conduct independence. This

Functional Structure of Single Buyer



Source: Tenaga Nasional Berhad

"Single Buyer acts as a regulator and a 'peacemaker' by ensuring transparency and efficiency in carrying out its operations."

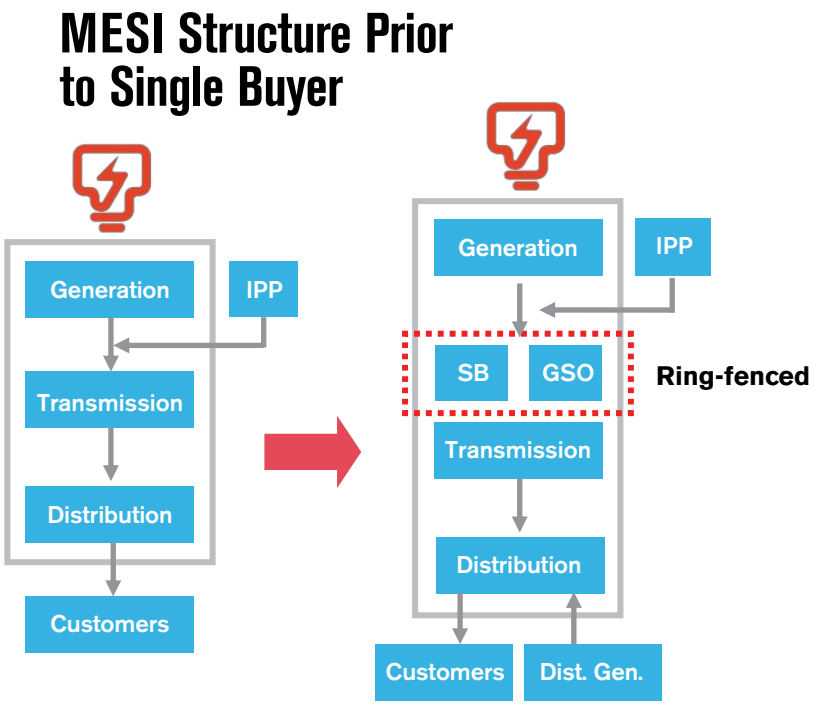
– Charanjit Singh,
Head and Chief Executive Officer of Single Buyer

model also resulted in the formation of the Single Buyer entity to execute and manage Power Purchase Agreement (PPA) contracts.

The Independence of Single Buyer

General responsibilities were embedded within TNB prior to the institution of Single Buyer, such as acts, as in particular the purchase of energy from power producers. This vertically-integrated structure was transformed with the formal establishment of SB on 1 September 2012. The main function of Single Buyer is to procure electricity from IPPs and TNB.

Single Buyer was reinforced with clear, transparent, non-discriminatory and auditable functions and operating procedures. This entity was ring-fenced in order provide greater transparency and allow stronger supervision from the Energy Commission as the regulator. In principal, Single Buyer maintains a separate set of accounts and operations. As such, despite being a subsidiary of TNB, this arrangement allows the Single Buyer to remain independent and transparent. Charanjit Singh, the CEO of Single Buyer pointed out that IPPs have shown tremendous support and co-operation of Single Buyer as it has alleviated concerns and fears of any conflict of interest.



Source: Tenaga Nasional Berhad

Revolutionising the Electricity Supply Industry

To further streamline the role of the Single Buyer entity, the New Enhanced Dispatch Arrangement Rules (NEDA) was created. A supplementary to Single Buyer Rules, NEDA provides the guideline and principles on the operation of the New Enhanced Dispatch Arrangement. It also laid down the obligations and rights of the participants, Single Buyer, Grid System Operators (GSO), grid owner as well as the distributors. NEDA is an avenue that enhances competition and cost efficiency of the Single Buyer market.

Under the IBR guidelines, the previously recommended managed market model (M3) structure is revived and enhanced to suit the current industry demands. In the new M3 structure, TNB's business is categorised into five business entities: TNB Generation, Single Buyer, Transmission, System Operator and Customer Services. TNB's divisional accounting framework will also be separately identified while Single Buyer and System Operator will be ring-fenced within TNB. Charanjit believes that M3 must be modified according to the evolution of MESI with the introduction of renewable energy. Consumers are more aware of the changes in the industry and altering their electricity usage will ensure they adapt to the on-going changes.

Ever evolving, MESI has exciting times ahead with the independence of Single Buyer as a stand-alone entity. The fair play and competition amongst players not only changes the market but ultimately lightens the burden of the consumers thus benefitting the nation as a whole. EM

Inspired by Isaac Asimov's published science fiction short story 'Reason', this is an imagined illustration of the space-based solar power stations by John Mankins, founder of Mankins Space Technology and author of 'The Case for Space-Bases Solar'.

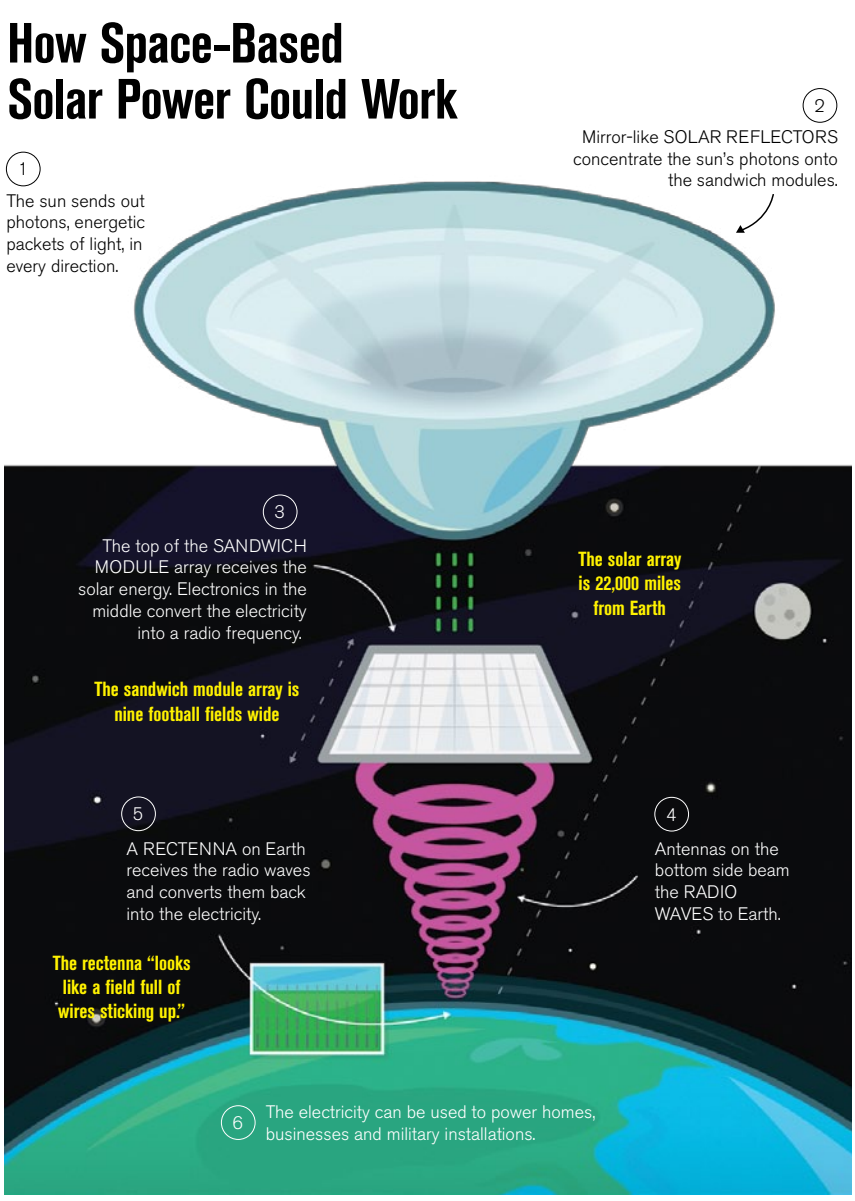
Chasing the Sun

Space-Based Solar Power

Solar power is one of the most significant sources of renewable energy today. However, the reliability of solar power often becomes an issue during bad weather, when the night falls as well as in cloudy areas. Now, let's take solar power one step further into the future where neither the weather nor the night can interfere with the collection of power. Through Space-Based Solar Power (SBSP), the whole idea of solar power generation is set to be transformed.

On Earth, the generation of energy through solar installations is heavily influenced by factors such as the atmosphere, cloud cover, seasonality and the night when no sunlight is present. At least 30% of all incoming solar radiation never even make it to ground level due to the absorption by water vapour, dust and the ozone. The sun is, however, always shining in space where there is no atmosphere to reduce the intensity of the sun's rays and the tilt of Earth does not prevent the collection of power. All these reasons make putting solar panels in space an appealing and sensible possibility.

The notion of harvesting solar power in space for use as energy on Earth has been around since the commencement of the space age.



Source: Business Insider

The concern over climate change has intensified drastically and with the advancement of the relevant technologies, interest in space-based solar power has risen in recent years. Without the advancement of a large-scale zero-carbon and human-driven energy, the persistent negative climate change will inevitably result in the impending destruction of ecosystems and human habitats worldwide.

The Mechanism of SBSP

Along with reflectors and a microwave or laser power transmitter, self-assembling satellites are launched into space. These reflectors or inflatable mirrors will spread over a vast swath of space and direct solar radiation onto the solar panels. The panels then convert the solar radiation into solar power and send it down to Earth. Here on Earth, power-receiving stations will collect the beam and feed it to the electric grid. The two most commonly proposed designs for SBSP are a large, deeper space microwave transmitting satellite and a smaller, nearer laser transmitting satellite.

John Mankins, the founder of Mankins Space Technology and the author of 'The Case for Space-Based Solar' spent 25 years at United States National Aeronautics and Space Administration (NASA) and Caltech's Jet Propulsion Laboratory refining his space solar power plant concept. Funded by NASA's Institute of Advanced Concepts since 2011, he insists that the technology and engineering required in making space solar a reality are already in existence. However, as with any expensive new idea, it all comes down to sufficient funds and ingenuity. "There's no secret sauce. It's a financial hurdle to get funding to develop the elements and demonstrate the new architecture required to do this," he said.

The Good and The Bad

The advantages of SBSP are numerous in which most protect the

"In the long run, renewable large-scale energy sources such as space solar power are essential to sustaining industrial civilisation, and the long and increasingly high quality of lives that we enjoy."

– John C. Mankins,
Founder of Mankins Space Technology and
Author of 'The Case for Space-Based Solar'

environment, ensuring sustainable environmental development. Unlike oil, gas, ethanol and coal plants, SBSP does not emit greenhouse gases. In addition to that, in contrast to terrestrial solar and wind power plants, SBSP is available all day and all year regardless of cloud covers, the time of day or wind speed. It also stands to provide true energy liberalisation for the nations that choose to develop it, eliminating competition between nations for the limited Earth-based energy resources.

The only major setback in bringing about the launch of SBSP is the ludicrously high development cost. The production cost is in the tens of billions of dollars range and requires as many as a hundred launches into space with the need of costly space-based assembly. In 2012, Tesla's Elon Musk stated that we should "stab that thing in the heart", citing against the high cost of deployment. However, proponents of SBSP are certain that the price of ignoring a clean, constant, global power supply could be relatively greater such as ecological trauma and interstate wars linked to oil.

Realising the Vision

Some nations are already willing to foot the bill when it comes to attempting to make SBSP a reality. According to a proposal from researchers at the Japan Aerospace Exploration Agency (JAXA), Japan foresees itself having a commercially viable space solar station within the next 25 years. A world leader in space-based solar power systems research, the agency has already created a technology roadmap that puts forward a series of ground and orbital demonstrations leading to the development of a 1-gigawatt commercial system in the 2030s, which is approximately the same energy output as a typical nuclear power plant.

China, the world's largest energy consumer, plans on having a commercially viable station in orbit by the year 2050 which would supply the bulk of the nation's power. The proposed station will be twice the size of New York's Central Park and weighs roughly 10,000 tonnes – heavier than anything that has ever been launched into space to date. In the United States, the people behind a California-based start-up company, Solaren Corp. have taken matters into their own hands and are no longer waiting for the Federal Government to harness this new power source. The aerospace company is in the process of negotiating new agreements and has secured the first round of financing for a lab-based demonstration of its component technologies to provide 200 megawatts of clean power from the cosmos over a 15-year period, which will begin at the end of this decade.

In placing importance on sustainable environmental growth, space-based solar power is the futuristic solution for the depleting and inconsistent energy sources found here on Earth, be it the renewable or the non-renewable ones. Though it would seem like an impossible feat financially, nothing can truly put a price on a greener and greater world for the future generation. EM

SMART GRID SY
CREATING NEW

With the Internet of Things (IoT) and digitalisation taking over industries, it is only a matter of time that the nation's energy supply industry is completely transformed by technology. The journey to digitalisation within the industry commenced with the implementation of the present-day Smart Grid System. ***Energy Malaysia*** delves into the workings of the Smart Grid System and the various job opportunities arising from its implementation.

A digitally enhanced network utilising computer-based remote control and automation to increase power grid efficiency, the Smart Grid System employs two-way communications technology and computer processing typically used in telecommunications. This enables utilities to control and adjust each device from a central location, while at the same time the devices are able to send data back to the operations centre.

Because of this, electricity utilities are able to receive real-time feedback on issues like power usage, consumption patterns and interruptions. The Smart Grid System also facilitates power utilities in moving towards the use of greener technology with them opting for renewable energy sources and becoming energy efficient for the reduction of carbon emissions.

The on-going implementation of the Smart Grid System in Malaysia has opened countless job opportunities in the industry, particularly for those skilled in Information and Communication Technology (ICT). The following are just some of the more in-demand occupations.

Operations Research Analyst

An operations research analyst formulates and applies analytical methods using science, mathematics and engineering principles to develop and interpret information. They reduce the complexity of resource management to assist utility companies in making informed decisions and in improving its overall efficiency. Using state-of-the-art software, analysts essentially solve problems and are often involved in planning and forecasting. For example, they anticipate future electricity needs so that power generation and transmission capacity is established before it is even needed.

STEMS: OPPORTUNITIES

Software developers in the energy sector are dedicated to developing softwares catered specifically to run a smart grid system.

To be employed as an operations research analyst, one must possess a Bachelor's Degree in disciplines that include extensive coursework in Mathematics and other quantitative subjects such as Mathematical Science and Operations Science. However, employers are also more inclined to hire candidates with a Master's Degree in Operations Research, Management Science or a related field – such as Computer Science, Engineering, Applied Mathematics or Information Systems.

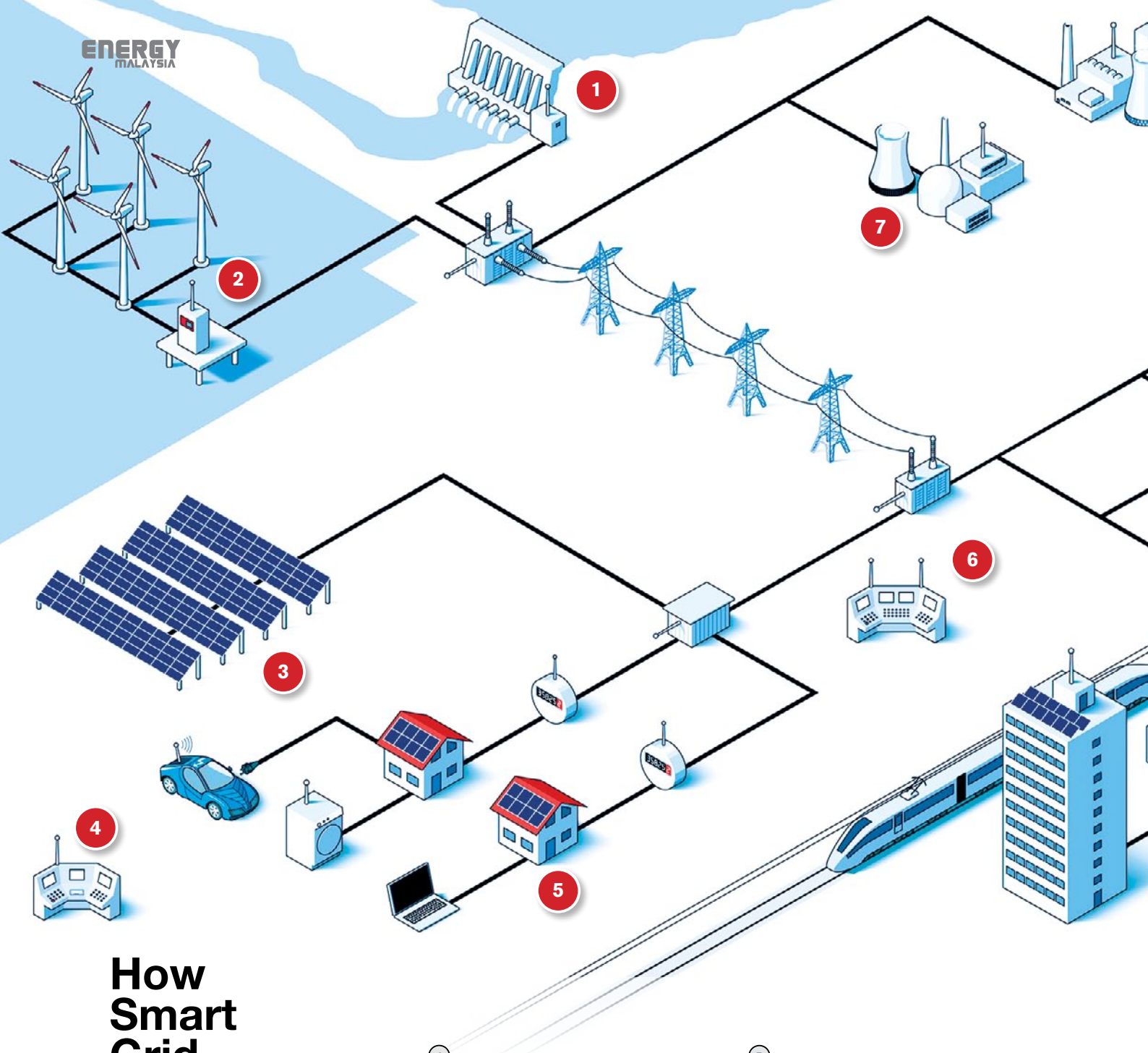
Candidates with a dual graduate degree in operations research and computer science are especially attractive to employers. Thus, continuous learning and the willingness to pursue further education are crucial for those who are interested in joining this line of work. One must also keep up to date with new technological advances and software tools while improvements in analytical methods are vital for maintaining problem-solving skills required for the job.

Software Developers

The profession of software developers has been around since the nation's paradigm shift towards modernisation. Software developers generally design, test and evaluate applications and systems that operate computers. With regards to the smart grid system, the computer system that runs the smart grid require a specific software that is created and modified accordingly by software developers to cater to the individual needs of each utility.

Commonly, software developers need a Bachelor's Degree in Computer Science or Software Engineering. However, for some positions that require a specific area of expertise, employers may prefer to hire candidates with a Master's Degree. On the other hand, an associate's degree, diploma or certificate in the related field is adequate for the less taxing jobs. Candidates who possess the relevant skill-set and industry experience are typically favoured by employers.

Technical know-how is one way of measuring how good a developer is but soft skills are the ones that really put you on the map. Adaptability should be second nature to developers due to the fact that there are always things to be changed and things to be learned. Critical thinking is also one of the import soft skills that should be practiced by a developer. It involves assessing facts which will allow them to quickly test each scenario mentally before choosing the most efficient solution. This would especially come in handy as it helps developers write clean and maintainable code.



How Smart Grid Works

1 ***Pumped Storage Hydroelectricity:*** *When electricity is abundant, these plants store energy in the form of water pumped to a high elevation reservoir. When there is a peak in demand, the water is released, generating electricity.*

2 ***Wind Farms:*** *Output from the wind turbines is subject to fluctuation. In future, the smart grid will provide real-time information on wind energy, so utilities can better manage their output.*

3 ***Photovoltaics:*** *Households and other operators feed their locally produced solar energy into the networks.*

4 ***Data Hubs:*** *To efficiently manage data, real-time information on energy generation and consumption is processed at hubs distributed throughout the network. They support the process of balancing the grid load.*

5 ***Houses:*** *Every house is connected to an electricity and data network. A communication device captures data on power use and transmits it to utilities every second. The device also communicates the current energy price to households, which allows customers to take advantage of lower rates.*

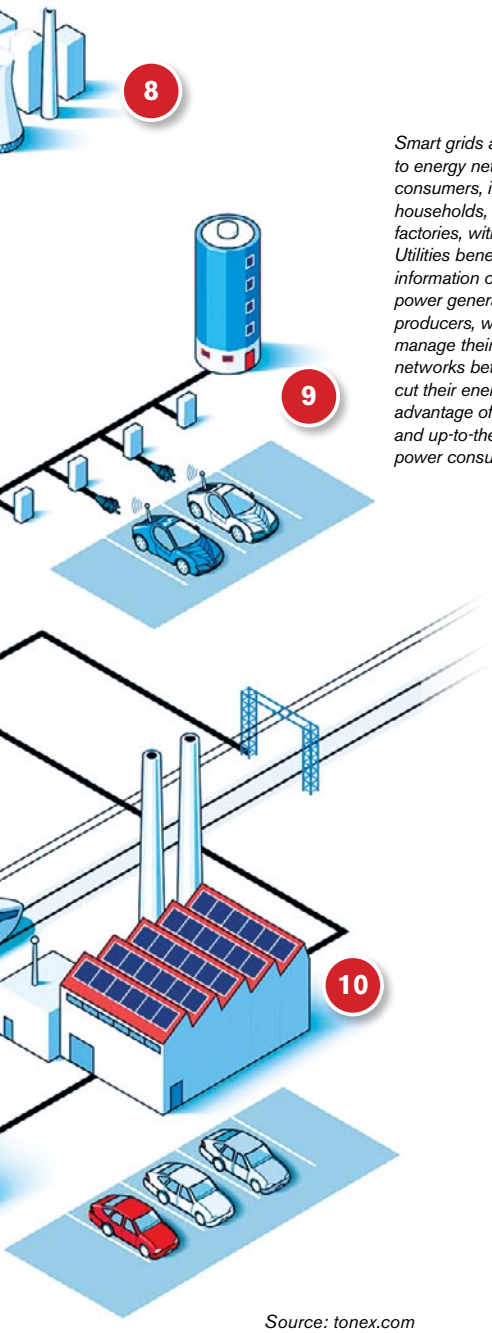
6 ***Data Centres:*** *Data from energy producers and consumers is fed into the data centre. Utilities can use this information to manage their power plants and grids more efficiently. Customers can access a real-time overview of their energy consumption online.*

7 ***Co-generation Plants:*** *Utilities use decentralised independent power plants, such as those located in factories, to provide additional, on-demand energy.*

8 ***Power Plants:*** *Thanks to decentralised energy suppliers, their contribution to the grid is reduced.*

9 ***Electric Vehicles:*** *Electric cars are filled up when prices are lowest. Utilities use the cars' batteries to store energy at times of peak load.*

10 ***Manufacturing:*** *Factories can programme their machines to operate during off-peak times, cutting cost.*



Smart grids add a digital dimension to energy networks. They connect consumers, including private households, businesses and factories, with electricity supplies. 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: tonex.com

Network and Computer System Administrators

These are dedicated teams of people who install and maintain an organisation's computer system. Most components of the smart grid depend greatly on reliable computer networks to operate. Therefore, it is up to the system administrators to ensure that the computer systems function properly and that problems are fixed in an efficient manner.

In terms of academic qualification, network and computer system administrators often times need a Bachelor's Degree in Computer Networking and System Administration. An associate's degree, diploma or a professional certificate in the same field in addition to the relevant work experience may be adequate for some jobs. The majority of system operators begin as computer support specialists before advancing to administrative positions.

To further develop themselves professionally, network and computer system administrators can enhance their employment opportunities by obtaining the relevant certifications. Numerous employers regard certain certifications as the industry standard and may require employees to obtain them. Computer specialists must also attend periodic training to stay abreast of the latest industry developments due to the ever-changing nature of technology.

Candidates need several vital personal qualities. Strong problem solving skills will be helpful in identifying problems within an organisation's computer network or in this case, within the smart grid's networks. Excellent critical thinking skills are a prerequisite as it aids you in weighing all the possible options and determining the most effective resolution.

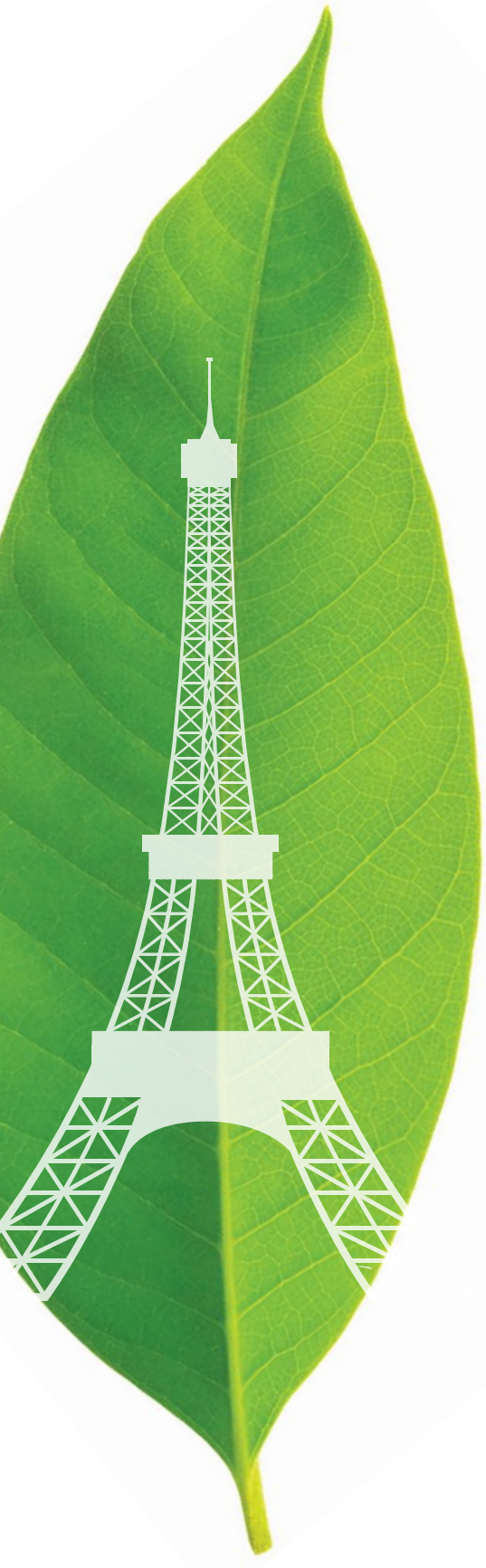
Computer System Analysts

Computer system analysts have many roles to play. They specialise in assisting in the selection of the appropriate system hardware or in developing and fine-tuning systems. They also cooperate with computer programmers to debug and eliminate errors from the system or do in-depth testing for the system. Apart from that, computer system analysts help build the system and manage them once operational as the smart grid relies more on computer control than the current grid.

To be employed as a computer system analyst, it is ideal for candidates to possess a Bachelor's Degree in Computer Science. For those without a Bachelor's Degree, an associate's degree, diploma or professional certification in an applicable field plus relevant work experience may be adequate for some roles.

In order to be a holistic computer system analyst, one needs to have strong troubleshooting and problem solving skills. They must retain an understanding of how each component works, diagnose the problems and determine viable options in case of a technical glitch. Analytical and writing skills are also a great asset to decipher large amounts of data and produce written reports of the analysis.

With the growth of digitalisation in the electricity supply industry, job opportunities therein are booming, requiring the current staff as well as fresh graduates to constantly seek additional industry relevant qualifications, skills and knowledge. It also pushes current employees to keep up to date with the latest technological developments in procuring the best opportunities for career advancement. All in all, the career prospect in the smart grid industry is thriving with potential for both the present as well as future employees to grow along with the technological advancement. EM



A PLEDGE TOWARDS SUSTAIN

Climate change is a complex issue with unique characteristics. It is global, long-term and involves complex interactions between environment, economy, policy, institutions, society and technology. Many nations, including Malaysia are taking a stand towards tackling climate change – with many pledging to play a big part to ensure the world is sustainable not only for the wealth and wellbeing of the country but the future of generations to come.

The Birth of Change

During the 21st Conference of Parties (COP 21), the Paris Agreement was adopted under the United Nations Framework. A total of 197 countries signed the Agreement aimed at reducing carbon emissions by 2030. It will be a legally binding global climate deal and it sets out a global action plan to put the world on track to mitigate the effects of climate change by limiting global warming to well below 2°C, and if possible, below 1.5°C.

Malaysia is no stranger to the effects of climate change as the nation has experienced a warming trend for the past few decades. The mean surface temperature has increased from 0.6°C to 1.2°C over 50 years and is projected to increase a degree by 2050. Rainfall intensity and sea levels are both projected to increase as well – states like Penang and Kelantan facing severe frequent flooding due to climate change.

During negotiations in COP 21, countries were asked to put forward a target for emission reduction in the period after 2020, known as Intended Nationally Determined Contribution (INDC). According to Malaysia's INDC, the country aims to reduce its carbon emissions up to 45% by 2030. This reduction consists of 35% mandatory reduction and a further 10% conditional upon receipt of climate finance, technology transfer and capacity building from developed countries.

At present, Malaysia is in the process of ratifying the Paris Agreement, which would allow Malaysia to participate in the reduction of global carbon emissions.

ABILITY

Rising Challenges

The assumptions that there is a lack of awareness in climate change among Malaysians is misleading. The level of awareness on issues about global warming are at a very high level. The government has conducted many programmes and events to increase the awareness. One of the largest event by KeTTHA was the International Greentech and Eco Products Exhibition and Conference that drew in thousands, displaying the latest technology on energy efficiency and renewable energy.

However, the problem still persists, especially in the residential sector. Many citizens might not feel the full brunt of climate change due to Malaysia's natural hot and humid weather, but Malaysians are feeling the effects. Incidents such as prolonged flash floods and crop failures are all the effects of climate change.

Aside from the citizens' lack of awareness, the high costs and technological limitation have hindered Malaysia's reduction in greenhouse gas emissions. For instance, very high investment and operating costs, particularly in green technologies and infrastructures, can serve as a significant barrier to investments in renewable energy. Despite this, Malaysia has addressed these problems through various initiatives and policies.

Committed to the Cause

Malaysia has undertaken a number of efforts to address climate change and has continually evaluated its mitigation potential in various key sectors. In the Eleventh Malaysia Plan, the nation places a strategic thrust on pursuing green growth for sustainability and resilience. The government recognises that investing in low-carbon, resource efficient and socially inclusive green developments will yield higher gains in the future.

Apart from the United States, Syria and Nicaragua, a total of 192 countries has sent their pledges to cut global carbon emissions in accordance to the Paris Agreement.

The government is committed to lead in creating green market through Government Green Procurement (GGP), and at the same time promote the adoption of criteria for green buildings and strengthening green certification. The share of renewables in the energy mix will be increased, while demand side management (DSM) will be enhanced. Low-carbon mobility through the utilisation of energy-efficient vehicles and public transport will also be promoted extensively.

Another key initiative in the government's attempts would be the Green Technology Financing Scheme (GTFS). The scheme was set up in 2009 with a funding of RM1.5 billion to encourage companies, specifically small and medium-sized enterprises, to use green technologies in their operations. The implementation of green projects under the GTFS has since resulted an estimated reduction in GHG emissions of 94.81kt CO_2 equivalent in 2013. At present, an allocation of RM5 billion has been approved for the second round of the scheme to start in 2018 and end in 2022.

Reducing GHG Through Efficiency

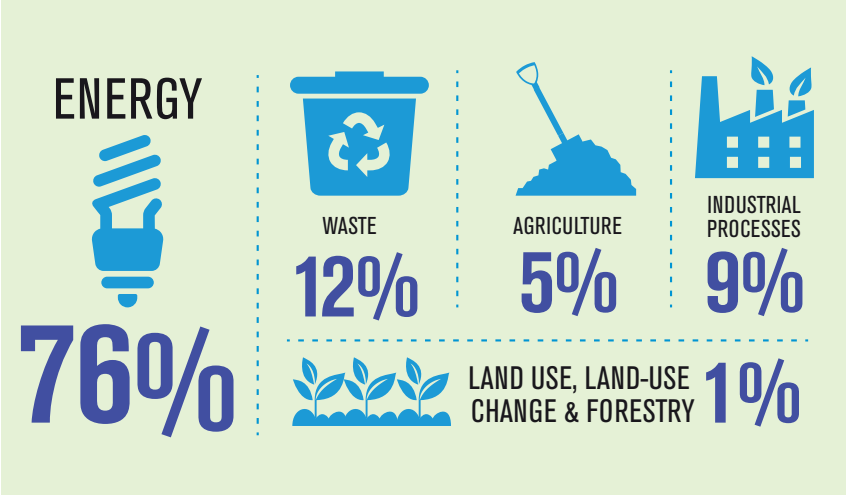
According to Zulkiflee Umar, the Head of Demand Side Management Unit of the Energy Commission, Malaysia is committed to achieving the target it has set. Undertaking a number of mitigation and adaptation strategies to tackle climate change, Malaysia is on track to achieve the reduction of carbon emission intensity per unit of GDP in terms of both emissions and removals.

The Energy Commission has also played a crucial role as well. Zulkiflee said that their task as the Demand Side Management Unit is to balance the demand for electricity by the consumers with respect to consumption of electricity. The unit strives to reduce the electricity consumptions of all sectors in Malaysia. One of the ways is by enforcing regulations such as the Efficient Management of Electrical Energy Regulations (EMEER) 2008 and the Minimum Energy Performance Standards (MEPS).

Energy Malaysia also had the opportunity to discuss Malaysia's initiatives with Nurhafiza Mohamed Hasan, the Head of Capacity Development in Energy Commission. Her unit is responsible in formulating yearly generation development plan for the next 20 years. Based on the approved plans, any new plants would be required to implement high efficiency technology in order to limit and reduce emission from these new generation projects.

Nurhafiza said that currently, coal is the leading fuel in the generation mix due to the fact that it's the cheapest option in the system. However, the planning regime is developed to cater all possible options including RE generation to produce a balance generation mix at an affordable system cost and pricing. Thermal plants would still be required as a base load since most RE generation is limited with its intermittency issues. Benefits of RE generation can be tapped at the fullest with support of other technology like battery and storage (BESS) – intermittent nature of these renewable energies requires a back-up energy that can be supplied quickly, in which a battery can be a solution.

Malaysia's Green House Gas (GHG) Emissions by Sector in 2011



Source: IPCC 2013

It is imperative that the resulting agreement and action plan by nation include a combination of policy, technology and finance with the ultimate goal of making future development sustainable, locally and globally. Climate action may seem expensive, but inaction is even costlier. For we did not inherit the Earth from our fathers, we are merely borrowing her from our children and therefore we have a responsibility to handover a healthy planet for generations to come. EM

Image Source: Petronas

GAS WHAT?

Alongside the electricity supply industry, the gas supply sector is also undergoing a transition. The gas supply industry plays a vital role in the Malaysian energy sector and in line with the Economic Transformation Plan (ETP), the local gas market is opening up to a competitive market.

"With the introduction of competition in the Third Party Access (TPA) System, it creates an exciting market structure. The players will be swayed by the supply and demand and it could set the tone of the market price."

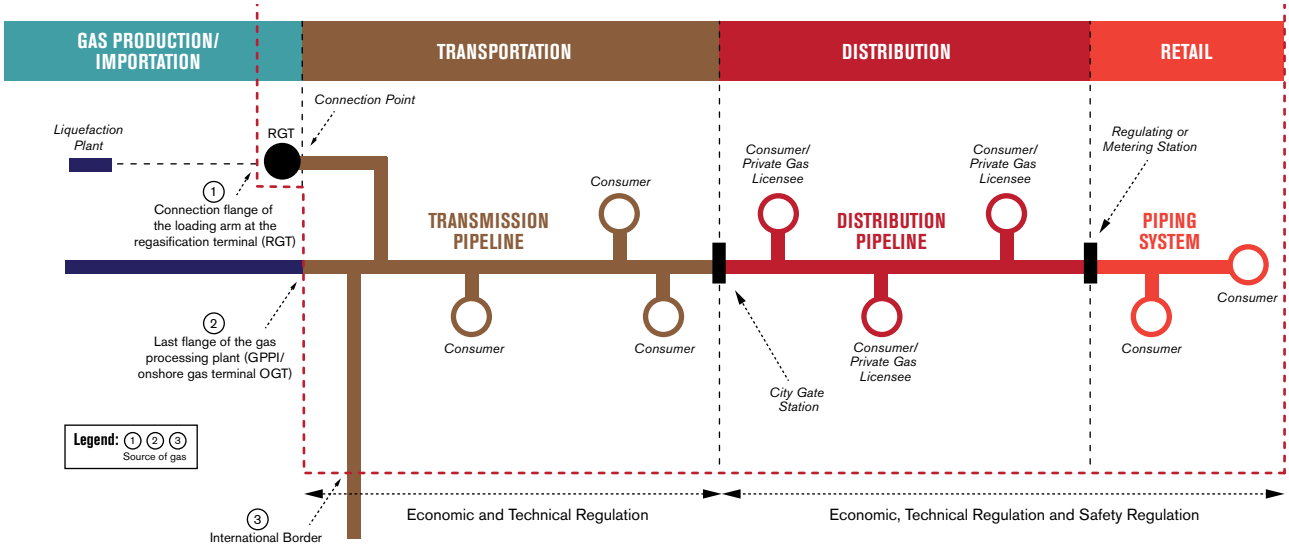
– Rumaizi Abdul Halim,
Head of Gas Market Development and Operation

Liberalising the Gas Sector

With the amendment of the *Gas Supply Act 1993*, the effort to liberalise the gas market in Malaysia was put into works which then came into effect on 16 January 2017. And subsequently, the establishment of a third party access (TPA) system commenced. The TPA system enables third parties to access gas facilities that they do not own or operate. In addition to access to gas facilities, the TPA system will also allow any party to utilise the facilities on the same terms and conditions as other parties for similar utilisation. Under the scope of TPA, the three types of gas facilities that are available for access and utilisation are liquefied natural gas (LNG) regasification terminals, gas transmission pipelines and gas distribution pipelines.

A grace period of one year was awarded to existing players for the submission of licensing application since the commencement of the TPA system. Meanwhile, new players must apply for and be granted with a licence before being able to proceed with the 7 licensed activities. Among the 7 licensed activities is the importation into regasification terminals – the act of bringing in LNG into or within Malaysia by any means other than by transshipment. Furthermore, the *Gas Supply Act 1993* also governs the licensing of regasification, shipping,

REGULATORY SCOPE UNDER GAS SUPPLY ACT 1993



Source: Suruhanjaya Tenaga

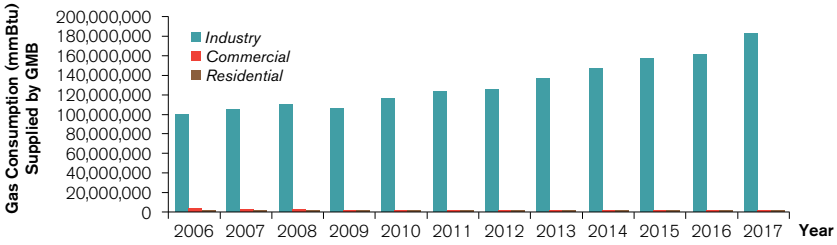
transportation, distribution, retail and the usage of gas.

The statute also stipulates the guidelines of the competition and the quotation prices for regasification, transmission and distribution. Within the ambit of the *Gas Supply Act 1993*, provisions which prohibit anti-competitive behaviour here incorporated to regulate a level playing field for all players. According to Rumaizi Abdul Halim, Head of Gas Market Development and Operation, the entering into of anti-competitive agreements as well as any abuse of a dominant position in the market is strictly prohibited under these provisions. If any party infringes the prohibitions, they would have to pay a substantial fine.

The Energy Commission has also developed and issued TPA Codes which contain the principles of access to the gas facilities. As a regulatory body, the Commission has the authority to approve the access arrangement established by a gas facility owner which contains the terms and conditions for accessing such gas facility. Alongside the Codes, the access arrangements will ensure that all players are subjected to the same transparent procedures, terms and conditions for similar use of each gas facility. They will not be prejudiced by the fact that they do not own nor are affiliated with such facilities. Access arrangements are a set of rules of how interested parties can access and utilise the gas facilities that are not owned by them.

The Energy Commission will also issue guidelines complimentary to the *Gas Supply Act 1993* and the TPA Codes. As of now, the *Guidelines on Competition for the Malaysian Gas Market in Relation to Market Definition, Anti-Competitive Agreements and Abuse of Dominant Position* are ready and it will provide further clarifications on anti-competitive behaviour and the relevant methodology in determining anti-competitive behaviour. Additionally, the Energy Commission has also issued *Guidelines on Licence Application*. The objective of this guideline is to establish a framework for the issuance of licences for the players. These guidelines are put in place to govern the TPA system so that no party will be prejudiced or taken advantage of.

Natural Gas Consumption in Peninsular Malaysia 2006–2017



YEAR	INDUSTRY	COMMERCIAL	RESIDENTIAL
2006	95,917,929	799,002	12,627
2007	105,474,492	880,705	14,713
2008	110,606,270	1,001,105	17,839
2009	106,359,785	934,766	18,565
2010	116,579,760	1,006,564	19,838
2011	123,587,690	1,021,176	20,073
2012	126,364,815	990,892	24,546
2013	137,246,099	961,562	36,627
2014	146,311,939	992,935	37,616
2015	157,720,218	1,021,607	28,710
2016	162,451,003	1,007,563	24,738
2017	182,502,651	1,045,193	25,850

Source: Suruhanjaya Tenaga

Revamping the Gas Market

The implementation of the TPA system brings about a change in the gas market. Everyone is unfamiliar with the effects of the implementation and it results in apprehension amongst the players and the end-users of the system. However, Petronas Gas Berhad, a public listed company which owns gas facilities (LNG regasification terminal and gas transmission pipeline) and Gas Malaysia Berhad which owns gas distribution pipeline have been supportive of the implementation of the system. On the bright side, the implementation opens up the gas market and it creates more flexibility in the market structure. The advantage of the flexibility is that the gas users would have better bargaining power and options from many suppliers, thus creating an exciting gas market.

The liberalisation of the gas market will result in a competitive and efficient gas price. In the current arrangement, the gas tariff will be gradually increased by RM1.50 every 6 months from an initial subsidised gas price. A domino effect, the increase of the subsidised gas will eventually be at par with the market price. Without a two-tiered pricing system, the electricity generators will have to compete in the aspect of efficiency. Consumers in turn will have leverage in having options for the best and cheapest services.

Be it the littlest alteration or a complete transformation, people are often times apprehensive of change. The Malaysian energy supply industry is undergoing a transition in the gas sector which may be worrisome to a few but these changes are put in place with the best interest of the end consumers in mind. EM

Advocating *Reliable & Quality Supply* in the *Gas Industry*

The gas industry plays a pivotal role when it comes to the economic growth of the nation. Residential and more importantly commercial and industrial sectors require gas for productivity and sustainability. ***Energy Malaysia*** interviews Ahmad Hashimi Abdul Manap, the CEO of Gas Malaysia Berhad (GMB) on the state of this vital industry.

"In general, market forces will balance the dynamics of demand and supply in segments of the industry where competition is feasible. Competition will in turn increase the economic efficiency through precise pricing signals and better utilisation of the gas infrastructure. It would also remove disparities between competitive sources, eventually ensuring competitive pricing."

– Ahmad Hashimi Abdul Manap,
CEO of Gas Malaysia Berhad (GMB)

Q: How does the distribution pipeline project improve the security of the supply of gas and what are the challenges in achieving the said goals?

A: Gas Malaysia builds the nation by providing efficient and effective gas distribution infrastructure in all major industrial areas and at the same time, emphasising on supply reliability.

The challenges in managing our operations boils down to ensuring the safe and reliable delivery of natural gas while protecting the safety of our employees and the consumers. To mitigate operational risks and maintain the pipeline safety and integrity, our experienced and competent personnel adheres to strict quality control and safety measures at all stages of our business. From the planning and construction of the new pipeline to its operations and maintenance are all in accordance to international codes and standards, as well as established internal SOPs.

Q: How will increased competition under the TPA affect the gas prices as a whole?

A: In general, market forces will balance the dynamics of demand and supply in segments of the industry where competition is feasible. Competition will in turn increase the economic efficiency through precise pricing signals and better utilisation of the gas infrastructure. It would also remove disparities between competitive sources, eventually ensuring competitive pricing.

Q: In light of the revised gas tariff this year, what are the ways that consumers, specifically those from the industrial sector can do to use gas effectively and efficiently?

A: It is imperative for industrial consumers to optimise their energy consumption. They need to be aware on gas demand forecasting, ensuring their machineries and equipment are working at a high operational efficiency. Consumers could also consider other energy solutions, such as combined heat and power (CHP), to achieve higher operational efficiency.

Q: Green Technology has been identified as a driver of the future economy for the nation. How does GMB apply green technology into their objectives and commitments?

A: We have worked tirelessly to enhance our commercial potential by diversifying into the non-regulated sphere of the gas distribution business. Some of the diversification effort deploys the development and application of services that conserve the natural environment and resources. One fine example would be our ventures into CHP and Bio-Compressed Natural Gas (BioCNG). CHP system, which simultaneously produces electricity and steam with natural gas as fuel source, boasts up to 85% generation efficiency and 30% reduction of CO_2.

Our BioCNG distribution business indirectly supports the efforts to convert waste into energy, simultaneously reducing the nations' global warming potential. The distributed BioCNG is a result from a biogas upgrading process, prior to which, methane is captured from Palm Oil Mill Effluent (POME). As we know, if released into the atmosphere, methane is about 22 times more hazardous than carbon dioxide in posing greenhouse effect.

In addition to creating new demand for natural gas, expanding customer base and complementing sustainable growth for the utility company, these ventures also address issues on supply efficiency and cleaner environment issues.

Q: Are there any suggestions that could be implemented by the government to improve the gas industry?

A: We must adopt stronger advocacy, governance and enforcement to enable further utilisation of cleaner and efficient fuels, such as natural gas. Prioritising the utilisation of natural gas as compared to other fuels will lead to an increase in production efficiency. In a broad sense, it will create new areas for growth, increase the development of gas infrastructure, as well as breed more innovative energy solutions, altogether ensuring the sustainability of the gas industry in Malaysia.

Not only will this pave for business owners for higher level of operational efficiency, it will also help us ensure that the nation will have a cleaner and heathier environment.

Q: What are your visions for the future of the gas industry in Malaysia?

A: A sustainable source of supply, or energy security.

While we support the national agenda in liberalising the gas industry, I hope that with stronger advocacy and promotion on natural gas utilisation, demand will be stronger. New industrial areas will be developed via public-private partnership with the state and federal governments and industry players will enjoy a sustainable return on their investment on infrastructure. EM

Governance Reform of *Single Buyer* and *Grid System Operator*

Dato' Abdul Razak, Energy Commission's Chairman alongside Ir. Azhar, Energy Commission's Acting CEO at the Q&A Session during the workshop.

A Stakeholder Workshop on the Governance Reform of Single Buyer (SB) and Grid System Operator (GSO) was organised by the Energy Commission on 28 November. This one day workshop was chaired by the Chairman of the Energy Commission (ST) Dato' Abdul Razak Abdul Majid. Amongst the attendees were representatives from ST, Ministry of Energy, Green Technology and Water (KeTTHA), Economic Planning Unit (EPU), Tenaga Nasional (TNB), SB and GSO.

Presented by KPMG Advisory, the consultant for the project, the aim of the workshop was to discuss the structure, governance and challenges of the reform of SB and GSO, to enable the entities to be functioning independently from TNB. With the implementation of the 9 Malaysian Electricity Supply Industry (MESI) Reform Initiatives, a four-stage reform roadmap has been established to address further challenges and opportunities which have been identified

Objectives of the Malaysian Electricity Supply Industry (MESI)

Efficient tariffs | Secure & reliable | Customer satisfaction | Environmental sustainability

CHALLENGES	OPPORTUNITIES
Increasing reserve margin (RM700m p.a. add cost for every 10% above target)	Competitive bidding for new generation capacities
Rising fuel prices; pass-through risks (~RM10–15b Market Value at risk)	Improve generation siting outcomes and planning (-2.5% of fuel cost)
Disruptive tech/asynchronous gen. (~issue at 30–40% of installed capacity)	ASEAN interconnection (~peak shaving, trading hub)

Source: KPMG

with the end result of liberalisation in generation, retail and customer contestability after the year of 2020.

The main focus of the workshop is to engage with the stakeholders and policy makers on the proposal of an Independent Single Buyer (ISB) and Independent System Operator (ISO) to enhance the transparency and efficiency of the existing SB and GSO. This governance reform will further promote confidence of industry participants and investors in the operation of SB and GSO. KPMG also gave a run down on the potential advantages and disadvantages from several aspects arising out of the various options in governance reform of SB and GSO.

In his opening remarks, Dato' Abdul Razak stated that government has taken steps to warrant transparency within the electricity supply industry. He also reiterated the key objectives of MESI which are to provide efficient tariffs, secure and reliable supply of electricity, guaranteed customer satisfaction and to ensure environmental sustainability.

During the workshop, a discussion session between the stakeholders was facilitated by KPMG. The topics of discussion deliberated were on the pros and cons of the reform options and alignment with MESI objectives. A set of principles was formulated in the discussion for the reform. The results of the discussion will be taken into consideration by KPMG. In addition to that, post-reform creditworthiness and financial viability of an independent SB and GSO was also highlighted by KPMG.

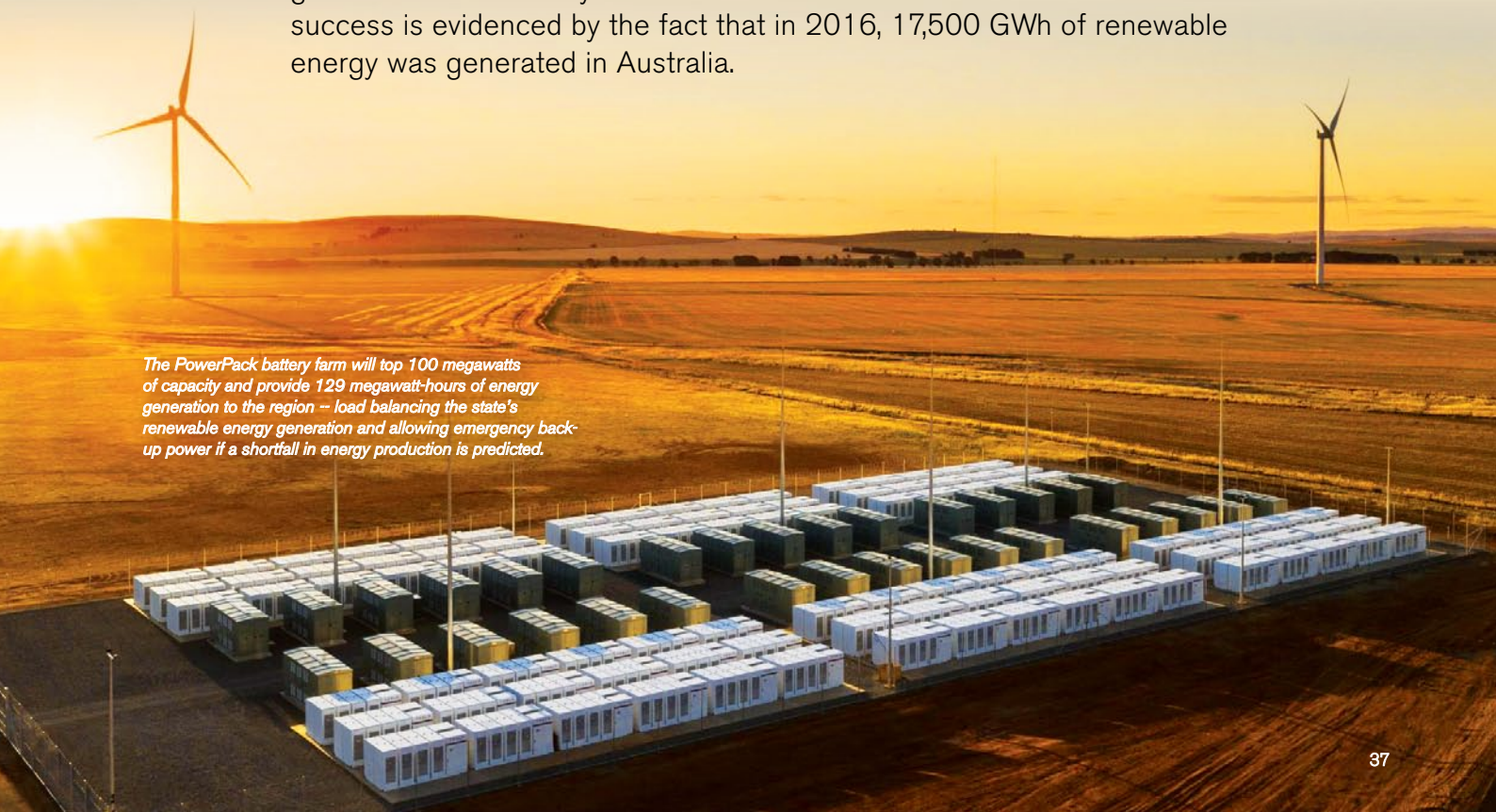
Dato' Roslina Zainal, TNB Vice President of Regulatory Economic & Planning (front row, second from left), and Dato' Ir. Ho Peng Choong, TNB Vice President of Grid (front row, third from left) amongst other attendees of the workshop that looks into the prospect of reformation of Single Buyer and Grid System Operator.

In concluding the workshop, the feedback from stakeholders on KPMG's assessment of reform options was gathered for drafting the final report which will be presented at the 2nd Stakeholder Workshop to be held later. EM

BACKING UP WITH BATTERIES

AUSTRALIA

Comprising the Australian mainland, the island of Tasmania and several smaller islands, Australia is both the world's largest island and smallest continent, which has led to it being dubbed 'the island continent'. Although a resource rich country, being the world's largest exporter of coal, Australia has also embraced alternative energy sources, which make up around 10 percent of the country's energy supply. This focus on renewables is due to the Renewable Energy Target (RET) - an Australian Government scheme designed to reduce emissions of greenhouse gases in the electricity sector and encourage the additional generation of electricity from sustainable and renewable sources. Its success is evidenced by the fact that in 2016, 17,500 GWh of renewable energy was generated in Australia.



The PowerPack battery farm will top 100 megawatts of capacity and provide 129 megawatt-hours of energy generation to the region -- load balancing the state's renewable energy generation and allowing emergency back-up power if a shortfall in energy production is predicted.

The state of South Australia is the undisputed leader in renewable energy production, with around 40 percent of its electricity coming from renewable sources, mainly wind. However, in 2016, South Australia went from being a power-rich state to being nearly paralysed by an energy crisis. This happened after the devastating 50-year storm set off a catastrophic chain of events which resulted in the destruction of transmission lines.

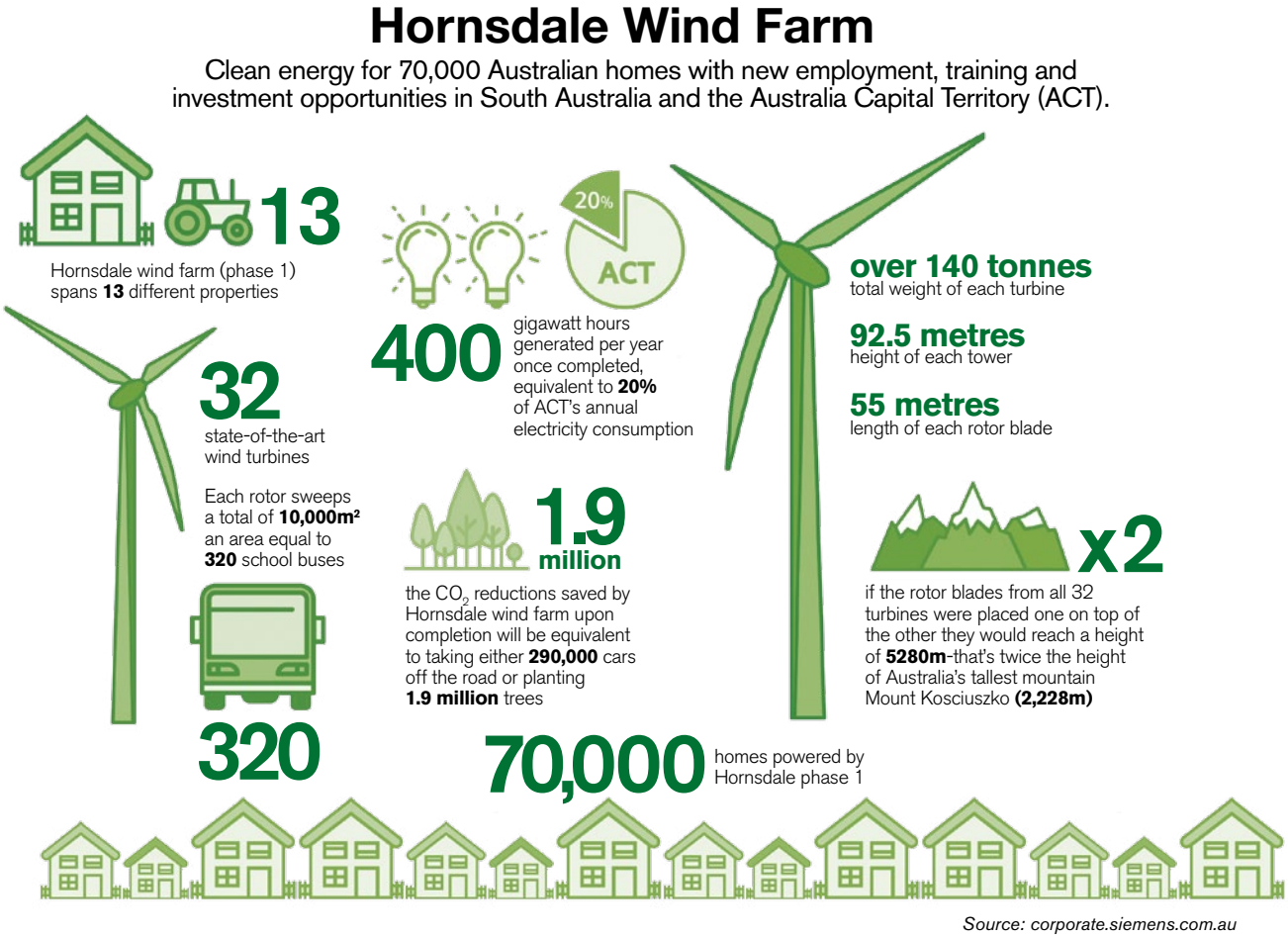
The state-wide blackout in South Australia left industries crippled for up to two weeks and stoked fears of more outages across the national electricity market due to limited supplies. Further blackouts then occurred in the heat of the Australian summer in early 2017 that left the state devastated, without the capacity to supply electricity for 1.7 million of its residents.

Tesla to the Rescue

The outages led to the realisation that a method had to be found to store electricity, which can then be utilised in the event of a failure of the generation or transmission system such as what happened in 2016 and 2017.

The South Australian government launched a tender process, which invited parties to bid for the rights to install the world's largest lithium-ion battery storage system in South Australia. California-based company Tesla won the tender, and signed a deal with the South Australian government for the installation of a 100-megawatt Powerpack system, to be paired with a wind farm by global renewable energy provider, Neoen's Hornsdale.

The deal first came to light in March 2017 when Tesla's CEO, Elon Musk committed himself to solving the power crisis in the state within a period of 100 days through the utilisation of a Tesla Energy product, the failure of which the system will be given to the state for free. As promised, Tesla successfully completed the installation of the 100-megawatt Powerpack battery



Source: corporate.siemens.com.au

Seamless backup power, with or without solar. Tesla's Powerwall detects grid outages and automatically becomes your home's main energy source.

backup system all within the stipulated 100 days.

Not Your Average Batteries

The Powerpack system is the largest lithium-ion battery storage project in the world and is capable of providing enough power to more than 30,000 homes, which equals to approximately the number of homes that lost power during the blackout period. The Tesla Powerpack charges using renewable energy from the Hornsdale Wind Farm located about two hours from Adelaide that delivers electricity during peak hours to help maintain the steadfast operation of South Australia's electrical infrastructure.

The Tesla Powerpack system further fuels the state's movement towards renewable energy and a noticeable advancement of a more resilient and modern grid will be observed. The grid-scale energy storage project is not only sustainable but will also aid in solving power shortages, decrease intermittencies and manage summertime peak load to improve the overall reliability of South Australia's mainstream electrical system.

Additionally, Tesla's Powerwall (home battery) is currently being installed across Australia for residential customers. The very same technology that helped stabilise the South Australian grid can now be used by homeowners to collect energy during the day so it is stored and made available throughout the day, providing homes with uninterrupted power even if the power grid goes down.

Bringing it Back Home

Now one of the largest renewable energy developments in Australia, it was the lack of proper energy storage facilities that brought the backup battery system to the Land Down Under. It not only maintains the supply of sustainable energy for the nation but it also brings positive flow-on effect for the local community with more than 250 construction jobs created over the span of the project.

Using the South Australian blackout crisis as a cautionary tale, the state government's move in implementing a backup battery system for their renewable energy infrastructure is something that Malaysia could stand to learn from, as prevention is indeed better than a cure. Though it may be rather costly, it would certainly be a good investment in ensuring the continuous supply of electricity for the nation. EM

TRANSITIO

TOWARDS S

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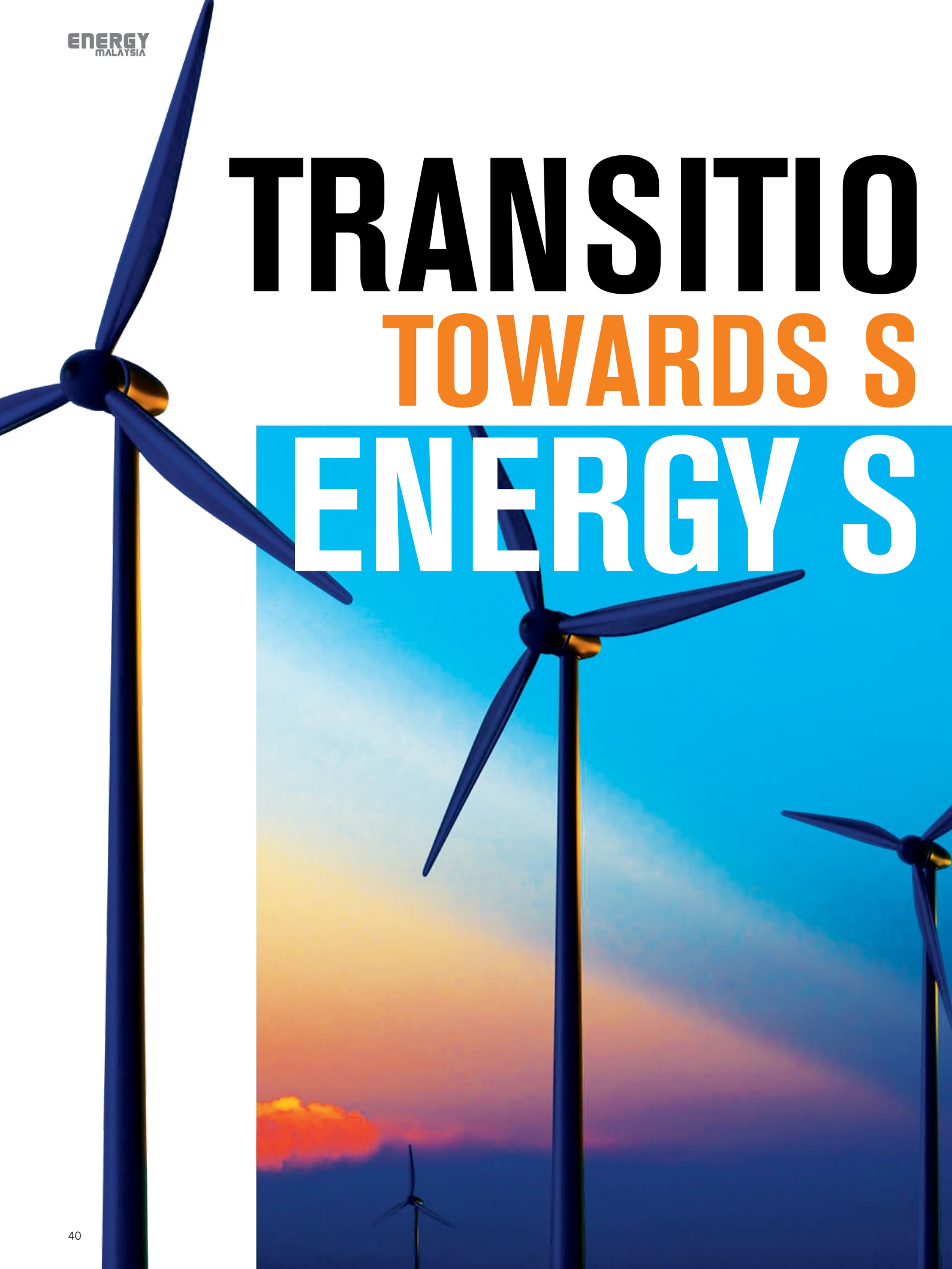
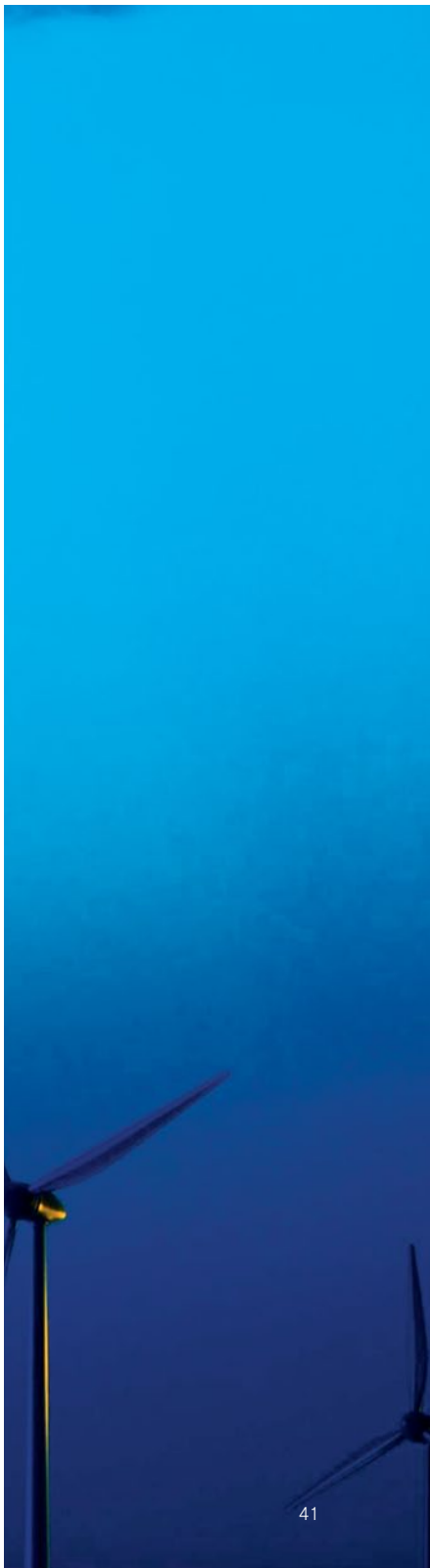


NING USTAINABLE ECURITY



Energy security has always been a key issue in Malaysia's socio-economic growth trajectory towards becoming a high-income nation by 2020. However, concerns are mounting in maintaining a continuous supply of energy at affordable prices as the nation's oil and gas resources continue to drop. ***Energy Malaysia*** provides an analysis of Malaysia's transition away from fuel-based generation in an effort to maintain and enhance the nation's energy security, based on the Peninsular Malaysia Electricity Supply Outlook 2017.

A Crude Awakening

As of 2010, oil remains the world's leading energy source, accounting for 34% of the global energy consumption followed by natural gas at 25%, coal at 26%, nuclear at 6%, biomass/waste at 9%, hydro at 2% and other renewables at 1%. The global energy demand is expected to increase by 35% in the period towards 2040. Therefore, the world is in dire need for a more diverse, reliable and affordable fuel mix

With several new coal power plants being built, coal could be seen as a long term source of power in the nation.

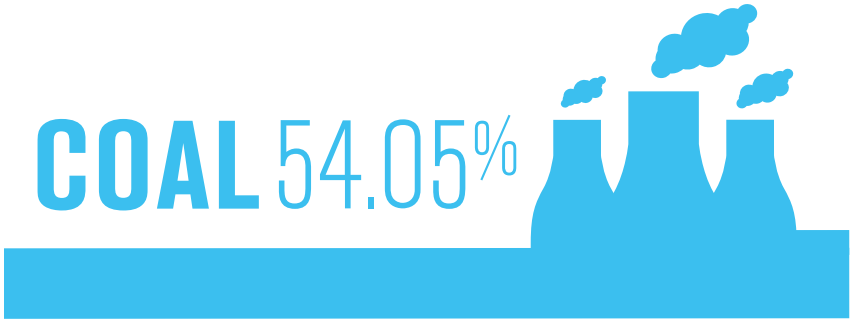
that can provide enough energy for future economic growth and societal advancements. In essence, generation-mix percentage affects both the electricity cost and the environment. Past generation-mix in the Peninsular featured a dominant oil strategy whereby oil production percentage even reached the 85% mark before the 1977 oil crisis changed everything.

The production of oil-based energy is expected to rise. However, as world population continues to grow and the limited amount of oil begins to diminish, it may no longer be a realistic or viable option to continue supplying the amount of energy demanded by the world through oil-based generation. After all, there is only a finite amount of oil in the world. Some estimate that there may be as few as 20 years' worth of oil left as the rising population increases its consumption day by day. Prices would then go up due to the simple economic model of supply and demand.

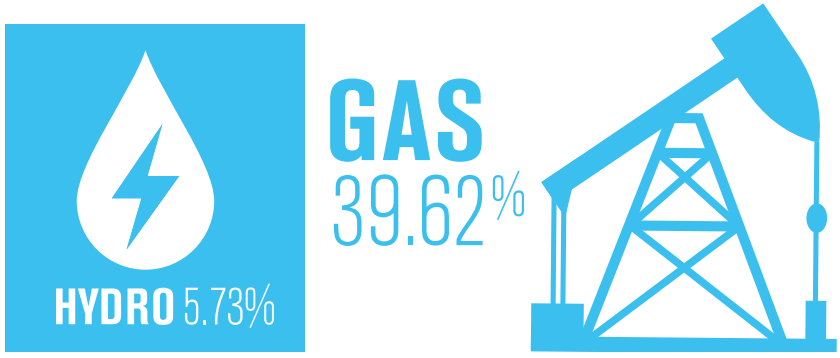
With these challenges at hand, the Malaysian government decided to switch to natural gas making it the nation's leading fuel since 2001. With the introduction of the Peninsular Gas Utilisation Project, Malaysia has also become the third largest producer of natural gas in the world. However, the depletion of natural gas reserves and curtailment of gas supplies by PETRONAS, plus high and uncertain prices have made coal an attractive fuel alternative despite being deemed as harmful towards the environment.

Coal Takes the Lead

As of November 2017, the coal capacity in Peninsular Malaysia stood at 54.05% of the nation's total generation mix. It showcased numbers that are higher than gas which accounted for 39.6% of the total

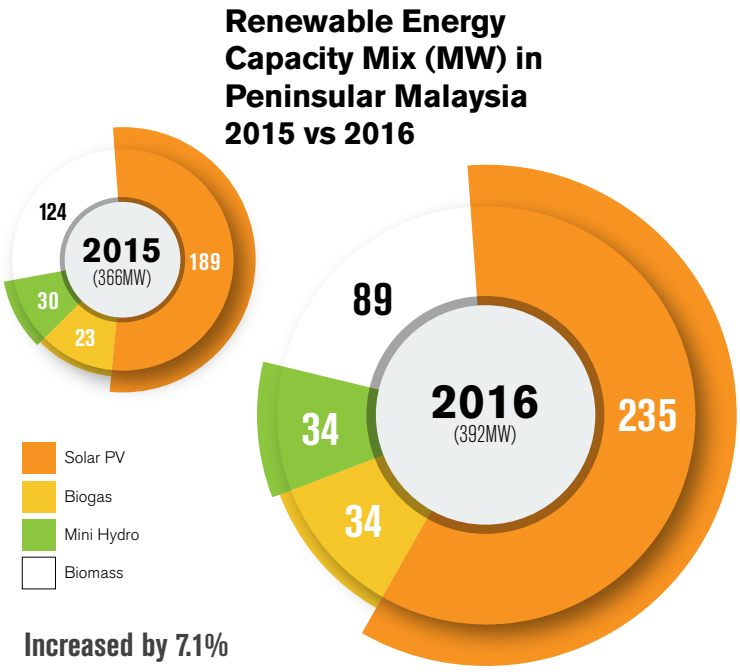


GENERATION MIX (GWh)
Jan 2017 to Nov 2017



Although it might cause harm to the environment, coal is able to produce a continuous and efficient supply of electricity as compared to renewable energy and natural gas.

Source: Suruhanjaya Tenaga



The increase of using renewable energy is in line with the nation's efforts to reduce carbon emissions, which they pledged in the Paris Agreement last year.

Source: Suruhanjaya Tenaga

generation mix, making coal the main fuel for power generation in Peninsular Malaysia for the year 2017. The coal used in Malaysia is entirely imported and given its low price and abundant supply, the Energy Commission's Peninsular Malaysia Electricity Outlook 2017 highlighted on the growing prominence of coal for the nation. Coal consumption is expected to increase to more than 30 million tonnes per annum making it one of the main source of energy generation for Malaysia.

However, coal, as a long-term source of energy, poses a myriad of negative effect on the environment. The European Union aims to do away with coal power plants after 2020. Thankfully, with the introduction of new innovations, "clean coal" can now be produced. Through High Efficient and Low Emission (HELE) technologies - such as supercritical (SC), ultra-supercritical (USC) and advanced ultra-supercritical - coal-fired power plants are designed to operate at a higher steam temperature and pressure that improve efficiency while generating more electricity, using less coal.

Adding RE to the Mix

In line with the Eleventh Malaysia Plan, RE can support the continuous increase of energy demand in Malaysia. Currently, Peninsular Malaysia has a total licensed RE capacity of 392MW – most of which are fuelled by solar PV, biomass, mini-hydro plants and biogas.

As a participant of the United Nations Framework Convention on Climate Change (UNFCC), Malaysia has pledged to reduce 45% of carbon emissions by 2030 (35% on unconditional basis and a further 10% upon receiving financial incentives, technology and capacity building from developed countries).

To achieve that, the government has taken the necessary steps to increase shares of renewables in the overall fuel mix through the implementation of programmes such as Feed-in-Tariff, Large Scale Solar PV, Net Energy Metering and the development of new hydroelectric stations. The development of hydropower plants is expected to come on stream post-2020. Although RE technology can be costly, its actual potential and return on investments down the line would greatly benefit the energy industry.

Energy is the foundation that supports and spurs the socio-economic development of a nation. Such development is simply not possible without energy just as sustainable development is not attainable without sustainable energy resources. Therefore, it is crucial to plan for the nation's future energy demand, for the benefit of Malaysia and the world as a whole. EM

The Age of *Innovation*

Suruhanjaya Tenaga launched the Malaysia Energy Statistics Mobile Application in Kuala Lumpur on 21 November 2017. In the era where information is seen as crucial and valuable, the app by the agency is timely apt.

Suruhanjaya Tenaga (Energy Commission), the hub of energy data in Malaysia has developed a mobile application on energy statistics. This move is an effort towards a more transparent energy sector and in realising the importance of energy data especially in policy making.

The mobile application, known as "MyEnergyStats" would be the first mobile application on energy statistics in the ASEAN region, which is a triumph for Malaysia towards the age of digitalisation. The application would display information on energy reserves, energy supply, energy consumption, energy transformation, indicators, electricity supply performance as well as gas distribution statistics. Developed in 2016, the app was fully operational as of July 2017.

The application can be downloaded for free via the Apple Appstore and Google Playstore. Everyone is eligible and encouraged to download the app as there are no restrictions and the best part is that, it's free. Users can select their desired parameter and the application will display the data in tabular or graphical form. In addition to the Malaysia Energy Information Hub (MEIH), which provides statistics and information regarding the energy through www.meih.st.gov.my, the mobile app would enhance it further and would make it accessible to anyone anywhere in the world.

The launch of the mobile application was officiated by the Energy Commission's Chairman, Dato' Abdul Razak Abdul Majid, accompanied by United Nations Statistic Division (UNSD)'s Statistician of Industrial and Energy Statistics Section, Leonardo Souza, Energy, Green Technology and Water Senior Under Secretary, Noor Afifah Abdul Razak, Energy Commission's Acting Chief Executive Officer, Ir. Azhar Omar and Energy Commission's Energy Management and Service Quality Development Director, Ir. Abdul Rahim Ibrahim.

The launching began with a speech from the Energy Commission's Chairman Dato' Abdul Razak. In his speech he touched upon how Malaysia has reached a milestone with the mobile app to be first in the ASEAN region. He further added that this mobile application will be a handy tool allowing anyone to access Malaysia's energy data anywhere and at any time, even offline.

There was also a three-day workshop, which was jointly organised by the Energy Commission and the UNSD. It was aimed at providing an overview of the current developments on energy statistics on top of promoting the exchange of practices and views regarding energy statistics programmes in different countries.

The workshop was attended by 100 participants including senior managers from national statistical officers and senior representatives from ministries and government agencies as well as industry players. Dato' Abdul Razak also noted that by the end of this workshop, participants will have a better understanding on the importance of energy statistics.

Being the first in ASEAN to launch an app in regards to statistics and data in the energy sector has pushed Malaysia towards becoming a digitalised nation. The app would further help companies or ministries gain insights and hopefully enhance the state of the energy sector for the benefit of the nation. EM

Dato' Abdul Razak, Chairman of the Energy Commission spoke about the importance of going forward with technology in order to improve and safeguard the future of the energy industry.

A Challenge on *Awareness*

The nation's dependence on coal can be cost-effective but it is limited and poses a harmful threat to the environment. However, increasing energy efficiency and reducing energy waste can make a significant difference. The Energy Commission has made various programmes and initiatives in its attempts to educate the public and the Energy Efficiency Challenge is one of them.

The Energy Efficiency Challenge (EE Challenge) 2017, which was opened from April to September, has yielded an impressive result. A total of 308,985 kWh of electricity worth RM156,725.55 was saved throughout the duration of the competition. The savings also indicated that carbon emissions as much as 235 tonnes has been reduced as well.

The EE Challenge has been organised yearly since its inception in 2014. The objective of this competition was to educate and instil a culture of using electricity efficiently amongst students. The challenge would increase awareness and hopefully encourage students on the importance of saving energy and sustaining the environment around them.

The event this year was opened to secondary school students, where a total of 72 schools, including two from Sabah had participated. Students had to present a detailed report in regards to the amount of electricity being consumed in their school. Out of the 72 schools that participated, 37 had successfully reduced the electricity consumption.

During the Prize Giving Ceremony on 14 November, the Chairman of the Energy Commission, Dato' Abdul Razak Abdul Majid said the starting point of efficient energy is through instilling the practice of energy efficiency through the younger generation. He also noted that this event is in line with the government's commitment under the Conference of Paris (COP 21) where by the year 2030, the government is committed to decrease the intensity of carbon emissions by 45%.

There are also various initiatives made by the Energy Commission in its efforts to conserve energy – one being to improve the monitoring of efficient energy implementation among domestic, commercial and industrial users in this country. The Energy Commission also stressed on activities that create awareness on using energy efficiently.

Besides the main prize, prizes were also given for the most creative video as well as the most viral video. The champion received RM15,000 whereas the winners for the other two categories would be given RM5,000 respectively.

The EE Challenge plays a vital role towards educating youths on the importance of Energy Efficiency. Throughout its inception, the values learnt from the events should be practiced not only during the competition but throughout their lives as they carry the torch of the future. EM

Outcome of the Energy Efficiency Challenge

37 schools showed a reduction of electric usage

Electric usage was reduced by **308,985** kwh

64 schools successfully submitted their reports

RM **156,725** saved

235 tonnes of reduced carbon emissions

Source: Energy Commission

Striving for a *Sustainable Future*

Professor Ken Koyama gave his take on future generation mixes and its implication to Malaysia.

Issues relating to energy are among the most important and difficult challenges confronting the world today. Providing sufficient energy to meet the requirements of a growing world population with rising living standards will require major advances in energy supply and efficiency in developing countries, especially Malaysia, the choice of technology, policy and economic levers used to determine the nation's energy systems will have profound implications for their growth.

On 31 October, the Energy Commission invited Professor Ken Koyama, the Chair in Energy Economics of Energy Commission Malaysia to give a talk on World Energy Challenges Up to 2050 and its Implication to Malaysia.

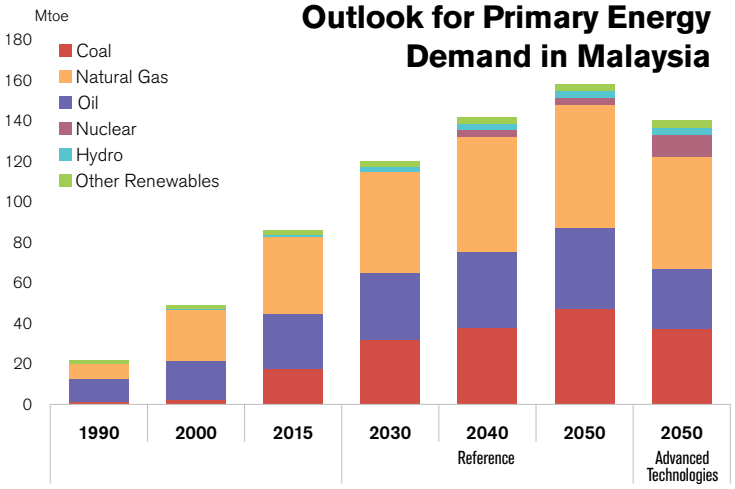
Professor Ken started his speech with an overview of the global energy market by 2050. The global energy demand will continue to increase despite vast improvements in energy efficiency. Approximately two-thirds of the increase in demand by 2050 come from non-organisation for economic co-operation and development (OECD) Asia. Prof Ken highlighted that China's energy demand would peak by mid-2040s, and the centre of gravity of the energy market would shift to India and ASEAN over the long term.

Three-quarters of the increase in energy demand are concentrated in the power generation and transport sectors. The shift towards thermal power generation would meet the rapid increase in electricity demand in developing countries. Fossil fuel dependency of the world would remain about 80% even in 2050.

Prof Ken also said that energy efficiency and low carbon technologies can reduce energy consumption by 13% in 2050. Carbon emissions will begin to decline in the mid-2020s but are far from the level of halving it by 2050. Electricity-related measures such as non-fossil fuel power generation, thermal power generation with carbon capture and storage as well as demand reduction will contribute to two thirds of the total reduction in 2050.

As for its implication on Malaysia, the nation faces a future challenge on what energy mix the country should choose to meet the growing electricity demand while considering the environment load, energy security and economic efficiency. According to Professor Ken, Malaysia may be looking for how far it would expand its renewable energy power generation with costs and grid modification taken into account.

Outlook for Primary Energy Demand in Malaysia



Even with advanced technologies, natural gas would still be the leading generation mix in Malaysia as it would produce electricity continuously and effectively.

Source: Institute of Energy Economics Japan Outlook 2018 (IEEJ, 2017)

Despite the growing challenges, the country has a lot of potential to grow. We have invaluable resources for all its sectors as well as policy makers who safeguards the nation's future and wellbeing. EM

Increasing Understanding on Electricity Tariff Determination

Acting Chief Executive Officer (CEO) of the Energy Commission (ST), Ir. Azhar Omar answering questions from the members of the floor alongside Dato' Abdul Razak Abdul Majid, the Chairman of ST in regards to the Incentive-Based Regulation (IBR) mechanism.

After its successful implementation in Peninsular Malaysia since 2015, the Incentive-Based Regulation (IBR) mechanism has entered its Second Regulatory Period (RP2) in 2018. Now that the first round is over, there are questions about the mechanism, and what lies ahead in RP2, other than the electricity tariff which was announced by the Minister of Energy, Green Technology and Water, Datuk Seri Panglima Dr. Maximus Johnity Ongkili in December 2017.

In light of this, the Energy Commission organised a session called a "Briefing on Electricity Tariff in Peninsular Malaysia for Regulatory Period 2 (RP2: 2018-2020) under the Incentive-Based Regulation (IBR) Mechanism" on 16 January 2018. Dedicated for the media and investment analysts, the briefing was conducted by Acting Chief Executive Officer (CEO), Ir. Azhar Omar, and the Chairman of the Energy Commission, Dato' Abdul Razak Abdul Majid fielding the subsequent question and answer session.

During the briefing, Ir. Azhar explained that the implementation of IBR for RP2 maintains the previous tariff structure and schedule, and was effective from 1 January 2018 to 31 December 2020.

Though the Average Base Tariff for RP2 has increased to 39.45 sen/kWh compared to 38.53 sen/kWh in RP1, the consumers are still paying for the same amount, given the amount of consumption remains the same for the period.

Apart from the new average base tariff decision, the Government also decided to use the efficiency savings gained from the RP1 to cover the current tariff rebate cost of 1.52 sen/kWh and surcharge of 0.28 sen/kWh based on Imbalance Cost Pass-Through (ICPT) review for the period of 1 Jan to 30 June 2018, amounting to RM929 million.

ICPT is described as an uncontrollable cost which incurs at the generation stage including the change in price of coal, piped gas and the foreign exchange rate. It is monitored and revised every six months. The review will decide on whether a rebate or a surcharge should be imposed on the consumers, on top of the base tariff that has been decided.

During RP1, which was implemented from 2015 to 2017, the average profit for TNB's regulated business entities was around RM4.1 billion. The actual capex spent was RM17 billion, compared to the approved amount of RM18.5 billion, while the actual opex spent was RM17.5 billion compared to the approved amount of RM18.4 billion.

Despite the slower projected power demand growth in RP2, the approved capex and opex for TNB is capped at RM36.8 billion in total, which is not much different from RM36.9 billion in RP1. This is driven by, among other things, the increasing cost of building power plants.

By the end of RP2, the installed power generating capacity in Peninsular Malaysia is projected to be around 27, 007 MW, where 61% of it is generated from coal-fired power plants, 33% from gas-fired power plants, 4% from hydropower plants and the remaining from renewables and other sources.

Currently, the installed capacity is made up from 48% gas-fired power plants, 42% coal-fired power plants, and 10% hydropower and other sources.

For RP2, consumers are expected to continue to receive reliable electricity supply along with more advanced infrastructure development initiatives and support programmes by TNB including the Advanced Metering Initiatives (AMI). The initiative will see the rolling out of 1.5 million smart meters across the peninsular to enable consumers to manage their consumption of electricity effectively.

Ir. Azhar gave an overview on the state of the industry and the role of IBR when it enters into the Second Regulatory Period (RP2) in 2018.

There will also be the implementation of solar projects in 10 major national public universities, with a total capacity of 200MW, apart from an education programme amounting up to RM1 billion for the period of 2018 to 2022. EM

WE WOULD LIKE TO HEAR FROM YOU!

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

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Where to get more energy-related data and statistics?

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

Send the completed form over to us:

The IBR Asia Group
The Penthouse, 10-3A, Jalan PJU 8/3, Damansara Perdana, 47820 Petaling Jaya, Selangor Darul Ehsan, Malaysia
fax: 03-7729-4887 e-mail: clientservice@ibrasiagroup.com

Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY and USE OF ENERGY

Suruhanjaya Tenaga (ST), a statutory body established under *the Energy Commission Act 2001*, is responsible for regulating the energy sector, specifically the electricity supply and piped gas supply industries in Peninsular Malaysia and Sabah.

The Energy Commission...

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

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

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

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

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

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

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

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