Towards a World-Class Energy Sector

Suruhanjaya Tenaga
Energy Commission

ENERGY

MALAYSIA

Volume 19 | 2019
www.st.gov.my

LET'S GET SMART

STREET LIGHTING
SWITCHING ON LED

THE DARK SIDE OF
DIGITALISATION

SPECIAL FOCUS
Where is the World Going with Energy

A Wake-Up Call for Launderettes

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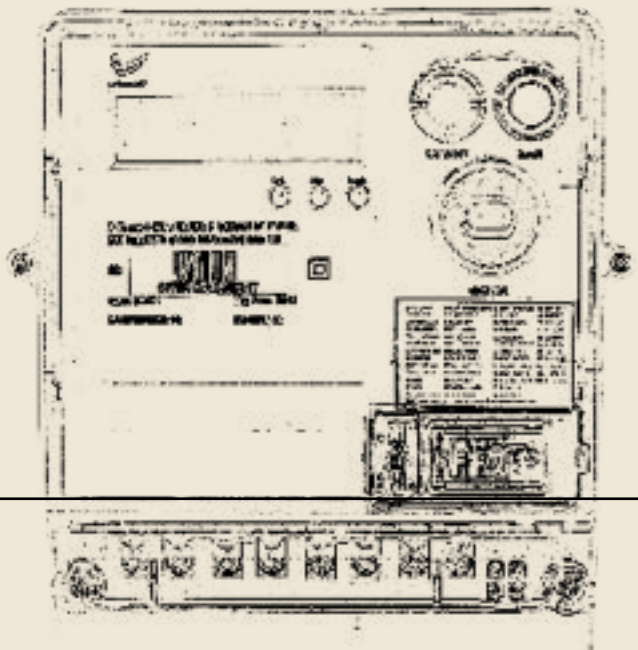
Let's Get Smart



REGULARS

FEATURES

Editorial Board

ST Publication No: ST(P)16/12/2019

Published on behalf of the Energy Commission by:

Editorial:
pVm communications sdn bhd

Design:
affinity worldwide sdn bhd

Contact:
pVm communications sdn bhd

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Printed by:
Dolphin Press Int Sdn Berhad
Petaling Jaya , Malaysia

THE NEED for Collective Responsibility

Datuk Ir Ahmad Fauzi Hasan
Energy Commission
Malaysia

The world we live in today is about empowering consumers to make informed decisions. In the energy industry, it is also about collective responsibility, with all stakeholders playing their respective roles to achieve a low carbon economy. This requires us to take a hard look at ourselves in terms of energy production (to reduce dependence on fossil fuels) and consumption (reduce wastage).

Our cover story this issue is about smart meters that will enable Malaysian consumers – domestic, commercial and light industrial premises – to monitor their power consumption by providing readings every 30 minutes of any given day. These frequent updates will enable them to take immediate action to reduce their power consumption, wastage and bills.

We thus look forward to Malaysian consumers reaping the full benefits of smart meters, which are based on online communication: between the meter and the billing centre as well as 30-minute online posts to consumers. Consumers can use this information to help change existing power consumption habits at his or her premises. When every individual in the nine million premises set to become smart metered plays a part in being prudent with energy usage, the savings are substantial. This collective responsibility will help enhance Malaysia's standing as a civic conscious society that recognises decarbonisation is about thinking global and acting local.

Another initiative being implemented across Peninsular Malaysia to reduce power consumption and electricity bills is the LED public street lighting programme. It will see 150-watt high pressure sodium vapour (HPSV) bulbs being replaced by 90-watt light emitting diode (LED) lights. As at end August, 2019, more than 60% of HPSV lights have been replaced.

Leading by example, the Government hopes that it will encourage businesses and homes to follow. This exercise is expected to half energy consumption and the electricity bill of local authorities who are responsible for public street lighting.

The benefits of LED lighting are well-documented, but the decision to install them is a choice left to consumers.

The primary disadvantage of LED lights is that they are relatively more expensive, and the upfront investment may take some time to recover. But it is a really a question of foresight, especially among industrial and commercial consumers, who can leverage on LED lighting to help reduce their operational costs with lower electricity bills.

Meanwhile, in Singapore, we see households and small businesses being given a choice of utility providers under the Open Electricity Market initiative implemented in 2018 by our counterpart, the Energy Market Authority (EMA) of Singapore. Prior to this, power supply was a monopoly controlled by the Singapore Power Group. Now, consumers have a pick of 13 retailers offering attractive packages. The take up rate so far is encouraging, says EMA, with whom we are constantly changing notes.

On a lighter note, we look back at how far Malaysia's electricity sector has come. Even in the early days when the first power station was built in Pahang in 1900 for the purpose of gold mining, electricity has always been a crucial element in nation building. More than a century later, electricity is into the internet of things, embracing digitalisation.

In this issue, I am delighted to welcome our previous chairman, Tan Sri Tajuddin Ali, who has penned his thoughts on the dark side of digitalisation. He warns: the dark side is not about hackers and other cyber terrorists. Handling these dark forces is an industry given. What is more threatening is the lack of drivers to hone and develop competencies to keep abreast with technologies that are altering the workplace at a fast and furious pace.

I would also like to congratulate the Commission's new Chief Executive Officer Abdul Razib bin Dawood, who was appointed to the position in August. I am confident that with his dedication, integrity and vast regulatory experience he will be able to take us to the next level in our journey to be a world class energy regulator.

In conclusion, I am happy to announce that the Commission has been certified as an ISO 9001: 2015 organisation, which brings us closer to realising our vision to be a world class regulator.

THE ENERGY COMMISSION IS NOW **ISO 9001:2015 CERTIFIED**

We are proud to announce that the Energy Commission has obtained the Quality Management System ISO 9001:2015 in 2019. This means an expansion of the Commission's scope, and led to the first surveillance audit.

The Commission's ISO 9001:2015 journey started in July 2018, culminating in the accreditation this year. The Commission's quality management system is now aligned to a robust and globally recognised approach that focuses on continuously improving processes and managing risks to meet the needs and expectations of stakeholders.

Hereon, the Commission will comply with ISO 9001 standards by establishing, documenting, implementing and maintaining a quality management system that is effective and globally recognised.

THE SCOPE OF THIS APPROVAL IS APPLICABLE TO:

- Management for the Licensing of Electrical Installation and Gas Supply
- Management of Electrical and Gas Competency
- Management for the Approval of Electrical and Gas Equipment
- Management for the Registration of Electrical Installation
- Management for the Approval of Gas Installation and Gas Operation
- Management for the Registration of Electrical and Gas Contractor
- Management for the Registration of Electrical Energy Manager
- Management of Enforcement, Accident, Investigation and Prosecution

Gas: The road ahead

Gas is being threatened by massive investments in the advanced battery technology ecosystem, writes Jeff McMahon in Forbes (October 29, 2019), citing a recent report released by the Rocky Mountain Institute (RMI).

RMI estimates previous and planned investments total 150 billion U.S dollars through 2023. "These investments will push both Lithium-Ion (Li-ion) and new battery technologies across competitive thresholds for new applications more quickly than anticipated," according to RMI. This, in turn, will reduce the costs of decarbonisation in key sectors and speed the global energy transition beyond the expectations of mainstream global energy models.

"These changes are already contributing to cancellations of planned natural-gas power generation," states RMI. "The need for these new natural-gas plants can be offset through clean-energy portfolios (CEPs) of energy storage, efficiency and renewable energy.

New natural-gas plants risk becoming stranded assets (unable to compete with renewables and storage before they've paid off their capital cost), while existing natural-gas plants cease to be competitive as soon as 2021, RMI predicts. RMI analysts expect Li-ion to remain the dominant battery technology through 2023, steadily improving in performance, but then they anticipate a suite of advanced battery technologies coming online to cater to specific uses.

Heavier transport will use solid-state batteries such as rechargeable zinc alkaline, Lithium-metal (Li-metal), and Lithium-sulfur (Li-sulfur). The electric grid will adopt low-cost and long-duration batteries such as zinc-based, flow, and high-temperature batteries. And when electric vehicles become ubiquitous–raising the demand for fast charging–high-power batteries will proliferate.

Many of these alternative battery technologies will leap from the lab to the marketplace by 2030, the report predicts. Some of these changes will be driven outside the U.S, specifically in countries like India, Indonesia and the Philippines that prefer smaller vehicles.

Source : https://www.forbes.com/sites/jeffmcmahon/2019/10/29/huge-battery-investments-drop-energy-storage-costs-threaten-natural-gas-industry/#6592e9c7c3b1

Malaysia currently ranks as the third largest exporter of LNG in the world. Between January and April 2019, the oil and gas industry contributed RM46.8 billion to Malaysia's export earnings, with RM15.8 billion coming from LNG alone.

"As such, there is a need to encourage upstream investments to ensure a steady supply of natural gas for domestic and international markets." says Malaysian Gas Association (MGA) President, Hazli Sham Kassim.

Meanwhile, in Malaysia, market liberalisation efforts will see gas prices increase on a semi-annual basis by RM1.50/million BTU to align domestic gas prices with global prices. The rationalisation process promotes a cost-efficient tariff structure for consumers and it is in line with the government's overall agenda of liberalising industries and increasing competition.

On the implementation of the Third-Party Access (TPA) system, Hazli said it will encourage new parties to participate in the domestic gas industry, thus creating a dynamic, versatile and thriving sector.

Source: New Straits Times (5 June 2019)

At the inaugural Malaysian Gas Symposium 2019 (MyGAS 2019) in June, the Minister of Economic Affairs, Azmin Ali outlined several key initiatives that will further strengthen the industry and its sustainability. One such initiative is the National Oil and Gas Services and Equipment (OGSE) Industry Blueprint Study under the 12th Malaysia Plan to elevate the competitiveness of local players. The other is an Oil, Gas, Energy and Environment White Paper on Malaysia's Future Energy Landscape, outlining a blueprint on energy policies that will stimulate climate action and mitigate carbon emissions.

Come September 2020, Malaysia will host the 7th International Energy Forum (IEF) and the International Gas Union (IGU) Ministerial Gas Forum during which dialogues will discuss the nation's role in key aspects of global value chains such as the integration of the world's gas supply and infrastructures.

Sources: New Straits Times & The Star (26 June 2019)

LED street lighting: 60% done

Between early 2018 and mid-June 2019, Tenaga Nasional Bhd had replaced almost 60% of public street lights in Peninsular Malaysia with 90 watt Light Emitting Diode (LED) bulbs. Previously, they were using 150 watt High Pressure Sodium Vapour (HPSV) bulbs. With this, 212, 639 units of the 367,000 street lights under local authorities in Peninsular Malaysia are energy efficient. This replacement exercise is an Incentive-Based Regulation initiative to reduce energy consumption in the country.

LED bulbs also reduce street lighting failure from an average 15% with HPSV bulbs to less than 1%. It also results in savings of 30-40% in electricity charges. In addition, it emits less heat, is more durable and stable and has no mercury that is harmful to the environment.

The remaining street lights in the Peninsular will be replaced from December 2020.

Source: Bernama, 21 June 2019

THAILAND

Thailand to build 16 floating solar farms

Thailand plans to build the world's largest floating solar farms to boost the country's share of clean energy. The state-run Electricity Generating Authority of Thailand (EGAT) will float 16 farms at nine hydroelectric dam reservoirs by 2037. They will have a combined capacity of 2.7GW, which is almost three times the 1.3GW of global generation as at October 2018.

Floating systems are considered 18% more expensive than land based ones because of the need for floats, moorings and resilient electrical components, according to the World Bank.

Locating solar farms at existing hydropower reservoirs will not need us to spend as much on infrastructure tying it to the grid. The system will also improve overall output of hydropower plants, says Thepparat Theppitak, the deputy governor of EGAT. Also, the projects bypass land use in forests and farmlands, and the water can also help cool solar systems, thus increasing efficiency by 10%, says Thepparat.

Bidding for the first farm at Sirindhorn Dam in northeast Thailand is open to international companies. It has a budget of two billion baht (RM257.67 million). The plant is set to start operations in 2020.

The Star, 5 March 2019

StatFact

arbon dioxide
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SINGAPORE

Racing to build one of world's largest floating solar panel systems

Singapore outlined its multi-pronged approach to tackle climate change at the Ecosperity Conference 2019 in June. This includes deploying floating solar photovoltaic (PV) systems at three of its reservoirs, namely Tengeh, Bedok and Lower Seletar. It will be the republic's first large-scale floating system of solar panels that will power water treatment processes.

National water agency Public Utilities Board (PUB) sought proposals from companies to design, build, own and run a floating system of solar panels at its Tengeh Reservoir. The 50MW system at Tengeh, slated for operations by 2021, will be one of the world's (and Southeast Asia's largest) largest single floating solar PV systems. According to PUB, the expected reduction in carbon dioxide emissions is equivalent to removing 6,000 cars off Singapore's roads.

Construction contracts will be awarded by Q3 2019 for the smaller 1.5MWp systems at Bedok and Lower Seletar. Both are expected to come online by early 2020. Once all three systems are completed, PUB's total solar capacity will be approximately 57MWp, enough to power about 15,500 four bedroom HDB flats for one year.

In Singapore's circular economy approach of minimising waste and transforming it into resources, other strategies in the works include converting incinerated bottom ash into construction material, and segregating and treating food waste into agricultural inputs on local farms. Its integrated water and waste treatment plants at Tuas Nexus converts food waste and used water sludge into biogas sources. Once it's fully operational by 2027, it is expected to shave more than 200,000 tonnes a year off national carbon emissions.

Sources: The Straits Times, pv magazine, Channel News Asia (5 June 2019)

VIETNAM

Trying to cut loose from coal

While countries are making efforts to increase the share of renewables in their generation mix, Vietnam's coal share is rising. From 2000 to 2015, the biomass and hydro share of the total primary energy mix in Vietnam fell from 53% to 24% while coal's share grew from 14% to 35% of the total energy supply.

Vietnam's economy is forecast to grow at a rate of between 6.5% and 7.5% per year from now until 2030, and according to its Energy Outlook Report 2017, its energy demand is expected to grow 8% annually until

2035. Vietnam is looking to expand its coal sector to meet this demand with its share growing to 56% by 2030, requiring investments up to 150 billion U.S dollars.

A consortium around Japan Bank for International Cooperation has already approved a $2-billion loan for a coal-fired power plant. There are plans to increase the number of coal-fired plants to 32 by 2020 and 51 by 2030. The 32 coal-fired plants would be burning 63 million tons of coal per year. This figure will more than double to around 129 million tons per year when all 51 plants are fully operational.

However, in light of worsening pollution, Vietnam has made a revision to its current Power Development Plan (PDP 7) 2016 to develop renewable energy sources as a measure to protect the environment. The Ministry of Industry and Trade has started offering incentives for renewables. Attractive payments of 6.67 to 10.87 cents per kilowatt-hour (kWh) are offered for solar projects and feed-in tariffs of 8.5 cents per kWh for onshore and 9.8 cents per kWh for offshore facilities are offered for wind power.

With continued support from the government, price drops and improving technology for wind and solar, it is expected that renewables might eventually become Vietnam's biggest electricity source by 2030.

Sources: Reuters, The Asean Post.

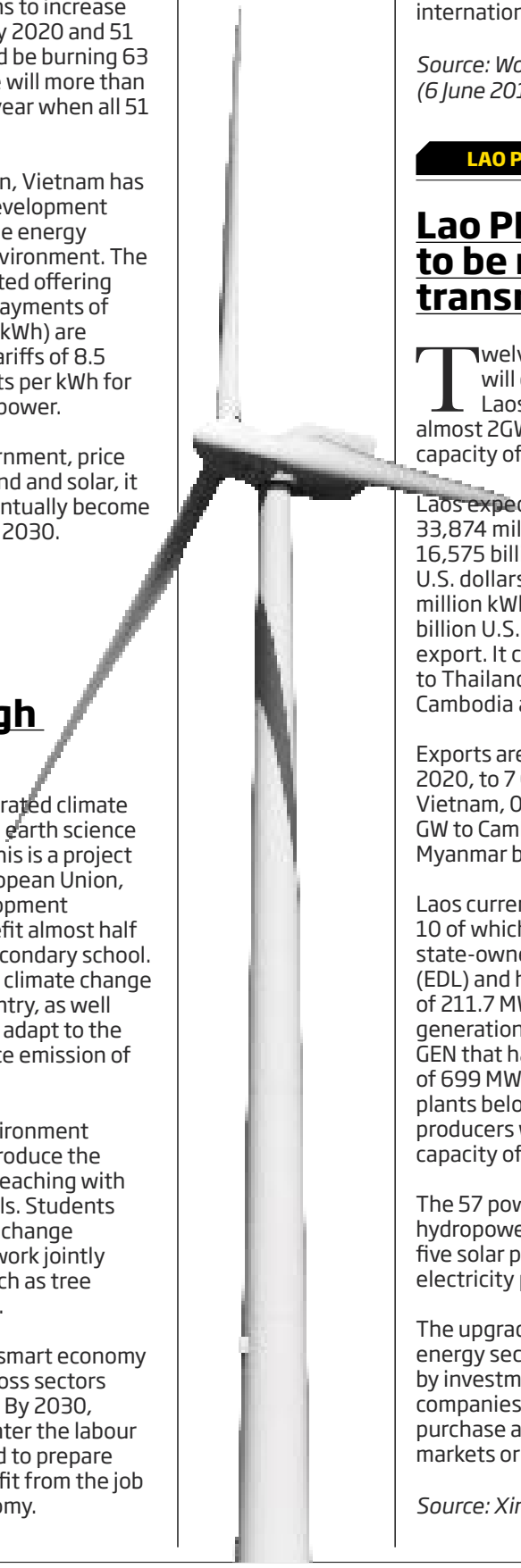
CAMBODIA

Climate change in high school curriculum

By 2020, Cambodia will have integrated climate change into a new and expanded earth science curriculum for grades 10 to 12. This is a project undertaken with support from the European Union, Sweden and the United Nations Development Program. The new curriculum will benefit almost half a million students enrolled in higher secondary school. They will learn about factors that drive climate change and the vulnerability profile of the country, as well as key approaches and technologies to adapt to the impacts of climate change and to reduce emission of greenhouse gases.

At the same time, the Ministries of Environment and Education have collaborated to introduce the eco-school concept combining formal teaching with practical engagement at 15 pilot schools. Students here learn to develop effective climate change responses via classroom learning and work jointly with teachers on resilience projects such as tree planting and climate-smart agriculture.

In addition, the transition to a climate-smart economy will generate shifts in job demands across sectors and require new skills for existing jobs. By 2030, three million young Cambodians will enter the labour market and tertiary education will need to prepare them so they may contribute and benefit from the job opportunities of a climate-smart economy.



Six universities in the country have begun to incorporate climate change in relevant curricula and taken measures to boost climate-related research through scholarships and partnerships with international academic institutions.

Source: World Economic Forum (6 June 2019)

LAO PDR

Lao PDR set to be regional transmission hub

Twelve new power plants will come into operation in Laos later this year, adding almost 2GW to the existing installed capacity of approximately 7.2GW.

Laos expects to generate about 33,874 million kWh worth about 16,575 billion Kip (some 1.9 billion U.S. dollars) in 2019. About 25,625 million kWh worth about 1.45 billion U.S. dollars is targeted for export. It currently exports power to Thailand, Vietnam, Malaysia, Cambodia and Myanmar.

Exports are expected to rise in 2020, to 7 GW to Thailand, 1 GW to Vietnam, 0.3 GW to Malaysia, 0.2 GW to Cambodia, and to 0.1 GW to Myanmar by 2022.

Laos currently has 57 power plants, 10 of which are operated by the state-owned Electricite du Laos (EDL) and has an installed capacity of 211.7 MW. Ten are owned by generation public company EDL-GEN that has an installed capacity of 699 MW. The rest of the power plants belong to independent power producers who have a total installed capacity of 6.3 GW.

The 57 power plants consist of 49 hydropower plants, a lignite plant, five solar plants, and two waste-to-electricity plants.

The upgrading of the country's energy sector is financed mostly by investments from foreign companies who make power purchase agreements with specific markets or buyers.

Source: Xinhua, 14 February 2019

Let's Get SMART

Smart meters are empowering consumers to make better energy consumption decisions. Find out how Malaysia is managing the cost and deployment of smart meters that are part of the Advanced Metering Infrastructure, which aims to make power supply and consumption the shared responsibility of both the utility and consumers.

In 2018, Malaysia joined economic powerhouses like the USA, EU, Japan, China, India, Australia and Singapore to make smart metering a way of life. As at the end of July 2019, there were 266,000 smart meters installed in homes (85%), commercial premises (14%), and light industries and street lighting (1%).

"The roll out of smart meters continues in earnest," says Ir Roslee bin Esman, Director, Industry Operations Department Energy Commission. "National utility company TNB, which is spearheading this project, is racing to meet its target: 340,000 smart meters in Melaka by end December 2019 and another 1.2 million in parts of the Klang Valley by end 2020. All in, 1.5 million premises will be smart metered under Phase 1 from 2018 to 2020. These geographical zones were selected because of their high Internet penetration and a population that is tech savvy. They are an ideal starting point."

Phase 2 from 2021 to 2023 will cover the rest of the Klang Valley, Johor and Penang; and Phase 3 (2024-2026) will be for the rest of Malaysia. The target is nine million smart metered domestic, commercial and light industrial premises. Large and mid size industrial consumers have a different metering system based on time-of-use, with off peak and peak rates. Their tariffs are also higher.

TNB's Ir Mohamed Ghouse Ahmad, Project Director (AMI – Klang Valley), Distribution Network Division, says the national utility provider has allocated RM1.192 billion for Phase 1. "With smart meters, we expect to see a reduction in power usage that will translate to a reduction in demand and eventually the cost of production. Besides, with many services going online there is less time and manpower needed. This will reduce operating expenditure.

Ir Mohamed Ghous Ahmad

Project Director (AMI – Klang Valley), Distribution Network Division, TNB

"Under the Incentive Based Regulation mechanism, there are three general types of tariff in the country – one for industry, another for commercial & retail consumers, and another for domestic consumers," says the Commission's Suraiya Nadzrah Binti Ramli, Deputy Director for the Electricity/Gas Supply and Services Quality Unit. "We can use these variable tariffs to arrive at something that is equitable and affordable while advancing with smart meter applications that are transforming the energy landscape."

> "MALAYSIA IS THE SECOND ASEAN COUNTRY TO ROLL OUT SMART METERS, AFTER SINGAPORE. BUT THE ISLAND NATION DOES NOT HAVE A BIG CATCHMENT. AS SUCH, OUR PROJECT IS BEING BENCHMARKED BY OUR COUNTERPARTS IN THAILAND AND INDONESIA. THEY HAVE VISITED US, TO LEARN FROM US."

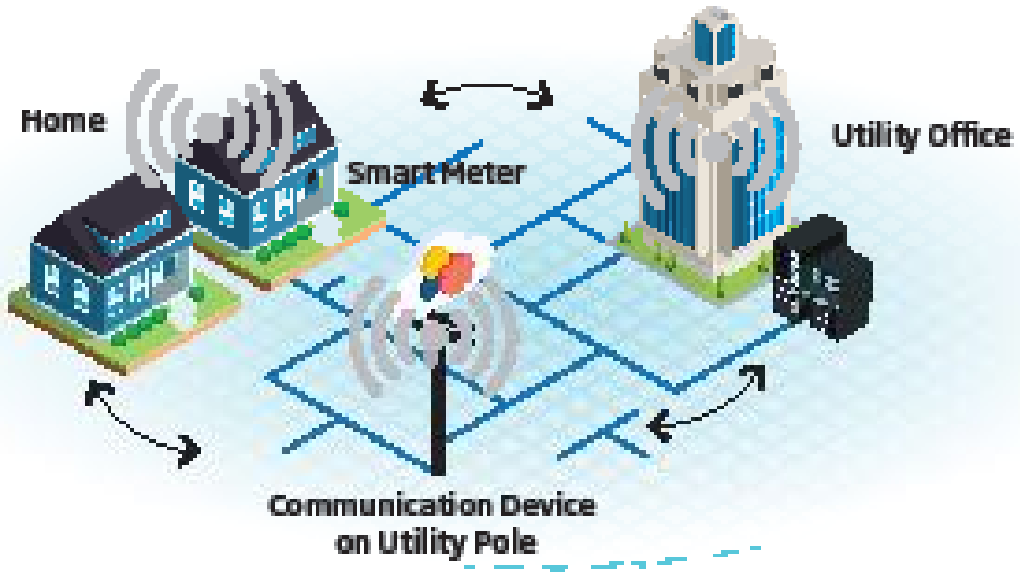
StatFact

1.5 mil

premises will be smart metered under Phase 1 from 2018 to 2020.

Consumers do not have to pay for the installation and maintenance of smart meters. These capital and operational costs will be borne by TNB, to be recovered through the Incentive-Based Regulation (IBR) mechanism, where the Energy Commission reviews tariffs every three years during what is called a Regulatory Period. The three smart meter phases are thus aligned to the Regulatory Periods - RP2 (2018-2020), RP3 (2021-2023) and RP4 (2023-2025). IBR is a transparent tariff setting mechanism that takes account of actual versus budgeted costs incurred by power producers to determine tariffs. It is about fair practices in supplying power to different market segments. Malaysia, which prides itself for having among the lowest electricity tariffs in ASEAN, will work hard at retaining this edge.

A total of 9.1 million consumers in Malaysia will be smart metered when the implementation exercise ends in 2026.



Malaysia's AMI Infrastructure

industry what smart phones are to the telecommunication industry – versatile electronic devices that use the power of communication to empower the person on the street. As with any smart device, they communicate via the Internet.

Herein is the fundamental difference between smart meters and their predecessors, analogue and digital meters. Analogue meters have been around since the 1950s and digital meters since 2000. Many have aged badly, and their readings are faulty. As such, bills tend to be based on estimates of previous usage patterns. Also, readings are done manually every month, with meter readers keying in data into hand held PDA, to be sent to TNB's billing system. There is room for human error and inaccurate billing in this process.

Smart meters are known for their accurate readings. They are the public face of the Advanced Metering Infrastructure (AMI), which is part of the smart grid. AMI uses 2-way remote communication between consumers and the utility provider 24/7/365 via three components: smart meter, utility pole and data centre.

The smart meter will record power usage in a home, and the data is transmitted to utility poles fitted with extender bridges and repeaters. The Head End System (HES) here receives data, while the Meter Data Management System (MDMS) analyses and transmits the data to the Billing and Customer Relationship Management (BCRM) system at the utility provider's office.

customers, establish new power connections, track outages, provide disconnection-reconnection services and monitor power theft, tampering and any other irregular behavior. For consumers, it is the avenue for convenient online bill payment, connection and reconnection services and reporting grievances," says Ir Ghous.

"These are just the initial offerings. Our smart meters can also be used for a variety of other online applications. They are ready for time-of-use tariffs based on peak and off peak charges; Net Energy Metering customers who can sell their solar energy and buy power from a utility; and a liberalised retail market with multiple power suppliers. They can also be used to control electrical appliances remotely, as in smart homes. Smart meters are enablers, and we can always add more and more applications as and when needed, just like smart phones.

Conventional vs Smart Meter Reading & Billing

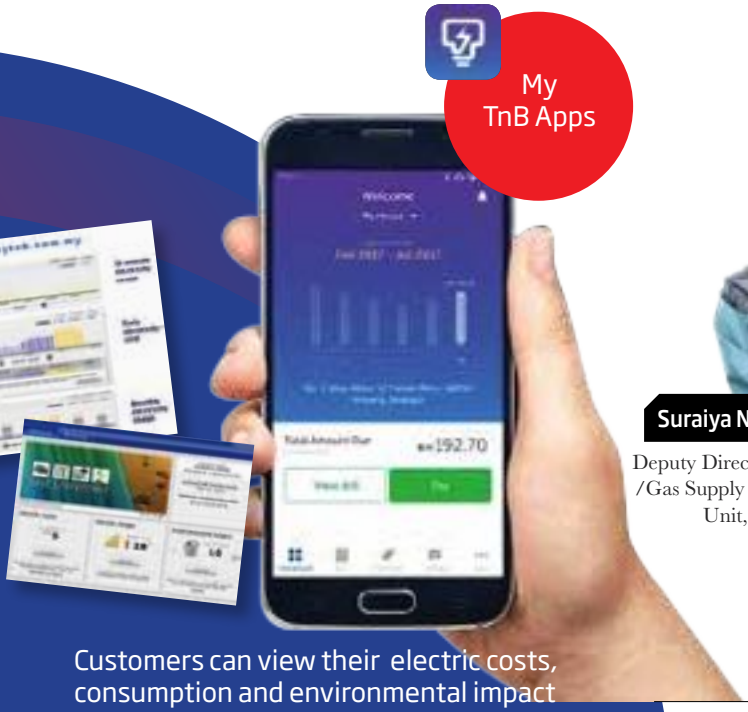
"What is empowering about our smart meters is that consumers can track their consumption every 30 minutes," points out Ir Roslee. "All they have to do is refer to their daily historical consumption, that is, their power usage the day before by checking the MyTNB website or mobile application. It gives them access to their power usage every half hour, that is, 48 readings on any given day. Smart meters also enable them to track their daily and monthly electricity costs in detail. With this information, they can make the necessary adjustments to reduce their power bill and carbon footprint.

"Previously, consumers only knew how much power they had used upon receiving their monthly bills. Any attempt to cut down electricity bills then was at best based on estimates."

Ir Roslee Bin Esman

Director, Industry Operations Department, Energy Commission

> "MOST COUNTRIES IN THE EU AND JAPAN HAVE SUCCESSFULLY USED DAILY HISTORICAL CONSUMPTION DATA TO MANAGE CONSUMPTION AND APPLICATIONS ARISING FROM THE CONVERGENCE OF AMI AND DISTRIBUTION AUTOMATION. IN THE LONGER TERM, REAL TIME MONITORING WILL BECOME MORE PERVASIVE, ESPECIALLY WHEN SMART HOMES WANT A BREAKDOWN OF POWER USAGE BY APPLIANCE OR DEVICE."



Customers can view their electric costs, consumption and environmental impact details on-line

Suraiya Nadzrah Binti Ramli

Deputy Director for the Electricity /Gas Supply and Services Quality Unit, Energy Commission

SHAKY START. LOOPHOLES FIXED

Smart metering started out as part of TNB's digitalisation road map. It later became a national initiative to support the government's green agenda to reduce power consumption and the nation's carbon footprint.

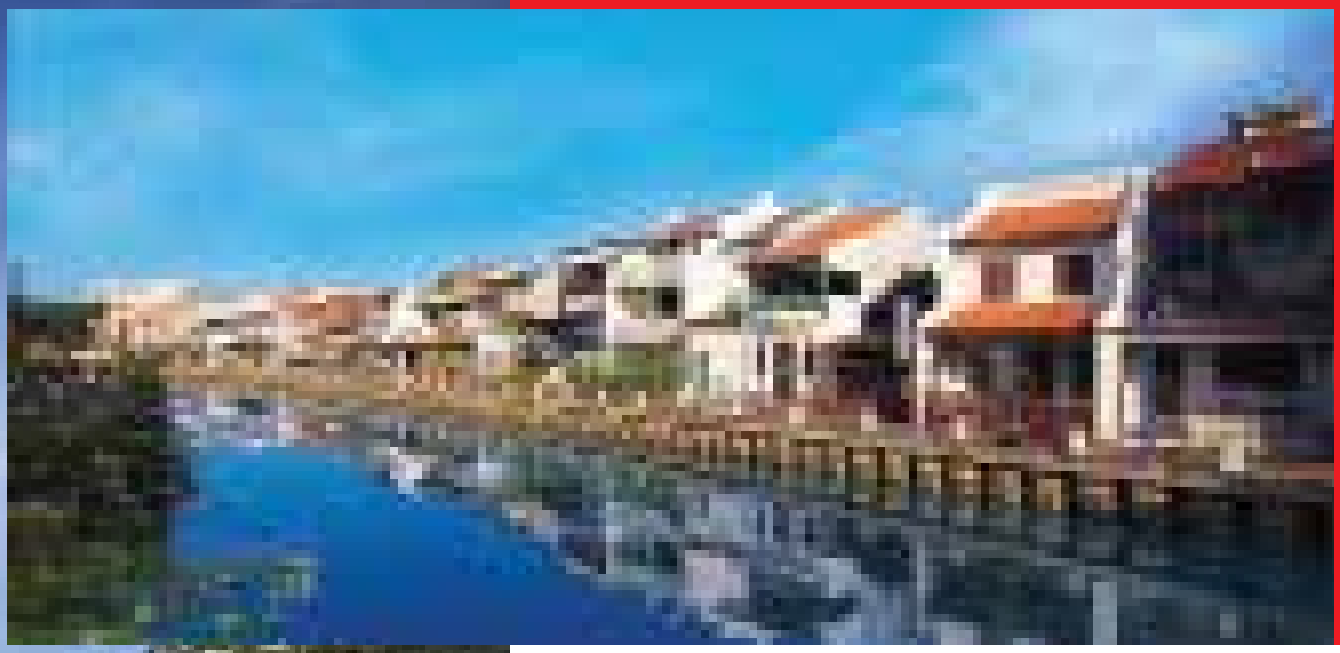
"The main objective of this project is to enhance sustainable energy and energy efficiency adoption among Malaysians," said Kamaliah Abdul Kadir, Senior General Manager (Customer Service) for TNB distribution division, in an email interview with The Star (21 November 2014). The smart meter project was then in its infancy.

Kamaliah said smart meters would also help educate customers to do their bit in the efficient use of resources and help minimise energy usage during peak load. "What's crucial for us now is to get public acceptance of the project and for customers to see the benefit of having these meters installed. Customers need to see how the system can add value to the existing digital or analogue meters because smart meters teach them to learn to adjust their consumption behaviour based on the information made available on their computers."

Kamaliah added that the smart meter system would also allow TNB to introduce detailed billing based on consumption profiles. "As the pilot project implementer, we at TNB want to find the best technology within the smart meter's features that best suit our customers' expectations and meet the objectives set." She also said TNB would have to conduct a series of complex tests related to cellular technology, radio frequency and power line carrier communication (for data transmission) before the system could be successfully implemented.

That year, TNB commissioned a pilot project involving 800 households in Melaka and 200 in Putrajaya. "The pilot had three types of smart meters based on the data transmission network," explains the Commission's Suraiya. "They used either radio frequency (RF), cellular or power line carrier network to transmit data. It all depends on the geographical landscape. RF-based meters work best in densely populated areas. Cellular-based meters are more suitable for areas where houses are more dispersed."

Phase 1 of the smart meter roll out covers the historic city of Melaka (right) and the federal administrative capital of Putrajaya (above)



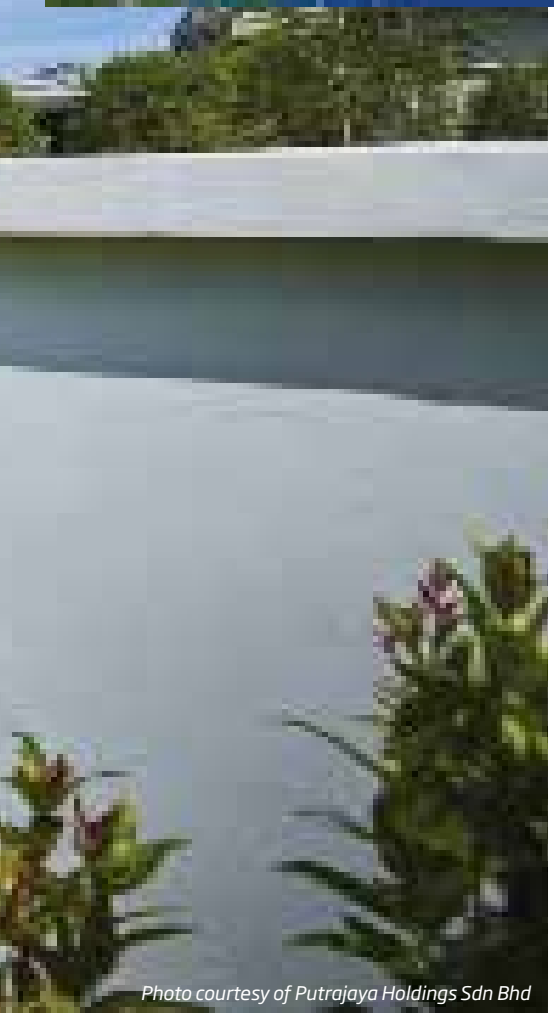


Photo courtesy of Putrajaya Holdings Sdn Bhd

Ir Ghous adds, "In the USA and Europe, RF is the preferred data transmission network, while in Japan and UK, cellular meters are more common because they have a more mature telecommunication infrastructure. In Malaysia, the majority of smart meters will use the RF network that is owned by TNB. For some rural areas, we will need to lease the cellular network from the telcos. This will increase the smart meter infrastructure costs."

The feedback from the pilot project was encouraging. TNB then presented a cost benefit analysis to the Commission to roll out smart meters nationally. It was time framed against the 3-year Regulatory Periods.

The smart meter rollout started in Melaka, where some homes declined to install them. This affected the smooth transmission of data in the 3-point AMI infrastructure. The interruption of data flow caused the electricity bills of some smart metered homes to spike, and there was an outcry. The media went to town with their stories.

"With smart meters, data has to flow smoothly across the three components of the AMI infrastructure. When a few homes along the transmission line did not accept smart meters, there was poor data meshing. It caused loopholes, and readings went haywire and led to overbilling. To rectify the issue, we sent meter readers to aggrieved households for manual reading. We also referred to their past records to produce estimated bills. Rebates were then given accordingly," says Ir Ghous.

"To solve this problem, we will be installing repeaters in locations identified as potential data loopholes. Repeaters prevent poor data meshing and inaccurate readings. They will ensure data flows without hiccups to the BCRM system.

"Looking back, this episode was a good wake up call for us. It shows we should not take our consumers for granted and expect 100% buy in for our products and services," adds Ir Ghous.

Manual meter reading is more error prone, and soon to be a thing of the past.

GLOBAL TRENDS

The smart metering industry is maturing, reports Smart Energy Magazine (31 December 2018). The magazine says that in 2016 utilities are estimated to have invested $14.3 billion in smart meters for electricity and gas, pushing the total installed globally to 700 million.

It also notes that as technology cements its place within the utility sector, three trends have taken shape.

North America, once the leading market for investment in smart meters, now lags behind China and Europe. In a rush to meet national and EU targets, European utilities will install 182 million smart meters over 2016-20, amounting to $37.8 billion of investment. Likewise in Japan, 55 million meters, costing $16.6 billion, will be installed from 2016 through to 2020. The story is not confined to developed markets. Over the past year, there have been announcements in new and unexpected places: a 2,000-customer pilot in Nigeria; a 216,000-meter project in Serbia; and an ambitious project connecting one million meters over cellular networks in Uzbekistan.

StatFact

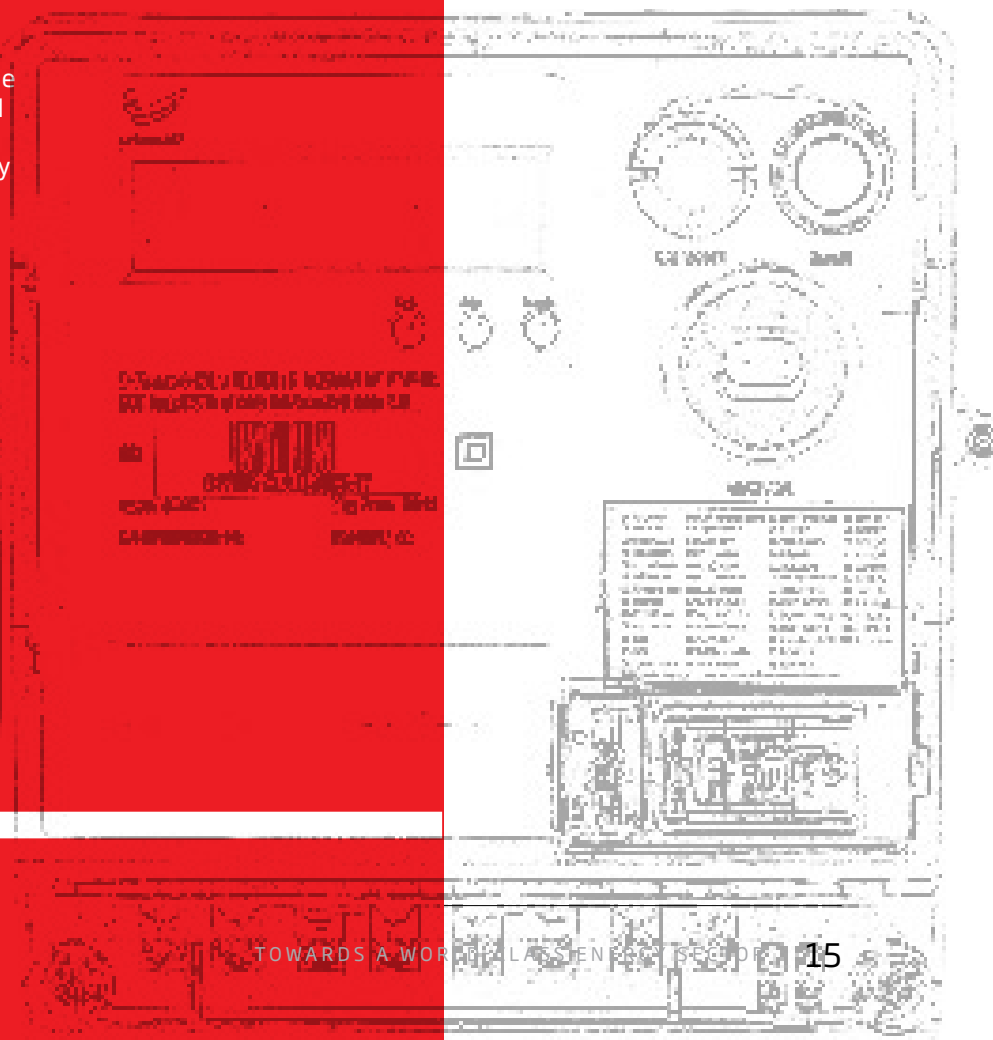
Smart meters installed globally

700 mil

Moving forward with smart meters that lend themselves well to a wide variety of applications; they are becoming more than end user energy saving devices, say experts.

Utilities are also capitalising on the convergence between smart metering and distribution automation. North American utilities have successfully integrated AMI data with other operational technologies such as outage and distribution management systems. Of the 11 largest smart metering projects, seven use meter data for outage management, six for theft detection and four for asset management. AMI is also being used to support the grid, especially with the rise of solar energy prosumers. In addition, utilities are also using smart meters to reach further into the home, especially smart homes. The days of implementing smart meters solely for end-user energy savings are long gone. Regulators require, and utilities should expect, multiple use cases and benefits.

There is also a trend among utilities to outsource data functions of smart metering projects to vendors. This allows utilities the flexibility to choose the appropriate level of operational involvement and asset ownership based on their regulatory environment and strategic preferences.



STREET LIGHTING

Switching on

When the clock strikes seven in the evening, Malaysian streets lights come on, to glow till the break of dawn at seven in the morning. This 12-hour lighting cycle, every day, all year round comes at a heavy economic and environmental cost. The costs rise even higher when festive lights come out to dazzle in the night. But change is in the air with the government switching to LED street lighting across Peninsular Malaysia.

Street lights across Peninsular Malaysia are starting to glow brighter these days, following a government initiative to replace traditional incandescent lights with energy efficient light emitting diode (LED) lights on all public streets.

In April 2019, Malaysia's Housing and Local Government Minister Zuraida Kamaruddin announced that all roads nationwide will be illuminated with LED lamps in a move to save energy by as much as 50%. She said the plan to introduce LED street lighting will be rolled out in stages, beginning September.

"Right now, about 80% of street lamps in Malaysia use other forms of lighting apart from LED lights, which are known to be more energy-efficient and environment friendly than incandescent bulbs. We can save about 50% from our current energy expenses with this move;" she said

She added that the ministry will also look into having illuminated signages on shops and buildings changed to LED lighting as well. "This move will result in more power-saving, and create a more beautiful and attractive urban landscape for the people. We will conduct a pilot project for this in my constituency in Ampang first."

The LED street lighting conversion is scheduled for completion in 2020, and will cost the government RM623.9 million. It involves replacing 367,000 High Pressure Sodium Vapour bulbs (150 watts) with 90-watt LED bulbs. As at end August, 238,101 lights (64%) had been replaced, mainly in the cities.

Meanwhile, in July 2019, the Penang State Government declared that the island plans to become the first state in the country to use energy-efficient LED lighting on all streets, both public and private. Penang has 105,813 street lights, of which 31,596 are maintained by two local councils and the remaining 74,217 are managed by Tenaga Nasional Berhad.

The case for LED street lighting

The world is transitioning to LED street lighting because of their energy efficiency and economic returns. Research shows that they reduce carbon emissions and energy bills by half.

While Malaysia is moving ahead with its national LED street lighting exercise that has a 2020 deadline, the transition is somewhat slower in other countries. This is because these decisions are

StatFact

Energy saved by as much as

50%

LED

PROS CONS

usually made by municipal or city councils. In the UK, only about 50% of local authorities have made a significant shift towards this energy saving technology as at February 2019. In the USA, a September 2018 smartcitiesworld report predicts that it will take another ten years for about 90% of US street lights to use LED luminaries. The delay is caused by the upfront investment required to install LED lighting. Even though hardware costs have declined significantly, some local authorities do not have the budget or funding for this.

Still, the World Bank urges the use of LED street lighting. Its publication *Sustainable Energy for All* says it will in the longer run help reduce the financial burden of city authorities. It says street lighting is an increasingly significant part of a city's energy use, and is a growing burden on municipal budgets, especially when viewed in the context of rapid urbanisation. Malaysia itself is forecast to see a rapid population growth and urbanisation by 2030 that will increase energy consumption substantially.

Projections indicate that five billion people (60% of the world's population) will live in cities by 2050, and according to the International Energy Agency, the overall demand for lighting will be 80% higher by 2030, compared with 2005.

The pros for LED street lighting outweigh its cons.

- New LED lights have an extremely long life span - 50,000 to 100,000 hours or more compared to fluorescent bulbs that have a life span of about 10,000 hours.
- They have very low maintenance costs because of their long life span.
- They are extremely energy efficient, wasting very little energy in the form of infrared radiation.
- They produce directional light emitted in one direction (180 degrees), rather than a diffused 360-degree glow. So, no wastage and light pollution
- They have high light quality
- They don't need a warm up or cool down period.
- They have no toxic chemicals such as mercury.
- They can be dimmed, allowing more flexibility in controlling light levels.
- Some cities have harnessed LED lights smartly, using sensors to increase brightness when a pedestrian walks by or integrating systems that alert officials when a particular light needs maintenance. They can also be used to blink rapidly to signal emergency responders where they are needed.

- High initial costs partly because of materials used – LED is often made on sapphire and other expensive substances. It takes time to recover initial investment cost.
- Limited to blue, red, yellow and green colours – well suited for traffic lights - though manufacturers have invested in R&D to produce all colors of the spectrum.
- Too bright, according to some users.
- Their dimming feature has been used by some local authorities to save on their energy bills – resulting in poorly lit streets. Such economic priority can jeopardise public safety.

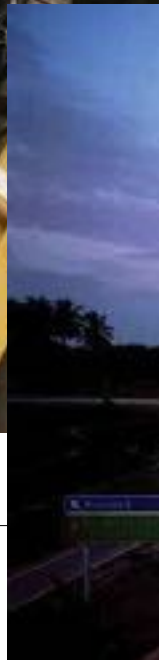
The World Bank publication also highlights the economic and environmental benefits of LED lighting. It says they are 40%-60% more energy efficient than traditional lighting technologies. "Simply by using LED luminaries, it is possible to provide better quality lighting, lower energy consumption and reduce carbon emissions. Operations and maintenance costs also tend to be much lower with LED luminaries that last at least four times longer than traditional bulbs. The cost savings can help ease the financial burden of municipalities that have tight fiscal budgets and are burdened with heavy utility bills. Cities that invest in LED street lighting can then take advantage of the savings and invest in other services such as sanitation, schools or public health."

Mark Kenber, the CEO of The Climate Group, an international nonprofit organisation that aims to accelerate climate action, weighs in with: "With the number of street lights around the world is likely to hit 350 million by 2025, local governments, utilities and financial institutions need to work together to ensure that all new and existing street lights are LED – or of equivalent energy efficiency – by 2025. LEDs are technically proven, commercially viable and already resulting in major savings for cities around the world.

FROM GAS TO LED STREET LIGHTS

In 1904, Georgetown, Penang became the first town in the Peninsular to have street lighting using gas-based bulbs. Penang now targets to be the first state in Malaysia with 100% LED street lighting.

With LED street lights, local authorities can expect to almost half their maintenance and power costs.



The average lifetime of a conventional High Pressure Sodium Vapour bulb is 12,000 hours compared to 50,000 hours of a high brightness LED bulb.

Street lighting in rural areas. The spacing between street lights along a stretch of road is designed to provide consistent illumination for the personal safety of pedestrians.

LED street lights are directional, casting light at a 180 angle onto the street below. There is no light diffusion or pollution.

Street lights can be both aesthetic and functional, as with this street in the federal administrative centre of Putrajaya. Here, the shape of street lamps can help you get your bearings – each of the arterial roads in the city has a street lamp design that is distinctively different.

A Wake Up Call for LAUNDERETTES

Besides Trade Licences issued by local councils for commercial operations, launderettes also need Private Gas Licences from the Commission when using piped gas supply. This lack of knowledge resulted in two fatal accidents last year.

In April and October 2018, there were two explosions at launderettes in the Klang Valley. There were fatalities in both accidents. Investigations showed that the explosions were caused by the faulty installation of piped gas by unauthorised personnel.

"Launderettes have become urban fixtures providing a convenient service. Unfortunately, most of the owners are unaware of the safety and legal requirements to operate these premises, especially those who choose piped gas as the economical option to run their business," says the Commission's Ir. Md Zakuan bin Hj. Ibrahim, Director, Safety Regulation Department. "At the time of the explosions, there were close to 2,000 outlets, all operating with piped gas, but without licences from the Commission."

Ir. Md Zakuan bin Hj. Ibrahim

Director, Safety Regulation Department, Energy Commission

LAUNDRETTES HAVE BECOME URBAN FIXTURES PROVIDING A CONVENIENT SERVICE.

According to the Gas Act 1993, the Commission is mandated to issue licences for the supply of all piped gas in the country. However, some launderette owners tend to believe all that was needed to run their businesses is a Trade Licence from their local council.

"Following the explosions, the Commission reached out to leading launderette franchisors as well as local councils for fact checking and to remedy irregularities with regards to piped gas installations. It then came to light that launderette owners were using piped gas to save on utility costs, unaware of the requirements of Section 11 of the Gas Act.

GAS SUPPLY ACT 1993 PART V

- *Licence required for supply of gas: Terms, Conditions and Contents of licence*
- *Section 11, Gas Supply Act 1993 states: "No person shall carry out any activity of (a) import into regasification terminal; (b) regasification of gas; (c) shipping of gas; (d) transportation of gas; (e) distribution of gas; (f) retail of gas; or (g) use of gas, unless such person is licensed under this Act."*

SAFETY FIRST

Within two months of the explosion, the Commission issued close to 150 licences. The remaining premises (70% in the Klang Valley) are in the process of completing their paperwork and installing piped gas system by authorised personnel," says Ir Md Zakuan. Typical turnaround time for a Private Gas Licence is 15 business days, with the Approval to Operate (ATO) issued within a week. The Commission, through its enforcement departments in its regional offices, is actively conducting checks, some based on public information, to ensure that these premises are safe. The Commission has nine regional offices across Malaysia.

"We have also held dialogues with local councils on this issue. One of the important outcomes is the agreement that councils will not issue Trade Licences without the submission of Private Gas Licences for premises using piped gas. Local councils are now working with both the Commission and Fire Department in the issuance of Trade Licences," adds Ir Md Zakuan.

The Commission is also in the midst of updating the Guidelines on Domestic Gas Piping System, with simpler instructions and improved visuals. The manual will help would-be launderette owners with the processes involved in applying for a Private Gas Licence.

RULES AND REGULATIONS
The Commission regulates Liquefied Petroleum Gas (LPG), Liquefied natural gas and natural gas piping systems throughout Peninsular Malaysia and Sabah under the provisions of the Gas Supply Act 1993 and Gas Supply Regulations 1997.

MS830: 2003
Code of Practice for The Storage, Handling And Transportation Of Liquefied Petroleum Gases.

MS930: 1986
Code of Practice For The Installation Of Fuel Gas Piping Systems And Appliances.

HOW TO GET A PRIVATE GAS LICENCE

2 STEPS

The Commission has established rules and regulations for all premises utilising piped gas systems. This involves two steps.

STEP 1

is the Approval to Install (ATI) process that requires the commitment to engage a registered gas contractor or competent person to design, install and maintain a commercial gas piping system. This is followed by the Approval to Operate (ATO) process. Only then, will the Commission issue the Private Gas License (PGL) to the operator.

Applications for the ATI, ATO, and PGL can be done via the Commission's Online Application System on the website (https://oas.st.gov.my/). The website also provides the list of registered contractors and competent persons for installation and inspection.

APPROVAL TO INSTALL (ATI)
approval of the design and installation of a commercial gas piping system by a registered gas contractor

APPROVAL TO OPERATE (ATO)
inspectation and approval installed gas piping system

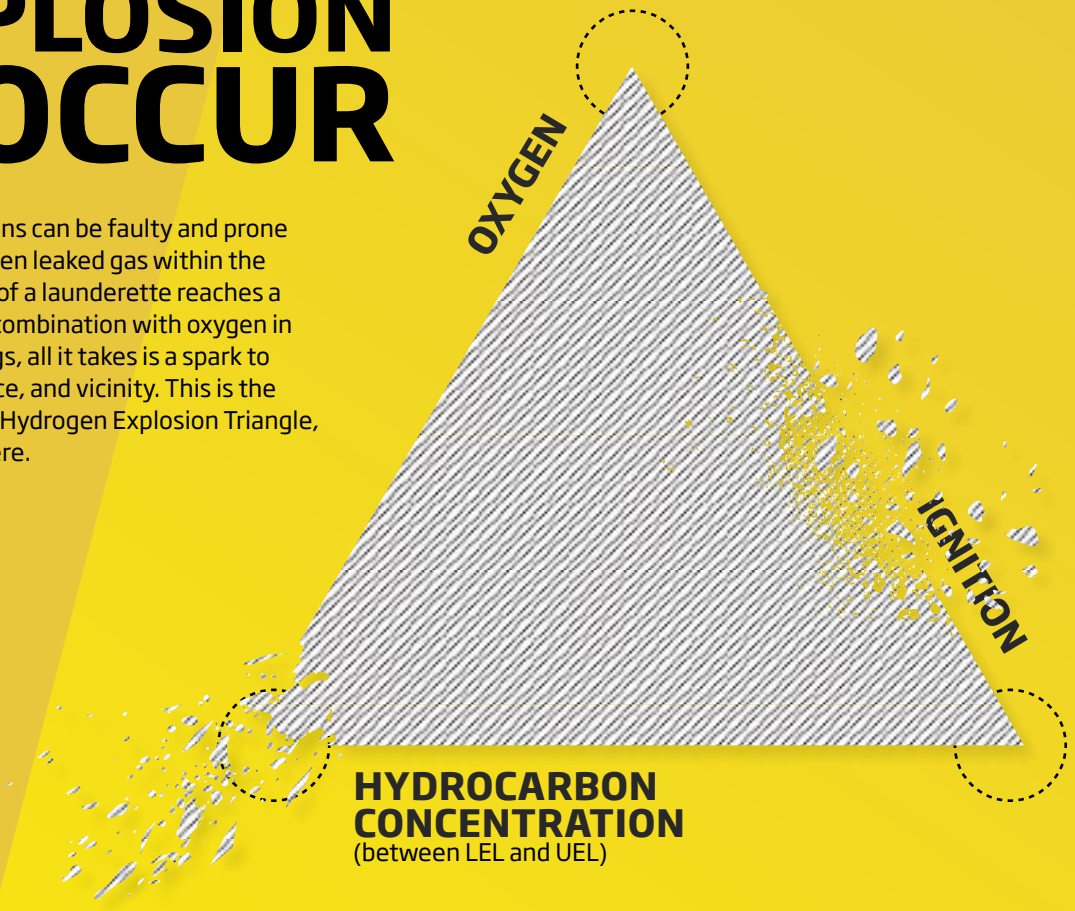
GAS LICENCE
issuance of a private gas licence upon the approval of the gas piping system

STEP 2

requires the laundrette operator to submit the Private Gas Licence, together with a supporting letter from the fire department (Bomba), to the local council to obtain a Trade Licence. They can only commence operations when they have a Trade Licence and Private Gas Licence, both of which must be prominently displayed at their premises. Illegal operators are liable to a fine not exceeding RM100,000 or jail term of up to three years, or both. There is also a fine of RM1,000 per day if the installation is not rectified upon conviction.

HOW DOES AN EXPLOSION OCCUR

Illegal installations can be faulty and prone to leakages. When leaked gas within the confined space of a launderette reaches a certain level in combination with oxygen in the surroundings, all it takes is a spark to blow up the place, and vicinity. This is the outcome of the Hydrogen Explosion Triangle, as illustrated here.



THE TRIANGLE IS MADE UP OF THREE ELEMENTS NEEDED FOR AN EXPLOSION TO OCCUR - HYDROCARBON, OXYGEN, AND AN IGNITION SOURCE.

In self-service laundrettes, the hydrocarbon is liquid petroleum gas or propane, and the ignition source is sparks from the drier. When the propane concentration in the confined space of the launderette is between 2.4% and 9.6%, a spark from one of the driers will cause an explosion.

LOWER EXPLOSIVE LIMIT (LEL) is the lowest concentration of air-fuel mixture at which a gas can ignite.

UPPER EXPLOSIVE LIMIT (UEL) is the highest concentration of air-fuel mixture at which a gas can ignite.

Does The Public Have To Worry About Exploding LAUNDRETTES?

The Commission advises the public to check the licences of launderettes they patronise. It is now mandatory for all launderettes to prominently display their Trade Licence and Private Gas Licence, issued by the local council and the Commission respectively. As long as these licences are there, the outlet is safe. Otherwise, choose a different launderette, and report the illegal operator to the local council.

SINGAPORE

ELECTRICITY

SINGAPORE WAS ONE OF THE EARLIEST COUNTRIES IN THE WORLD TO LIBERALISE THE POWER SUPPLY MARKET BY DEREGULATING THE WHOLESALE SEGMENT IN 2001 UNDER THE OPEN ELECTRICITY MARKET INITIATIVE IMPLEMENTED BY THE ENERGY MARKET AUTHORITY. OEM NOW COMES FULL CIRCLE WITH THE OPENING UP OF THE RETAIL MARKET IN 2018. WE CHECK OUT THE BENEFITS AND PITFALLS OF THIS LATEST MOVE.

Y OES RETAIL

Singapore's Open Electricity Market (OEM) initiative to liberalise the country's electricity market went retail in 2018. Between 1 November 2018 and 1 May 2019, OEM was gradually rolled out nationwide to all consumers by zones. With this, 1.4 million households and business accounts can now choose to buy power from one of 13 authorised retailers. Until then, Singapore Power Group (SP Group) was the island nation's sole power supplier.

OEM was first implemented by Singapore's regulatory body Energy Market Authority (EMA) for the wholesale segment back in 2001. It is one of the earliest countries in the world to deregulate the power supply market, but became cautious after that. By extending OEM to the retail market, Singapore has joined a growing list of nations such as the USA, UK, Italy and Japan that give consumers the right to choose their power supplier.

In the EMA website, Chief Executive Ngiam Shih Shun says: "The Open Electricity Market is about giving consumers a choice. While some consumers have chosen to switch, others have decided to continue buying from the SP Group. Some are taking a wait-and-see approach as there is no deadline to switching. Consumers are encouraged to take time to learn more about the options and price plans available before deciding whether to switch."

We look at how power retailing is working in the small island nation.

A

How will the consumer benefit?

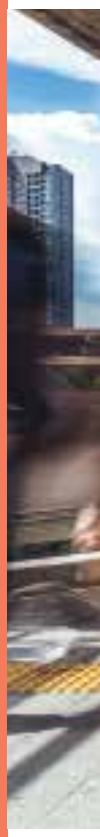
According to the Minister-In-Charge of Industry and Trade, S Iswaran, this move intends to give consumers more flexibility in choosing a retailer and a package that suits their needs, which will bring them benefits and also lead to better energy efficiency in the country.

There may be substantial immediate cost savings for consumers who decide to switch from the SP Group to another service provider – although consumers still have the choice of staying with SP Group and pay regular tariffs.

Established electricity retailers like Tuas Power and newly authorised retailers such as iSwitch have advertised rates with cost savings of more than 20% compared to SP Group's tariffs.

But ultimately, how much households and small businesses save depends on pricing plan choices and usage patterns. Some households may be in a better position to adjust their electricity consumption patterns to changes in price, compared to others. Working parents with young children, especially those without domestic help will find it difficult to shift much of their home-based activities to off-peak periods on weekdays. This leaves such households with little flexibility to change their energy consumption habits.

Young couples with no children and elderly retirees, on the other hand, may be in a better position to choose time-of-use-pricing plans where rates vary depending on when electricity is used during a given day.



Making the switch

It is not compulsory for consumers to switch retailers; it is their decision entirely. It is best for them to understand all the options at their disposal before making their choice, advises the EMA. Even after a consumer switches, there is no guarantee that low costs can be sustained, as there may be underlying price mechanisms that could increase electricity costs as electricity has become a tradable commodity.

Consumers can choose two types of standard price plans; they are the Fixed Price Plan and Discount off the Regulated Tariff Plan. The Fixed Price Plan, as the name suggests, is suitable for consumers who prefer a constant electricity rate throughout the duration of the contract. The rates could be higher or lower than the regulated tariff, since it is reviewed every quarter. For consumers who do not mind changes in electricity rates every quarter, as long as it is below the regulated tariff, they can opt for the Discount off the Regulated Tariff Plan.

EMA advises consumers to look out for large cancellation fees for switching prior to contract expiration, a minimum lock-in period, and minimum monthly usage penalty fees that may be imposed. These could dampen a consumer's decision to switch.

During the first year, there may be a period of trial and error as households shop around to try out various retailers to get a deal that offers them the most value. There may be an initial spike in activity, as companies aggressively try to acquire consumers with highly attractive packages for different market segments.

However, some segments may be stagnant with consumers taking their time to trust the reliability of new retailers. As such, they do not actively search for alternatives or are not willing to go through the administrative hassle of switching.

Highly developed electricity retail markets such as the US and Europe have evolved to a level where electrical services companies offer competitive, bundled services. Offers include tariff vouchers, the use of green electricity, integrated billing solutions that offer usage analytics, and charity donations on behalf of the consumer. They are consumer centric packages that offer clear product differentiation.

The EMA's Outlook Report 2016, meanwhile, has projected a decrease in electricity supply for Singapore going forward due to old electricity generation plants shutting down in the coming years. With an expected increase in demand, this is a cause for concern for electricity prices, although the EMA's commitment to maintain a 30% minimum supply cushion should appease consumers. Therefore, consumers need not be concerned about their electricity supply being affected after switching retailers.

SO MANY PLAYERS VYING FOR A RELATIVELY SMALL MARKET COULD SPELL A DANGEROUS GAME IN THE POWER CHAIN

The playing field

Since the SP Group's monopoly in the retail market ended, there's now an open playing field of 13 retailers battling for a share of the country's 1.4 million accounts. Singapore has a total of 30 licensed electricity retailers, but only 13 have cleared the regulatory hurdles and authorised to sell electricity under OEM.

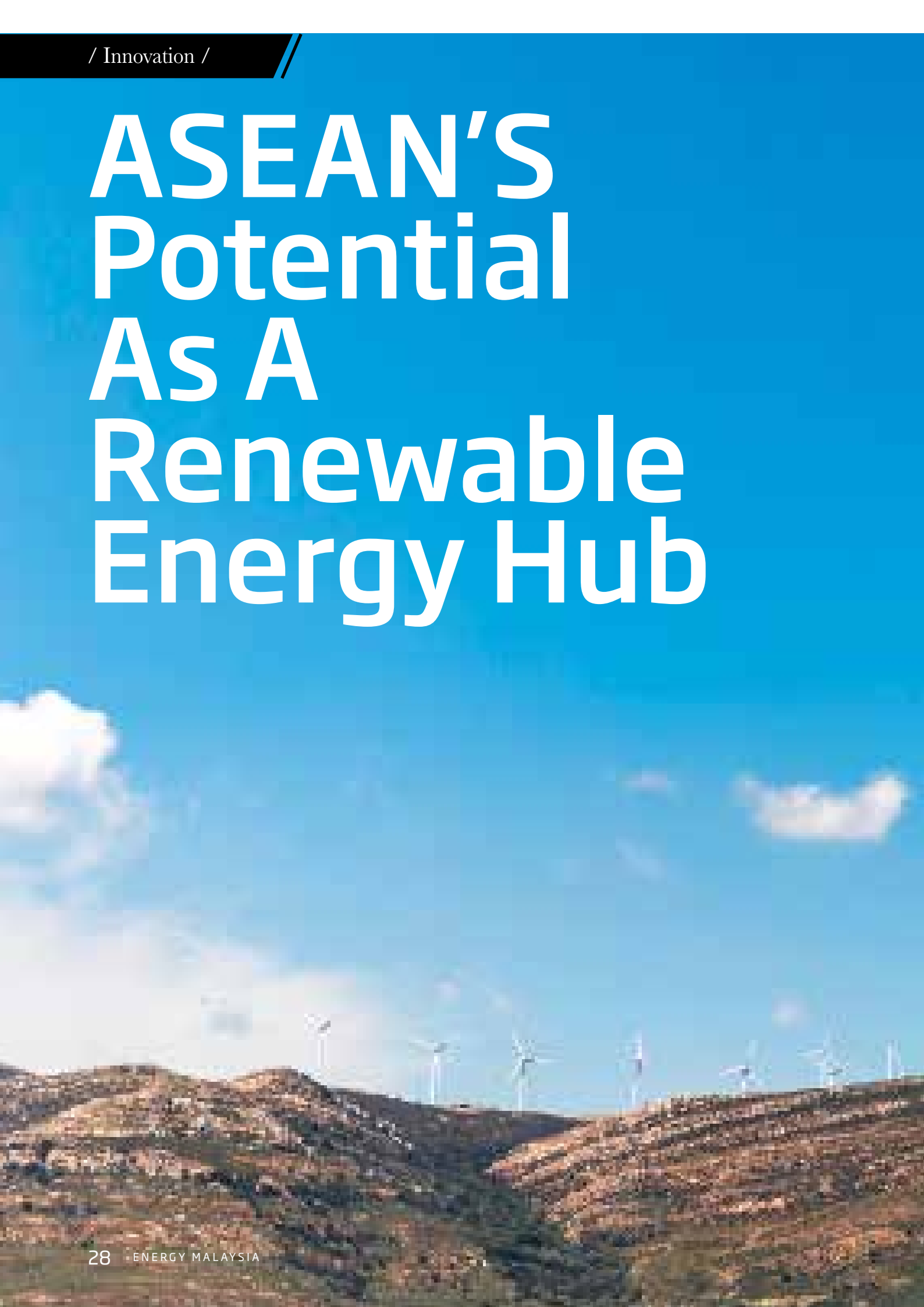
Stiff competition certainly has brought out innovative product offerings, where clearly, the consumer is king. Retailers are trying to entice potential consumers with plans that promise to cut power bills by up to 30% and showered them with freebies such as iPads, insurance policies and credit card rebates. Certain retailers also offer electricity plans sourced purely from renewable power generation for environment conscious consumers.

Having so many players vying for a relatively small market could spell a dangerous game in the power chain. Since hefty marketing and advertising expenditure is a given for customer acquisition, impending price wars can hurt retailer margins.

Experts contend that the power grab could force consolidation, especially among independent or stand-alone retailers that are not backed by their own 'genco' – power generation companies that generate and sell electricity in the wholesale market.

The road ahead may not appear to be straight and clear. Nevertheless, one vital sign to assess the success of an Open Electricity Market is whether it encourages consumers to be more prudent in their energy usage patterns. Should retail plans come with minimum usage penalty fees or rates that are significantly discounted below SP Group tariffs, there is the likelihood that consumers may be less inclined to cut back on their electricity consumption.

ASEAN'S Potential As A Renewable Energy Hub



AS ONE OF THE FASTEST DEVELOPING REGIONS IN THE WORLD, THE COUNTRIES OF SOUTHEAST ASIA COULD SEE A 40% RISE IN REGIONAL PRIMARY ENERGY DEMAND UP TO 2040, ACCORDING TO THE INTERNATIONAL ENERGY AGENCY. TO MEET THIS SIZEABLE INCREASE IN DEMAND, ASEAN COUNTRIES ARE RAPIDLY SCALING UP THEIR GENERATION CAPACITY WITH LARGE RENEWABLE PROJECTS. WE LOOK AT HOW ASEAN IS WELL POSITIONED TO BECOME A RENEWABLE ENERGY HUB.

A 2019 report published by the global auditing firm KPMG entitled "The Renewable Energy Transition" states that there are still about 70 million people in ASEAN without access to reliable electricity supply, which has presented opportunities for these governments to tap into the region's vast renewable energy (RE) resources. The report also notes that four key trends are expected to drive the region's transition to RE. They are technological innovation, clean energy friendly government policies, consumer demand for clean energy and the entry of new funds into the ASEAN RE market.

Based on these trends, ASEAN may well be poised to become a RE hub of the future.

LEVERAGING ON TECHNOLOGY

New technologies are helping realise the region's RE potential derived from natural resources such as the sun, wind, water and agricultural feedstock. Technology advancements in recent years have led to the steady decline in the overall cost of wind and solar energy production, making RE an increasingly viable option for public and private sector decision makers. A recent brief by the International RE Agency at the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change noted that when compared to fossil fuels and nuclear power, RE can now compete on cost alone. There is also a growing emphasis around environmental, social and governance factors as a crucial component of risk and return, which is driving more business corporations to adopt renewables.

PRO-RE POLICIES

ASEAN member states are now focused on increasing their share of RE in their energy mix as part of their sustainable energy growth and climate change commitments. As a region, ASEAN has also set a target for member countries to increase the component of RE in the ASEAN energy mix to 23% by 2025, up from 9% in 2014.

These targets are becoming more achievable with declining production costs and technological innovations such as better solar power efficiency and floating solar panels.

RE is also playing a big role in government rural electrification programmes. In Malaysia, there are several small-scale hybrid power stations using solar panels and wind turbines on Pulau Tioman and other islands off the East Coast of Peninsular Malaysia that are off the national grid. The Philippines recently completed a 2MW solar-battery micro grid project in Mindoro for electricity supply, also to off-grid areas.

CONSUMER DEMAND FOR CLEAN ENERGY

In the past, the high cost of producing RE discouraged governments from tapping this resource. However, with increasing public awareness of sustainable energy and a newfound openness to pay higher rates for clean energy, ASEAN governments are being motivated to invest more state funds into RE projects.

An important market for RE in the region is multinational companies, mainly Foreign Direct Investment (FDI) that is needed to boost socio-economic development. They include big players belonging to RE100, a 2014 global initiative consisting of more than 100 influential companies committed to using 100% RE for all their energy needs. Among the RE100 signatories are companies such as Google, Microsoft, Coca-Cola and IKEA – all of whom have a strong presence in ASEAN. They are proving that consumers can pressure for RE, since business and industry account for about two-thirds of the world's electricity consumption.

GROWING INVESTMENTS

In terms of funding, the World Bank, Asian Development Bank and Japan Bank for International Cooperation are pioneering RE investments in the region. Declining production costs and rising consumer demand are also helping to drive forward the RE mandate in the region. Sharad Somani, Executive Director and Asia Pacific Head of Power & Utilities at KPMG says, "The price of RE production has dropped sharply over the past five years and is expected to reach the price of conventional generation within the next five years. Once that happens, there will be more investors."

Meanwhile, the volume of RE investments continues to grow, and their value is evident in the strong pipeline of projects. This is mainly due to partnerships and collaborations between international funding agencies, private investors and governments. For example, the Asian Development Bank worked with the Melaka State Government in Malaysia on the Green City Action Plan roadmap, which involved structuring bankable projects for solar energy and street lighting, setting up a database to track indicators in environment and economic growth; and conducting training in urban development, environmental planning and knowledge sharing.

NOTABLE PROJECTS ON THE GROUND

GLOBAL TECHNICAL ENGINEERING COMPANY FIRCROFT IDENTIFIES KEY RE PROJECTS IN THE REGION, IN DIFFERENT STAGES OF DEVELOPMENT. THEY INVOLVE PUBLIC AND PRIVATE INVESTMENTS, PRIMARILY FROM REGIONAL AND GLOBAL POWER PRODUCERS.

StatFact

ASEAN target for RE in energy mix:

23%

by 2025

Laos

MOONSOON ONSHORE WIND POWER PROJECT

Value: $1.5bn (approx.)
Start Up: 2020

Situated in southern Laos, this project will have a capacity of 600MW and a total footprint of 68,000 hectares, making it one of the largest onshore wind farms in Southeast Asia. The scale of the project means that it expects to reduce the country's carbon emissions by 34 million tons throughout the project lifetime. The strategic location of the project, on a 1,200-metre high plateau along a main highway connecting Thailand to Vietnam, means that most of the energy it produces (as much as 95% by estimates) will be destined for export to markets in Asia.

The Philippines

THE PHILIPPINES: DINGALAN HYDRO PUMPED STORAGE FACILITY

Value: $1bn (approx.)
Start Up: 2022

A 500MW pumped storage hydroelectric power plant in the Municipality of Dingalan in Central Luzon. Construction of this project is subject to grid impact studies.

Myanmar

SAGAING SOLAR FARM

Value: $880m (approx.)
Start Up: 2020

Myanmar has set itself ambitious RE targets. It aims to generate 8% electricity through wind and solar energy by 2021, rising to 12% by 2025.

With a proposed generation capacity of 880MW, the Sagaing Solar Farm in northwest Myanmar will be one of country's first large-scale grid connected solar projects (the majority of the country's solar installations to-date have been in the off-grid sector). This project is expected to make a substantial contribution to the national RE target.

Thailand

SONGKHLA BIOMASS POWER PLANT

Value: $35m (approx.)
Start Up: 2020

As one of the world's largest rubber producers and exporters, Thailand's rubber trees have another application – as feedstock for a biomass power plant that is being built in southern Thailand. With a capacity of 20.6MW, it is scheduled to begin commercial operations in 2020.

Vietnam

OFFSHORE WIND FARM BEN TRE

Value: $618m (approx.)
Start Up: 2021

Vietnam is already a regional leader in installed RE capacity. This project will consolidate its position further. It will involve the phased development of a 310MW offshore wind farm off Ben Tre Province in southern Vietnam.

Indonesia

TIDAL POWER PROJECT

Value: $750m (approx.)
Start Up: 2022

This project in Larantuka Straits off Flores will have a total capacity of 150MW and is likely to be the largest tidal power plant in the world. It will sell power to the country's state-owned electrical utility company, PT Perusahaan Listrik Negara, under a 30-year power purchase agreement.

Cambodia

PREK LIANG I- II HYDRO POWER PLANT

Value: $500m (approx.)
Start Up: 2021

Cambodia has set itself a target of connecting 100% of its villages and 70% of households to the energy grid by 2030. This power plant in the northeast is one of the key projects that will help Cambodia to reach its target. It will involve the construction of a hydropower dam with an installed capacity of 128MW and annual growth generation of 583.91Wwh.

Singapore

TENGEH RESERVOIR FLOATING SOLAR FARM

Value: $50m (approx.)
Start Up: 2021

Tengeh Reservoir Floating Solar Farm in the north, near the Tuas checkpoint, could be one of the largest floating solar farms in the world. With a capacity of 50MW, it will be Singapore's first large scale floating solar PV system. Its main role will be to power the reservoir's water treatment facilities, eliminating 28,000 tonnes of carbon dioxide emissions per year – the equivalent of about 6,000 cars.

Hydro power plant

Tidal energy plant

Floating solar farm

Nurhafiza Binti Mohamed Hasan

RENEWABLE ENERGY IN MALAYSIA

THE COMMISSION'S DIRECTOR, INDUSTRY PLANNING AND DEVELOPMENT, NURHAFIZA BINTI MOHAMED HASAN SHEDS LIGHT ON MALAYSIA'S RE DIRECTION

How is the Energy Commission promoting the RE agenda in Malaysia?

As Malaysia's energy regulatory authority, we are aligned to the government's target to achieve 20% RE in the capacity mix. We have planned and are implementing RE related programmes such as Large Scale Solar (LSS), Net Energy Metering (NEM) and Self Consumption for solar installations.

The Commission also provides guidelines that RE producers must adhere to. We have implemented LSS bidding exercises periodically to meet the capacity target as envisioned. We have also developed guidelines for NEM and Self Consumption so that existing and potential producers have a clear understanding of the framework, application procedures and regulatory requirements.

We also work closely with the Sustainable Energy Development Authority (SEDA) that has developed a RE transformation roadmap up to 2035, where they are looking at other types of RE and the potential capacity we can have in Malaysia. Besides solar energy, the Commission also licenses biogas, biomass and mini hydro projects. However, by percentage of RE being deployed in the country so far, solar energy has a clear lead.

What is the progress of RE projects on the ground so far?

We have awarded a total of 890MW with capacity ranges from 1MW to 50MW. To date, LSS plants with a total capacity of 542MW have been commissioned. So far in 2019, we have generated 393GWh of energy from LSS out of our national capacity of 24,132MW. The goal is for us to reach 6,000MW of total installed capacity coming from RE by 2025.

Where are the most opportunities for growth?

We began with small RE programmes and feed-in-tariff projects, mainly in oil palm estates. Now, we have progressed to LSS, with Malaysia moving more towards solar energy as the preferred RE choice. It seems to be the most promising RE source because it is the easiest to be implemented, compared to other technologies such as biogas, biomass and others.

How will technological innovation change the way RE is deployed?

A report by the International RE Agency indicates that RE technologies are continuously being improved year on year.

Even the cost of solar energy production, for example, has declined dramatically and capacity has increased. In Malaysia, the new solar average capacity factor is at 17%, compared to 14% previously because of more efficient and cost-effective technologies.

What are the opportunities and challenges to Malaysia becoming a leader in RE in ASEAN?

The Prime Minister has said that the Malaysian government aims to boost the growth of its green technology sector, and has a targeted revenue of RM180 billion while creating more than 200,000 green jobs by 2030. The current opportunities are in the solar industry. Malaysia wants to develop a skilled workforce in solar PV installation and services.

The challenges are mainly for other renewable energies such as hydro, biogas and biomass. For biomass, for example, the challenge is having several biomass plants sourcing feedstock from the same area. After a few years, these plants are unable to operate because there is a shortage of feedstock.

So, we are trying to reduce overcrowding by having only one plant per site. This way, the resources can be sustained in a better way. Biogas is limited to palm oil millers and the energy generating capacity is very low. Besides, biogas plants are usually found in remote locations and the take up rate is low because the area is sparsely populated.

There is huge potential for mini hydro to be developed in Malaysia, but this resource is located mostly in rural areas. Here, connection to the main grid is a challenge at the moment.

How will interconnectedness between ASEAN member countries benefit the RE industry as a whole?

With member countries doing their part, we will help reduce carbon emissions and create job opportunities in the region. For instance, we have many solar installations in Malaysia. This provides an opportunity for our people working in this industry to share their expertise with other ASEAN countries.

IFGE 2019

Where is the World Going With Energy

GLOBAL ENERGY EXPERTS AND ACADEMICS GATHERED IN PUTRAJAYA TO DISCUSS THE ENERGY LANDSCAPE AND HOW THE WORLD IS TRANSITIONING TOWARDS A MORE SUSTAINABLE ENERGY FUTURE AT THE INTERNATIONAL FORUM ON GLOBAL ENERGY (IFGE) 2019.

The IFGE 2019 was held in Putrajaya on 16 July, 2019. Into its third year, IFGE's theme for 2019 was "Opportunities and Challenges in Global Energy Transition".

The forum focused on how the world will produce, distribute and consume energy in the future, and how Malaysia is adapting to this energy transition. With the threat of climate change and fossil fuels being a finite resource, new ways of generating and supplying energy are needed to secure a sustainable future for the global energy ecosystem. For Malaysia, the energy transition is already underway, and it is focused on expanding the renewable energy capacity in the national energy mix and improving energy efficiency.

The forum was officiated by the Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC), Yeo Bee Yin. In her address, she highlighted the need for Malaysia to accelerate its renewable energy potential to meet rising demand locally and highlighted the country's decision to reform the electricity and gas markets.

IFGE 2019 was attended by well-known international energy experts and academics, senior officials from Malaysia's Energy Commission, and representatives from the Ministry of Economic Affairs (oil and gas sector), Sustainable Energy Development Authority and other Malaysian government agencies. There were also industry executives from Tenaga Nasional Berhad, Malaysia Gas Association and Federation of Malaysian Manufacturers.

The forum was divided into three plenary sessions, each followed by panel discussions that gave different perspectives of the global energy transition. In the first session entitled Long Term Outlook for Global Energy Market and the Role of Renewable Energy, speaker Yukari Yamashita, Director of the Institute of Energy Economics Japan, spoke about the importance of achieving the 3E challenges – energy security, environmental protection and economic efficiency enhancement in a well-balanced way. With Asia being the world's largest consumer of energy, coal will still be a mainstay energy source in many Asian countries, including Malaysia. However, Yamashita explained that the target is for no new coal-fired power plants to be built in the world from 2020 onwards; they are to be replaced by natural gas and renewable energy plants. She also noted that wind and solar photovoltaics have been expanding their generation capabilities because of rapid decreases in generation costs. The main challenge lies in integrating renewable energy generation to existing power grids while keeping a control on costs. This is particularly more important in emerging

> THE MINISTER HIGHLIGHTED THE NEED FOR MALAYSIA TO ACCELERATE ITS RENEWABLE ENERGY POTENTIAL TO MEET RISING DEMAND LOCALLY AND THE COUNTRY'S DECISION TO REFORM THE ELECTRICITY AND GAS MARKETS.

economies and developing countries where affordability of energy is a political and social concern.

In the second session entitled Challenges of Power Market Transition and Liberalisation, speaker Professor Peter Hartley, a professor of economics at Rice University, USA, explained that European countries and some US states have liberalised their electricity market through privatisation and deregulation to encourage market forces to drive down electricity prices. While liberalisation has shown to make the electricity market more efficient and cost-effective through competition, the downside is that it also makes it more difficult to recover fixed costs for power generation in the wholesale market and expand capacity for stable electricity supply. Professor Hartley pointed out that this downside could get more complicated as renewable energy rapidly increases its share of the wholesale energy market. He said that in order to achieve a more balanced power mix in a competitive electricity market, governments should intervene and create a regulatory framework instead of leaving it entirely to market forces.

Datuk Ir. Ahmad Fauzi bin Hasan
Chairman of Energy Commission

In the third session, The Role of Gas in Global Energy Transition and its Challenges in a Sustainable Energy Future, speaker Professor Jonathan Stern, Director of Gas Research at Oxford Institute for Energy Studies, UK, stated that while global demand for natural gas is expected to steadily increase over the long term, decarbonisation initiatives and the affordability of natural gas will likely influence its future. As an example, Professor Stern cited the EU's ambitious initiative to reduce net greenhouse gas emissions down to zero. Such decarbonisation efforts would make the use of natural gas difficult and require it to be replaced by biogas, synthetic gas or hydrogen. This could, in turn, lead to an expansion of demand for natural gas in Asia where decarbonisation initiatives are less rigorous. Asia could then see natural gas as a more cost effective way to replace coal as a next-step-solution to combat air pollution and climate change.

In his closing remarks, Datuk Ir. Ahmad Fauzi bin Hasan, Chairman of Malaysia's Energy Commission noted that energy efficiency and renewable energy are the main pillars of the energy transition. "Together, they can provide over 90% of the energy-related carbon emissions reduction that is required, by using technologies that are safe, reliable, affordable and widely available. Energy intensity of the global economy will also need to fall by about two-thirds by 2050, lowering the total primary energy supply to slightly less than 2015 levels. The share of renewable energy must rise from 15% of the total primary energy supply (TPES) in 2015 to two-thirds by 2050," he added.

Ir Fauzi also cited six key drivers in the energy transition. They are the rapid decline in renewable energy costs; improvements in energy efficiency; widespread electrification; increased use of smart technologies; continuous technological breakthroughs; and well informed policy making.

Malaysia's Minister of Energy, Science, Technology, Environment & Climate Change, MsYeo Bee Yin

NATIONAL ENERGY AWARDS

The National Energy Awards (NEA) held in August 2019 received a promising number of submissions from players in the energy management and renewable energy industries in Malaysia. There were 145 applications, with 77 organisations qualifying to participate in the award's two categories. Category 1 on energy management and energy efficiency attracted 44 entries while there were 33 entries for Category 2 on renewable energy.

NEA 2019 WINNERS

Category 1 judged nominees on how effectively nominees had implemented energy efficiency measures in buildings and operations through integrating environmentally-friendly architectural designs. Category 2 nominees were required to show how innovatively they had applied renewable energy technologies in their operations.

At the awards ceremony, the Minister of Energy, Science, Technology, Environment & Climate Change (MESTECC), Yeo Bee Yin, said, "It is my aspiration to see the NEA evolve into the leading platform for sustainable energy industry players to convene, network and share best practices. It is on this note that I would like to see more industry associations and chambers to be a part of the NEA. I would also like to express my sincere gratitude to the Malaysia Green Building Council (MGBC) and Malaysia Society of Heating, Refrigerating and Air-Conditioning Engineers (MASHRAE), for agreeing to be our partners."

The National Energy Awards was spearheaded by MESTECC in 2018 to promote the development of innovation and best practices to drive Malaysia's sustainable energy sector forward.

The winners of NEA 2019 represented Malaysia in the ASEAN Energy Awards (AEA) held in Thailand in September 2019. Ten of the winners of this year's NEA had won accolades at the AEA held last year in Singapore.

"IT IS MY ASPIRATION TO SEE THE NEA EVOLVE INTO THE LEADING PLATFORM FOR SUSTAINABLE ENERGY INDUSTRY PLAYERS TO CONVENE, NETWORK AND SHARE BEST PRACTICES."

Category 1

Energy Management & Energy Efficiency

Energy Management in Building (Small)
Menara TM, MITC, Melaka (Winner)
Wisma TNB, Jalan Anson, Penang (Runner-Up)

Energy Management in Building (Large)
Menara Komtar, Penang (Winner)
Hospital Slim River, Perak (Runner-Up)

Green Building
Environmental Preservation and Innovation Centre (EPIC), Negeri Sembilan (Winner)
IKEA Cheras, Kuala Lumpur (Runner-Up)

Retrofitted Building
Subang Parade Mall, Selangor (Runner-Up)

Energy Management In Industry (Large)
CSC Steel, Melaka (Winner)
TG Medical Factory 14, Selangor (Runner-Up)

Energy Efficient Design
KLIA 2, Sepang (Winner)
Paramit Factory in the Forest, Penang (Runner-Up)

Category 2

Renewable Energy

National Grid
Cypark Resource (Winner)
Mattan Engineering (Runner-Up)

Local Grid
FGV Palm Industries (Winner)

Off-Grid Power
Universiti Malaysia Sarawak (Runner-Up)

Special Submissions to ASEAN Energy Awards

Gerbang Alaf
ZOG Engineering Technology
Malaysian Green Technology Corporation
SIRIM Berhad

Merit Awards

Menara KEN
KUB Berjaya Energy
Gan Teng Siew Realty
Mattan Engineering
Amcorp Perting Hydro

17th ASEAN Forum on Coal Council meets in Langkawi

The 17th ASEAN Forum on Coal (AFOC) council meeting was held in Langkawi from 2-4 April 2019. It was attended by 68 representatives from Indonesia, Myanmar, LAO PDR, The Philippines, Thailand and Cambodia, ASEAN Centre for Energy (ACE), ASEAN Secretariat (ASEC), World Coal Assosiciation (WCA), Japan Coal Energy Center (JCOAL), MESTECC, the Energy Commission and TNB Fuel Services.

AFOC is one of the working groups under the ASEAN Ministers of Energy Meeting (AMEM) that spearheads the Programme Area Coal and Clean Coal Techonology for the ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025.

The council meeting covered wide ranging subjects and activities such as the ASEAN Coal Awards 2019, the AFOC Dissemination and APAEC Phase II Workshop 2019. There were also discussions on opportunities for collaboration among member states to explore the use of clean coal technology and energy sustainability.

The panel of judges for the ASEAN Coal Awards 2019, chaired by Mohd Rizal Ramli with Dr. Siti Sumilah Rita Susilawati from Indonesia as vice-chairperson, met on Day 1 to judge entries for the award. A total of 24 entries had been received from four countries.

The awards ceremony was held in conjunction with the 37th AMEM meeting in Thailand in September 2019. Indonesia bagged eight awards, followed by Thailand (6), the Philippines (3) and Malaysia (1).

Day 2 was taken up by the AFOC Dissemination and APAEC Phase II Workshop 2019 in the morning. It was chaired by Marlinda Rosli with Christoper Zamora from ACE as vice-chairperson. It saw Indonesian delegates presenting their early findings of their research on the use of empty fruit bunches (EFB) as a fuel source and JCOAL talking about existing as well as future high efficiency low emission technologies for development. A discussion on the targets achieved during APEC Phase I and target setting for APEC Phase II was held after the workshop.

On Day 3, the 17th AFOC Council Meeting was held. It was chaired by the Energy Commission's Abdul Razib Dawood, with Kyaw Tet from Myanmar as vice-chairperson. Delegates heard presentations from WCA and JCOAL on various opportunities for collaboration among ASEAN member states to explore the use of clean coal technology and energy sustainability. They were also briefed on the outcomes of meetings held on the first two days.

The next AFOC meeting will be held in Nay Pyi Taw, Myanmar. Proceedings of the 17th AFOC council and associated meetings will be tabled at the AMEM meeting, scheduled in Thailand later in the year.

Singapore's EMA visits ST

On 10 July, the Energy Marketing Authority (EMA) of Singapore, the Commission's counterpart in the island republic, met with ST officials in Putrajaya. The agenda of the tripartite meeting between ST, EMA and MESTECC officials included discussions on electricity market liberalisation plans, renewable energy development plans in Malaysia, potential RE imports to Singapore and upgrading works for the electricity interconnection.


Kitar semula menerusi program 'RE-cycling'

Photo courtesy of Utusan Malaysia

Launch of Fabric RE-cycling in Kuala Lumpur

ST's first ever Be Energy Smart CSR Program

As a regulator, ST advocates safe and efficient energy consumption practices. Its Be Energy Smart initiative has been reaching out to educate the public on this since 2015.

On 19 March 2019, ST went one step further – it launched its first energy smart Corporate Social Resposibility programme called the Fabric RE-cycling. This programme focuses on community welfare (RE-cycle), environmental protection (RE-nature) and sustainable energy (RE-sustain).

Commercial Gas Installations: Awareness and Safety Seminar

Following two fatal incidents in 2018 at launderettes using piped gas systems, the Energy Commission's Safety Regulation Department organised an Awareness and Safety Seminar on 11 April 2019 in Kuala Lumpur. The seminar also saw the launch of the Guidelines for Gas Piping Installations at Launderettes or similar premises and the joint SIRIM-ST labelling of domestic cooking appliances.

The seminar was officiated by the Commission's Chairman Datuk Ir. Ahmad Fauzi Hasan, and attended by representatives from the Ministry of Housing and Local Government, Fire and Rescue Department, Ministry of Domestic Trade and Consumer Affairs, SIRIM and launderette owners.

During the seminar, the Commission proposed to make mandatory the submission its Approval to Install (ATI), Approval to Operate (ATO) and private gas licences as pre-requisites for local councils to issue trade licences to these businesses.

There were also four presentations made by the various units of the Commission's Safety Regulation Department. The Deputy Director of the Gas Installation & Equipment unit, Ir Shamsuddin bin Arshad, provided an overview of the legislative and standards requirements from a gas safety standpoint. This was followed by a briefing on the requirements for commercial gas installation licensing by the Gas Licensing Unit.

Mokhtar bin Mohd Nor from the Gas/Electrical Safety Development spoke on the guidelines for gas piping installations in launderettes or similar premises and safe work procedures; and Gas Safety Regulatory Officer, Nur Waheeda Wahab, highlighted the requirements for gas equipment registration.

UNITEN Energy Talk: Global Energy Trilemma Challenges

At the Energy Talk organised by University Tenaga Nasional (UNITEN) on April 2019, Professor Dr. Ken Koyama spoke on the "Global Energy Trilemma: Challenges for Energy Security, Environment Protection and Economic Efficiency". Dr Koyama is the Chief Economist at the Institute of Energy Economics, Japan (IEEJ). He also holds the Chair in Energy Economics of the Energy Commission at UNITEN.

With global economic growth and population increase contributing to the substantial rise in energy demand, particularly in Asia, there has to be an alignment of policy and strategy to respond to this phenomenon. Borne out of this demand is the global energy trilemma, of balancing energy security, environment protection, and energy equity.

In his address, Dr. Koyama stressed that energy is an essential part of human life and economic activity. He highlighted the current and ongoing challenges that the world and Asia have to face with regard to the energy trilemma. He also stressed on the importance of global energy landscapes regarding geopolitics, global governance, technological innovation and energy market reform in responding to these challenges. He elaborated by using a case study of how Japan is trying to address the trilemma through a recent Cabinet approval of the country's Strategic Energy Plan.

According to UNITEN's website: "The talk was conducted with the aim to expose participants to energy security, on how to ensure environmental protection alongside energy development and importance of economic efficiency in any policy implementations. In addition, it also aimed to inspire and encourage students to go in depth into energy economics by highlighting several issues and challenges that need to be addressed in this area."

The talk was attended by 62 participants who were mainly students and academics from the College of Energy Economics and Social Sciences. The 2-hour talk was a good platform for learning and connecting participants with Dr. Ken Koyama.

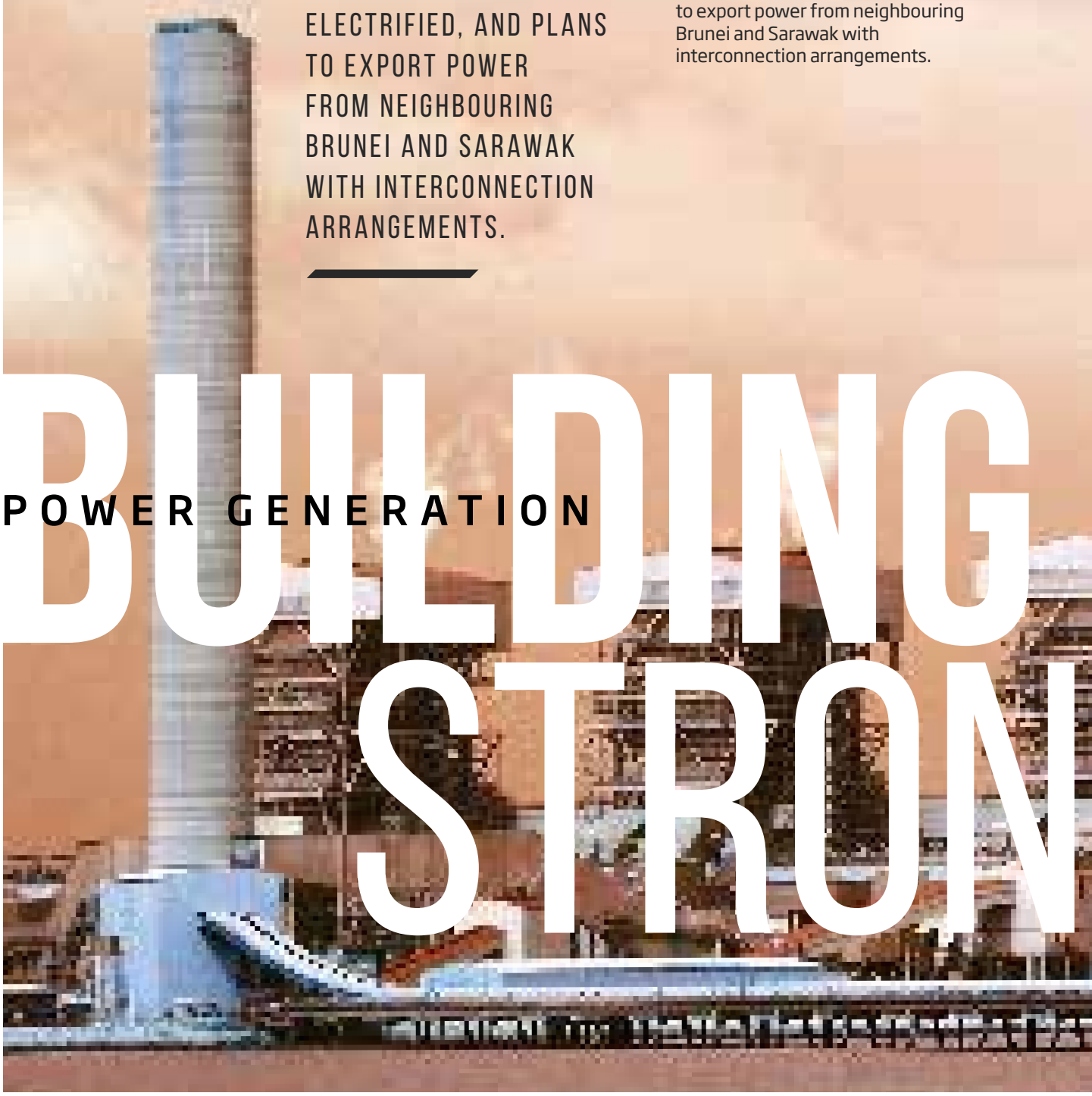
PENINSULAR MALAYSIA IS ALMOST 100% ELECTRIFIED, WHILE SARAWAK AIMS FOR 99% ELECTRIFICATION BY 2020 AND FULL ELECTRIFICATION BY 2025. MOUNTAINOUS SABAH IS 77% ELECTRIFIED, AND PLANS TO EXPORT POWER FROM NEIGHBOURING BRUNEI AND SARAWAK WITH INTERCONNECTION ARRANGEMENTS.

In a power hungry world, Malaysia is no exception as it races ahead to become an industrialised nation. For a country with a land area of 330,803 square kilometers and a population of 31.62 million (Department of Statistics, 2017), it has 69 power plants with 13GW generation capacity.

Peninsular Malaysia is almost 100% electrified, while Sarawak aims for 99% electrification by 2020 and full electrification by 2025. Mountainous Sabah is 77% electrified, and plans to export power from neighbouring Brunei and Sarawak with interconnection arrangements.

POWER GENERATION

BUILDING STRON



ON A LEGACY

Power generation had a relatively early start in Malaysia compared to other parts of the developing world. Globally, commercial electricity production started with the coupling of the dynamo to a hydraulic turbine in 1870, and spurred the Second Industrial Revolution that created inventions using energy, notably by Thomas Alva Edison and Nikola Tesla.

By 1878, the first power station was built. It was a private venture, when Lord Armstrong designed and built a hydroelectric power station on his property in Craigside, England. It used water from lakes on his estate to power dynamos. The electricity generated was used to power lights, heating, hot water, run an elevator as well as labour-saving devices and farm buildings.

Sixteen years later and thousands of miles away in the British colony of Malaya, two ambitious miners were encouraged by Lord Armstrong's enterprise. In 1894, K Thamboosamy Pillai and his partner Loke Yew started using electric pumps for their tin mining operations, drawing water from a nearby river. Their New Tin Mining Company in Rawang became the first commercial user of electricity in Malaysia.

In 1900, Malaysia got its first power station when the Raub Australian Gold Mining Company built Sempan Hydro Electric Station. This private enterprise involved the building of a dam across Sungai Sempan, seven miles from the gold mine. "The pipeline carrying water for the turbines to run the power plant ran steeply up into the jungle on the flanks of the Main Range," writes Brian Moynahan in "The Jungle Soldier, the True Story of Freddy Spencer Chapman". Electricity replaced steam power generated by wood burning at the gold mine.

This historic power station is preserved till this day by national utility company TNB, as a symbol of the birth of power plants in Malaysia. It is also a tribute to the thousands of men who endured unimaginable hardships in inhospitable tropical terrains infested by deadly pests and hostile wildlife to build power plants all over the country.

Until the mid-1920s, most generating plants were small, and used a variety of fuel including low grade coal, local wood, charcoal, imported oil and water power. Generation was undertaken by private enterprises such as the Perak River Hydro Electric Power Station, Huttenbach Ltd in Kedah and Negeri Sembilan and public services such as the Penang Municipality.

Demand for power continued unabated and large scale planning began and it led to the inflow of huge sums of foreign capital and technical expertise. To manage this, the Central Electricity Board was established in 1949. The name says it all – the centralisation of power generation under government jurisdiction. With this, private generation became a thing of past, when the government stepped in to make the power industry a key driver of the nation's economic and social prosperity.

SINCE 2018, THE GOVERNMENT POLICY IS FOR A FUEL MIX WITH 20% RENEWABLE ENERGY BY 2025.

While economic interests led to the establishment of power plants, its benefits were felt by all cross sections of the population. Electrification, especially rural electrification, became a social cause in the post-independence years.

Meanwhile, CEB, renamed National Electricity Board (NEB) after independence, began to feel the heavy financial burden of being the sole power generation entity. As a result, the Government announced the privatisation of power generation in 1988. This saw the emergence of independent power producers.

There are now 14 independent power generation companies (including NEB that became TNB after being public listed), who are all regulated by the Energy Commission to ensure safe, secure and affordable power supply in the country. The industry has been described as world class by many energy authorities.

From the beginning, Malaysia has followed global trends in terms of fuel mix. The early power plants used water power, followed by coal, then oil & gas, and now the focus is on renewable energy sources. The national 5-fuel policy means that the country cannot become overdependent on any single fuel source. Currently, coal dominates the fuel mix, followed closely by gas. And there is pressure to use more renewable energy for generation to realise Malaysia's COP21 Nationally Determined Target for a 45% reduction in carbon emissions by 2030.

Since 2018, the government policy is for a fuel mix with 20% renewable energy by 2025. The focus is on solar energy, to be generated by large scale solar farms while domestic and commercial consumers are being incentivised to install rooftop solar energy installations and become consumers and producers of energy at the same time.

Other RE sources include hydro, wind, biomass, and biogas.

Beyond 2050, although Malaysia will still be relying on coal and natural gas for power generation, RE is expected to play a bigger role in the mix.

As at mid-2019, Malaysia has 69 power plants – 8 coal fired/combined gas coal plants, 20 hydroelectric dams, 22 gas fired plants, 5 oil-fired plants, nine biomass plants and five large scale solar farms. There are also several small-scale hybrid power stations using diesel generators, solar panels and wind turbines on the islands off the East Coast of Peninsular Malaysia.

Under construction now are two more hydroelectric plants in Hulu Terengganu and Ulu Jelai, Pahang, and a co-generation plant in Pengerang, Johor.

StatFact

Under construction

2 hydroelectric plants

1 co-generation plant

Evolution of Power Generation in Malaysia

Picture Courtesy of Tenaga Nasional Berhad Archives

1950s -1960s

Chenderoh Dam

Shortly before and after independence in 1957, Malaysia invested heavily on large-scale hydroelectric power plants, with technical and financial support from the World Bank and other multilateral agencies.

One of the earliest large scale power projects in the country is the Perak Hydroelectric Scheme that consists of four dams on Sungai Perak, that is, Temengor, Bersia, Kenering and Chenderoh Dams generating a combined power of 580.5 MW.

Bersia Dam

1970s -1990s

400 MW Kenyir Hydro Power Station in Terengganu

When Malaysia embarked on its industrialisation programme in the 1970s, the demand for power grew exponentially. It lead to more power plants, from hydro and coal to gas and oil. The discovery of vast oil & gas reserves offshore led to the establishment of oil and gas plants.

30 MW is the threshold that defines hydro power and mini-hydro, while micro-hydro limits are 5 kW to 500 kW.

Putrajaya Power Station is a gas turbine plant that had an original installed capacity of 625MW; currently only 270 MW is still operational.

2010s onwards

Power generation comes full circle, with the privatisation of power generation in 1988 that created Independent Power Producers.

LSS Sepang – Malaysia's largest solar plant

The 2016 Paris Agreement is shaping power generation around the world. Malaysia, which pledged to reduce carbon emissions by 45% by 2030, is rapidly rolling out large scale solar farms to meet the national target for 20% RE by 2025 in the generation mix. While Malaysia ramps up with RE generation, coal and gas fired plants will continue to play an imporant role in power production to meet domestic demand.

The 3,100 MW coal-fired plant SJSAS Manjung in Perak. The original installed capacity for this plant started with 3x690MW, M4 (1x1010MW) COD in 2014.

Ministry of Education solar hybrid project in Pos Kemar, Gerik, Perak

THE DARKSIDE OF DIGITALISATION

by
Tan Sri
Ir Ahmad Tajuddin Ali

DIGITALISATION IS MARCHING RELENTLESSLY AROUND THE WORLD.

The dark side of digitalisation is not so much about hacking or cyber attacks. It is about people - the lack of leadership, direction and competencies to keep up with Industry 4.0 that we must embrace or else fall by the wayside.

The electricity supply industry is an early adopter of technologies. That is the nature of the business, which requires electricity to be generated, transmitted and distributed to users without a hitch. Failure is not an option, and technology has been used to deliver uninterrupted power. When there is no power, even clocks stop and it has a chain reaction, especially for time-sensitive businesses and industry. For example, it can also cause our transport systems to go haywire, with chaos reigning the streets, railway and even air travel.

THE DARK SIDE OF DIGITALISATION IS NOT SO MUCH ABOUT HACKING OR CYBER ATTACKS

During my time, as executive chairman of Tenaga Nasional Berhad from 1996 to 2000, my tagline was: "to keep the juice flowing." This required heavy investments in machinery, computers and staff training. We bought some of the best turbines in the world, and became its first users.

So, when Industry 4.0 arrived, the energy supply industry was better placed than most to survive and thrive in the digital revolution. In fact, digitalisation is a natural progression for the industry.

Tan Sri Ir Ahmad Tajuddin Ali is an expert on energy and technology having served the industry in various leadership capacities. He was Chairman of the Energy Commission for four years, Executive Chairman of Tenaga Nasional Berhad and Chairman of Gas Malaysia. He is currently Chairman of the Malaysia Industry-Government Group for High Technology (MIGHT) and SIRIM.

Under Industry 3.0 (also known as Manufacturing 3.0), the focus was on creating consistent, repetitive processes in a linear supply chain - like an assembly line - to boost productivity and reduce costs.

With digitalisation, the focus has shifted from working better to working differently. Instead of companies working independently at different parts of the value chain, digitalisation requires industry players to network in an eco-system that is data-driven, cloud enabled and platform centred. Businesses can then tap into the data available to pursue their own growth agendas. The business environment becomes more market-driven, and more agile and responsive to consumer needs.

Digitalisation has been hijacked by terms such as robotics, big data, analytics and AI. They are, in fact, the means to an end, the hardware and software that are creations of smart minds, to be operated by competent workers, for the benefit of increasingly discerning and demanding consumers. People are thus as much the bright side of digitalisation as they are the dark side.

Digitalisation is marching relentlessly around the world. If we do not embrace it, Malaysia will fall behind economies that it was once ahead of. The banking and travel industry have taken the cue, and online banking, online flight and hotel bookings have become a way of life here. But, there is a lot of catching up to be done, especially in manufacturing and construction, the pillars of the Malaysian economy.

The electricity supply industry had a head start in the use of technology, and it needs to keep up the momentum. What is needed is a strong commitment from the leadership (both political and business), management and staff.

Looking back, Malaysia marched confidently into the 21st century and we made public utilities such as electricity and piped water a basic human right, and used it to strengthen the socio-economic foundation of the nation. Rural electrification was regarded a social undertaking with economic benefits.

To generate national revenue, we established the world's best rubber research facility (Rubber Research Institute Malaysia) making the non-indigenous hevea brasiliensis tree the country's main source of wealth in the 1950s to 1970s. This performance was repeated with an R&D facility for oil palm, another non-indigenous plant. In the 1980s, we discovered oil, which became another source of national wealth. These resources became the basis of industrialisation and the revenue generated was ploughed back into public education, public health and other public facilities.

The 21st century so far has not been as kind. I recall my first address to staff during my stint at TNB. I wanted to boost staff morale, and how they must take pride in working for a technology-driven company. I mentioned smart meters as the way of the future. After I had finished, union leaders came to see me. They were upset with my speech because they said smart meters would make meter readers redundant. I appeased them by saying that this is likely to occur in 20 or 30 years' time, and even so, people would still be the driving force behind technology.

I cannot understate the importance of having competent staff to handle technology, and it is equally important for them to know its possible ramifications. The challenge is to ensure we have the manpower to manage new technologies that are moving at an exponential rate of change. We also need competent staff to ensure the security and integrity of all systems, and protect them from threats. They should be able to spot fraud and anything suspicious.

As I said, the dark side of digitalisation is people. It is caused by the fear of the unknown and the lack of skill sets to manage and keep up with technology. Less so are cyber attacks, cyber terrorism and fraud because it is mandatory for power infrastructures to have inbuilt safety systems to manage all manner of threats.

In Japan, businesses use technology to remain competitive. We have started to, but it needs to be more pervasive, especially for the energy industry that is on the road to greater digitalisation and market liberalisation. Big data is only useful if we have the skill sets to analyse them to help make strategic management decisions and forecast consumer trends. For this, corporate chieftains must also play their part and allocate adequate budgets to hire the best talent.

Without a doubt, digitalisation is here to stay, and we must embrace it or fall by the wayside. For the electricity supply industry, it means providing an end-to-end customer experience – reliable power supply, more accurate meter readings, easier online payments, and responsiveness to complaints. For customers, digitalisation is empowering. Take smart meters, for example. They allow consumers to monitor their daily energy consumption, and make the necessary lifestyle changes to reduce their bills and carbon footprint.

...THE DARK SIDE OF DIGITALISATION IS PEOPLE. IT IS CAUSED BY THE FEAR OF THE UNKNOWN AND THE LACK OF SKILL SETS TO MANAGE AND KEEP UP WITH TECHNOLOGY.

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 promotes competition and prevents 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, guidelines and 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; and enforces compliance.

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