Towards a World-Class Energy Sector

Suruhanjaya Tenaga
Energy Commission

ENERGY MALAYSIA

www.st.gov.my

Volume 20 | 2020

Q & A

ARE MALAYSIANS COMPLACENT ABOUT ENERGY EFFICIENCY?

SPECIAL FOCUS

LIVING DANGEROUSLY:

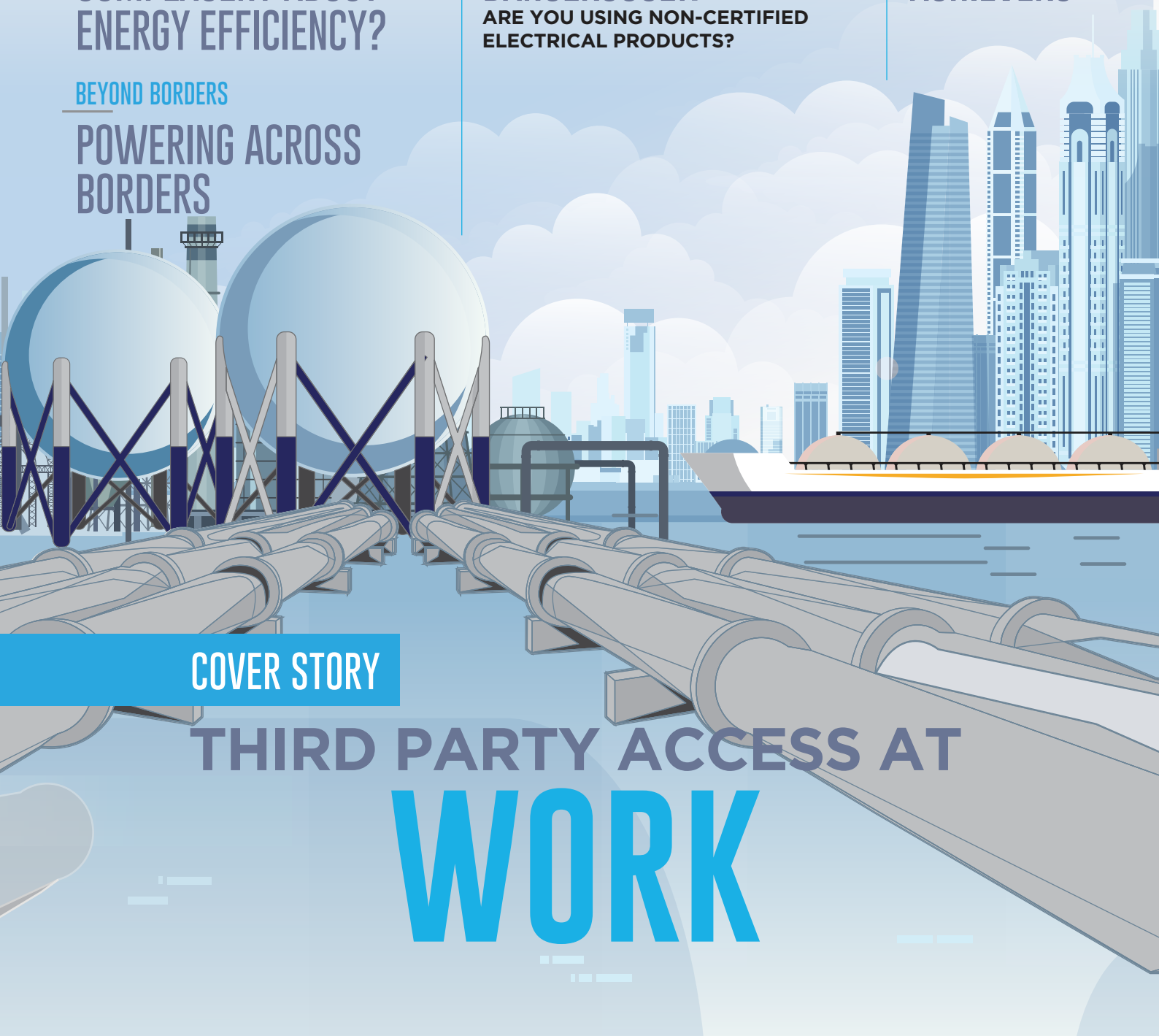
ARE YOU USING NON-CERTIFIED ELECTRICAL PRODUCTS?

EDUCATION

THE QUIET ACHIEVERS

BEYOND BORDERS

POWERING ACROSS BORDERS



COVER STORY

THIRD PARTY ACCESS AT WORK

CONTENTS

REGULARS

FEATURES

Editorial Board

ST Publication No: ST(P)02/07/2020

Published on behalf of the Energy Commission by:

pVm communications sdn bhd
A-12-13A Menara Prima,
Jalan PJU1/39 Dataran Prima
47301 Petaling Jaya
Selangor, Malaysia

tel + 603 7887 5016
email: premilla@pvmpublish.com.my
www.pvmpublish.com.my

Printed by:
Dolphin Press International Sdn Bhd
(0803493W)
No. 1, Jalan 13/118B
Desa Tun Razak
56000 Kuala Lumpur

Congratulations and Welcome to **YBhg Dato' Azian bin Osman**

as the new Chairman of the Energy Commission

On 8 May 2020, Dato' Azian Osman was appointed as Chairman, replacing Datuk Ir Ahmad Fauzi Hasan who retired on March 31, 2020.

The Commission looks forward to Dato' Azian's leadership to elevate its position to the next level. With Dato' Azian's extensive experience in various fields, the Commission's credentials will be further strengthened as an effective and authoritative regulator in a world class energy industry.

Thank you and Farewell to our former Chairman, **YBhg Datuk Ir. Ahmad Fauzi Hasan**

Datuk Ir. Ahmad Fauzi Hasan had held a few positions within the Energy Commission, namely Director of Gas Regulation, Chief Operating Officer and Chief Executive Officer before being appointed as Chairman on 1 April 2018.

As Chairman, Datuk Fauzi steered the Commission to greater heights as an internationally recognised regulator of a world class energy industry. During his term of office, he assumed a staunch advisory role for the implementation of policies, strategies and legislation related to energy regulation, supply, and safety. He was committed to building a more robust energy supply industry, acknowledged for its reliability, sustainability, and security. This was the key to realising the Commission's vision and mission.

Besides his contribution to the industry, Datuk Fauzi stressed on human capital development. He took a direct interest in the Commission's corporate development framework and coordination of talent management and development planning that culminated in the launch of the ST Learning Centre.

Datuk Fauzi is well known for sharing his vast knowledge gained from hands-on experience, professional networking, and avid reading during his spare time. His contribution to the industry has been immense, in terms of the development and enforcement of policies, plans and energy standards as well as international awareness activities.

His achievements and contributions to the Commission and its stakeholders will leave a lasting impression in many years to come. With his experience and insights, the Energy Commission and the energy industry moved forward into a new era. As a leader, he is well respected and admired for his advice, guidance, patience, and discipline.

The Energy Commission thanks Datuk Ir. Ahmad Fauzi Hasan, for his dedication, contributions, and passion for our industry. We wish him all the best and May Allah SWT shower him and his family with all His blessings.

NO END TO LEARNING

These are exciting times as we move forward with commercial operations under the Gas Third Party Access, as reported in our Cover Story entitled "Third Party Access at Work". It marks the beginning of the liberalisation of the Malaysian gas market, to make it more competitive, vibrant and sustainable.

For the first time, the industry witnessed the importation of LNG by a private shipper in October 2019, to be delivered to two TNB power plants via gas infrastructure owned by PETRONAS. Many insiders closely followed the movement of this maiden gas cargo.

The entire process saw various parties coming together to sign "willing buyer-willing seller" agreements that are a key feature of the Third Party Access system. They also had the mandatory licences issued by the Commission, each with its clearly defined roles and responsibilities. Tariff schedules were also subject to the Commission's approval. The Commission had embedded these checks in the Third Party Access system to protect the interests of all parties, to avoid conflicts of interest, and to create a transparent business operating environment.

The gas delivery to the power plants in Klang and Port Dickson was completed according to schedule. TNB also reported savings from this transaction that involved the purchase of gas in the open market when prices were low.

The Commission hopes the success of the inaugural operation will inspire confidence in the private sector to participate in the Malaysian gas market, which has many opportunities for domestic supply and export to regional markets.

We recognise that there will always be hurdles and lessons to be learnt with the passage of time. But we are confident that by being responsive to the marketplace, we can address these challenges.

In our article entitled "Are Malaysians Complacent about Energy Efficiency?", energy authority, the Distinguished Professor Dato' Dr Rajah Rasiah, who was also our former board member, urges the industry to actively engage with consumer groups and the public in the decision making process. In his view, the industry is operating in a closed circle, and needs to become more inclusive.

Professor Dr Rajah Rasiah also points out that youths can make meaningful contributions to changing behaviour towards energy consumption.

Youths are becoming powerful voices who wish to change the way adults think and act. In the article entitled "The Quiet Achievers", we see youths around the world appealing for changes in the energy industry to save our planet. These quiet achievers are not taking to the streets like some of their peers. They are working with communities and authorities to instigate change because their future is at stake. I believe the time has come for us to engage with youths and learn from them. They can be our best teachers, and help shake up some of us from our comfort zones.

At the Energy Commission, we have made some overtures to students by organising the Energy Efficiency (EE) Challenge to encourage students to save energy and power bills at schools. The winners of the 2019 Challenge are published in the "Happenings" news section of this magazine. We are happy to learn that the EE Challenge has sparked young minds to take home and apply the lessons learnt at school as retold by a student in "The Quiet Achievers".

One thing is becoming clear: we need to learn continuously – not just from the experts but also from young sparks and persons on the street.

Datuk Ir Ahmad Fauzi Hasan
Energy Commission Malaysia

NEWS FROM MALAYSIA AND AROUND THE WORLD

MALAYSIA

Malaysia has Southeast Asia's first hydrogen production plant

Southeast Asia's first hydrogen production plant is located in Bintawa, in Kuching, Sarawak. It is an integrated facility constructed and operated by Sarawak Energy Berhad, in collaboration with Linde Fox Sdn Bhd, a subsidiary of the Linde Fox Group, a global leader in sustainable hydrogen solutions. The Integrated Hydrogen Production Plant and Refueling Station is in line with the state government's vision to establish an emission-free transportation system. Earlier in the year, the state held the first hydrogen-powered bus trial in Kuching, the state capital.

The facility uses water to produce carbon-free hydrogen through electrolysis and has a refueling station for hydrogen powered vehicles. It is capable of producing up to 130kg of hydrogen per day at a purity of 99.99%. It also comes with a capacity for refueling up to 10 hydrogen powered buses and cars per day.

Hydrogen is an odourless, colourless and tasteless gas produced either through natural gas steam or electrolysis through water. It is lighter than water, and will burn with a clean, invisible flame that is carbon-free. It is a powerful energy carrier, holding about three times more energy than petrol, based on weight.

The gas can be burned to produce power with zero emissions unlike power produced using fossil fuels. The plant is in line with Sarawak's vision to establish an emission-free public transport system in the state.

Sarawak's chief minister Datuk Patinggi Abang Johari Tun Openg also announced plans to build six more hydrogen production facilities in the state – two in Kuching and one each in Sri Aman, Sibu, Bintulu and Miri.

Source: Borneo Post, 23 December 2019

Peer to peer solar power trading

The Sustainable Energy Development Authority (SEDA) has introduced a peer-to-peer energy trading programme. Under this, consumers with solar PV panels can sell excess power generated to other consumers.

The sale of the excess energy can be made through a grid operator or retailer. In Malaysia, both roles are played by Tenaga Nasional Berhad (TNB), which will be paid a grid fee for operating the platform that enables prosumers and consumers to trade in solar energy.

The programme encourages Malaysians to invest in solar panels on the rooftops of their homes, offices, factories or malls. It is estimated that there are 4.1 million units of rooftop space available for this purpose in the country.

Malaysia is the second Asian country, after Thailand, to launch a peer-to-peer energy trading project.

Source: The Sun, 29 October 2019

'Net Zero Carbon' pavilion at Dubai Expo 2020

The Ministry of Energy, Science, Technology, Enviroment and Climate Change (renamed Ministry of Natural Resources in mid 2020) will be constructing a rainforest canopy-themed pavilion at the Dubai Expo 2020 (postponed indefinitely because of the Covid 19 pandemic).

Carbon emissions produced during the construction of the pavilion is to be offset in Malaysia through tree planting initiatives, including reforesting more land areas.

Malaysia currently has a forest cover that constitutes 55.3% (18.3 million hectares) of its total land area, exceeding Malaysia's initial commitment of 50% at the 1991 Rio Summit.

Source: Focus Malaysia, 29 October 2019

Go green or be left behind

The Malaysian Green Technology Corporation and Climate Change Centre (MGTC) is calling for the private sector to make more investments in green technologies to help drive the country forward into a sustainable future.

MGTC Malaysia's Acting CEO Syed Ahmad Syed Mustafa said, "There is a need for more involvement from the private sector, especially given the fact that under the Paris Agreement, Malaysia has pledged to reduce its greenhouse gas emissions by 45% by 2030. He added that corporations not implementing sustainable practices in their businesses will be at risk of losing out in the competitive global environment.

One of the main challenges to more green investments in corporate Malaysia is a lack of awareness, especially among financial institutions. Financial institutions will need to play a bigger role in providing funding for green investments. The government's Green Technology Financing Scheme (GTFS) offers a 60% government guarantee as well as a 2% per year interest/profit rate subsidy on loans for the financing of green technology development.

Malaysia needs RM33 billion in investments in order to achieve its target of 20% electricity generation from renewable sources by 2025, from the 2% recorded in 2018, added GreenTech.

Source:Edge Financial Daily, 29 October 2019

Lighting up rural roads

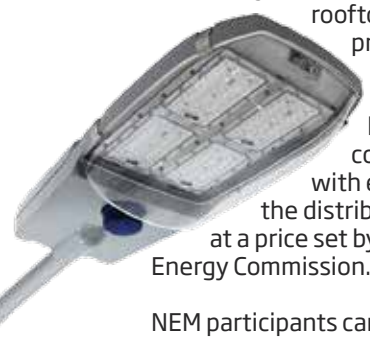
The Rural Development Ministry has embarked on a project to install 60,000 street lights nationwide to brighten up roads in rural areas. The project is to be completed over two years.

Source: The Star, 7 November 2019

Net Energy Metering goes to Sabah

The Net Energy Metering (NEM) programme implemented in Peninsular Malaysia has been expanded to Sabah. The Federal Government has approved a 50MW quota for NEM in Sabah beginning 2020.

NEM will enable consumers to generate clean energy using solar PV systems installed on the rooftops of their premises. The energy generated can be used for self-consumption, with excess sold to the distribution licensee at a price set by the Sabah Energy Commission.



NEM participants can benefit from lower electricity bills because they will be buying less electricity from the utility provider. Consumers under this programme will also contribute towards reducing carbon emissions and help to mitigate climate change.

Source: Astro Awani and Borneo Post, 5 November 2019

Solar power boost for remote island

Pulau Bait, an island off Semporna in Sabah, will receive around the clock electricity supply after the setting up of a Hybrid Solar System. The off grid Pulau Bait is one of eight islands to benefit from the system that supplies electricity to 400 homes.

To date, there are 34 such systems in the state, supplying power to people living in remote parts of Sabah.

Source: Borneo Post, 18 October 2019

Aging power station decommissioned

Southeast Asia's first combined-cycle power station, the Sultan Ismail Power Station in Paka, Terengganu, was decommissioned end 2019, after 33 years of service.

TNB said the shutting down of the station is inevitable as Malaysia is replacing its aging power plants with more advanced, cost-efficient and environmentally friendly ones to comply with best practices in the global electricity supply industry.

The 1,400MW power station was completed in 1987 at a cost of RM1.51 billion. Its current value is estimated at RM2.4 billion.

Source: The Star, 2 January 2020

INTERNATIONAL

Big data's hot problem

The insatiable demand for electrons by data centres has resulted in a rise in electricity sales last year, after nearly a decade of being flat or falling slightly.

The power-hungry data market is where some of the world's biggest and most innovative companies are struggling to become more energy efficient. A crucial metric to consider when it comes to energy use in these centres is the Power Usage Effectiveness (PUE) ratio. PUE is a measure of a data centre's energy efficiency – the ratio of total energy used divided by energy consumed for IT activities. Now with more computational power needed in the cloud, it's worth finding out what today's PUEs are and how close a company can get to an ideal level of 1.0.

A recent Uptime Institute survey of 1,600 data centre owners and operators found that the 2019 average PUE is 1.67, and that energy efficiency in data centres has deteriorated slightly over the last two years. This PUE shows that 60% of their electricity consumption is for IT activities and the rest for cooling, lighting and so on.

Data centres are now moving in a different direction to save energy. Instead of human-implemented recommendations, they are using Artificial Intelligence (AI) systems to directly control the use of energy. With efficiency gains much needed for their voracious use of power, these centres will need to become more energy efficient to avoid the adverse effects they could have on power grids and utilities.

Source: Edge Financial Daily, 16 December 2019

Renewables outpace fossil fuels in the UK

For the first time ever, renewable energy overtook fossil fuels in power generation in the United Kingdom, according to specialist website Carbon Brief. In the third quarter of 2019, the UK's wind farms, solar panels, biomass and hydro plants generated more electricity than the combined output from power stations fired by coal, oil and gas, said the website.

Renewables accounted for less than 10% of UK's power generation at the turn of the decade. It has since quadrupled, but gas remains the single biggest source of electricity production, accounting for 38% of the total over the three months, followed by nuclear power (21%) and wind (20%). Coal now generates less than 1% of the country's electricity needs, and is expected to be phased out completely by 2025.

Britain is looking to exploit offshore wind resources as it tries to achieve its target of carbon neutrality by 2050. In August 2019, the government authorised the extension of a project to build the world's largest wind farm in the North Sea.

Source: AFP, Daily Express (KK) 16 October 2019

Third Party Access at Work

The arrival of the first third party LNG shipment in October 2019 was a major milestone in the implementation of the Third Party Access arrangement. Besides being a trial run for open fuel sourcing, it also provided the Energy Commission the opportunity to test the operational and commercial effectiveness of the Third Party Access arrangement introduced in 2017.

On 7 October 2019, the Regasification Terminal Sungai Udang (RGTSU) in Melaka took delivery of the first Third Party Liquefied Natural Gas (LNG) cargo that arrived in Malaysia under the Third Party Access (TPA) arrangement. The approximately 3.5 TBTU LNG import is the result of sales agreements between utility company Tenaga Nasional Berhad (TNB) and Shell Trading Sdn Bhd. The cargo was unloaded and regasified at RGTSU, and then transported via the Peninsular Gas Utilisation (PGU) pipeline network to TNB's power stations in Port Dickson, Negeri Sembilan and Klang, Selangor.

Shell Trading had earlier signed a Gas Transportation Agreement with Petronas Gas Bhd and a Terminal Usage Agreement with Regas Terminal (Sg Udang) Sdn Bhd, a subsidiary of Petronas Gas Bhd.

"This marked the beginning of commercial operations under the TPA arrangement introduced in 2017," says Rumaizi Abdul Halim, Energy Commission's Deputy Director, Gas TPA. "We expect it to attract other players to participate in the TPA's new gas importation mechanism. TPA aims to make the market more competitive and vibrant while ensuring the security of gas supply in the country."

Under the TPA arrangement, licensed shippers shall have access to gas infrastructure owned and operated by Petronas Gas (regasification terminals and transmission network) and Gas Malaysia (distribution network). Previously, only Petronas and Gas Malaysia were the exclusive suppliers of gas in the country, with Petronas serving the wholesale market and Gas Malaysia Berhad, the retail market. The 2016 amendment to the Gas Supply Act 1993, which came into effect on 16 January 2017 provides the legal framework for the TPA, which allows other shippers to supply gas to the Malaysian gas market by using the existing gas infrastructure.

"Since TPA was introduced, we have had several expressions of interest from parties keen to participate in the potentially lucrative gas industry in this part of the world. As at end November 2019, the Energy Commission had issued 14 new licences for this purpose," says Rumaizi. "Seven are for LNG importation and seven for shipping. This is a healthy response by any measure. It shows market confidence in the liberalised Malaysian gas market, currently valued at close to RM20 billion a year."

"We expect the TNB, Shell and Petronas agreements to send a strong message to the market. They are agreements negotiated on a willing seller-willing buyer basis, a salient feature of the TPA. Other third parties are said to be currently negotiating with customers, and trying to put together packages attractive to both sides," says Rumaizi.

There are two types of customers – one that buys gas from the PGU transmission network (wholesale) and the other that buys from the distribution network (retail). Wholesale buyers comprise mainly the power sector, petrochemical industry, large manufacturers, exporters and the distribution network. The retail market covers mainly SMEs, such as rubber glove and steel manufacturers as well as the commercial & residential segments.

Meanwhile, in a media statement issued in conjunction with the third party LNG shipment last October, Petronas Gas Berhad (PGB) Managing Director and Chief Executive Officer Kamal Bahrin said, "TPA provides a platform for gas market liberalisation, thus encouraging healthy competition at market determined prices. Furthermore, the maiden Third Party LNG cargo will allow PGB to examine the effectiveness of the entire TPA arrangement, both commercially and operationally."

The first Third Party shipment of LNG arrived at the Regasification Terminal Sungai Udang in October 2019, to mark the operationalisation of the TPA arrangement.

GETTING IT RIGHT

The Energy Commission started revamping the gas supply industry by deregulating the marketplace in 2017. This involved studying best practices of gas market liberalisation in the United Kingdom, Netherlands, Australia and Singapore, regarded as among the best models in the world. Subsequently, several measures were introduced to help the Malaysian gas industry transition from monopolistic practices to a free market environment. The ultimate goal of deregulation is to create a competitive, vibrant and sustainable market of multiple players, selling gas at market-determined prices to consumers who can choose who best serves their needs.

As part of the transition, the Commission introduced the following measures:

THIRD PARTY ACCESS

The Third Party Access (TPA) arrangement was introduced in 2017. It allows Third Party gas suppliers to use Malaysia's gas facilities, namely, regasification terminals, transmission pipelines and distribution pipelines in a fair, equitable and non-discriminatory manner. The objective is to create a level playing field where players can compete fairly and healthily. TPA allows gas suppliers to negotiate costs with infrastructure owners on willing buyer-willing seller basis. It also ensures that there is no conflict of interest between asset operators and asset users. As the regulator, the Energy Commission will monitor the actions of all players in this value chain.

UNBUNDLING PETRONAS GAS AND GAS MALAYSIA

In the interest of good governance and fair business practice, the Commission unbundled the vertically integrated entities Petronas and Gas Malaysia. Subsequently, Petronas incorporated Petronas Energy and Gas Trading Sdn Bhd as a gas seller and shipper at wholesale level. For the retail market, Gas Malaysia formed Gas Malaysia Energy Services Sdn Bhd. This demarcation is to avoid conflict of interest between asset operators and asset users. The new entities will compete in the market like other third parties.

GAS PRICE RATIONALISATION

Gas price rationalisation has been on the cards since 2010, when the Government announced plans to "unlock premium gas demand". Put simply, it means removing gas subsidies over a period of time. Under the Commission's Incentive Based Regulation (IBR) scheme, gas prices are reviewed every six months with the intent to increase the regulated gas price of RM1.50/mmBtu until it reaches the market price. As at Q1 2019, Malaysian gas prices had reached parity with global market prices.

ENTICING NEW PLAYERS

"As the regulator, the Energy Commission is concentrating on establishing a business environment that is efficient, competitive and fair. This is one of the defining features of TPA, to protect the interests of all parties," says Rumaizi. "The key to this is a licensing scheme that is well-defined and unambiguous to avoid conflicts of interest. With licences in hand, companies can proceed to negotiate access arrangements with infrastructure operators to transport their supply to buyers," says Rumaizi.

"We also review the Access Arrangement document published by facility operators/licensees. This document details the rules of conduct for both the infrastructure operator and user, and it is subject to the Commission's approval. We make sure the document is fair to all parties. In addition, the Access Arrangement document also publishes the tariffs of each asset that is subject to the Commission's approval. With this document, users can evaluate the risks and opportunities in the market. This kind of transparency is critical for gas industry players, typically large companies with the financial strength, technical and operational expertise to serve the industry, both regionally and globally. Transparency governs the way these companies conduct business," he adds.

> "Since the gas business is capital intensive, only shippers and importers with a minimum paid up capital of RM5 million are eligible to apply for licences.

This applies especially to importers and shippers," says Rumaizi. "A second condition is that they must be incorporated in Malaysia. This is to encourage local companies to participate. We do not limit who can enter the market provided they meet these two conditions.

"Another incentive for players, especially importers, is competitive gas prices. In Malaysia, gas prices are seen as subsidised although they are being rationalised to reflect market prices. Our approach has been to review and increase the regulated gas price of RM1.50/mmBtu every six months. Today, the regulated gas price is at par with market prices. This new pricing should encourage more players into our market," adds Rumaizi.

TYPES OF LICENCES

Under the TPA arrangement, the Energy Commission issues seven types of licences. They are:

1. **IMPORT INTO REGASIFICATION TERMINALS** – to bring LNG into or within Malaysia by any means except trans-shipment.
2. **REGASIFICATION** – regasifying LNG, including receiving, storing of LNG and subsequent delivery of regasified gas to transmission lines.
3. **SHIPPING** – delivering gas to consumer's premises by owner of gas molecules through arrangements made with regasification, transportation or distribution licensees.
4. **TRANSPORTATION** – owning/ operating a transmission pipeline.
5. **DISTRIBUTION** – owning/ operating a distribution pipeline.
6. **RETAIL** – using gas for one's own consumption and on-selling gas to consumers through the said retail licensee's piping system.
7. **USE OF GAS** – using gas for one's own consumption and not getting supply for a retail licensee.

INNOVATIVE PRODUCTS

"Since we publish prices, from gas prices by market segment to tariffs by facility and capacity, newcomers have access to the information needed to become creative and innovative in their product offerings to win customers," explains Rumaizi."

"Here, a good model to emulate is the Malaysian telco industry. Fifteen years ago, there were only a handful of players offering a small selection of packages. Consumers had little choice. Now, with more players, competition has set in and telcos have become creative to attract customers. Consumers are now spoilt for choice and can choose packages that best suit their mobile phone habits and needs. If they are not happy, they can always switch to someone who serves them better."

"We wish to see this happen in the gas industry. Through deregulation, consumers will be empowered and at the same time, we will have a gas market that is innovative, vibrant and competitive."

> **“…the target is for renewable energy to make up 20%…”**

of the capacity mix by 2025. The preferred renewable source is solar energy that is infinite.

THE MAIN CHALLENGE FOR NEW PLAYERS IS MARKET PENETRATION. RUMAIZI SAYS, "IT IS NOT EASY BREAKING INTO A LONG-HELD MONOPOLY, WHERE RELATIONSHIPS HAVE BEEN BUILT OVER A LONG TIME.

PENETRATING THE MARKET

The main challenge for new players is market penetration. Rumaizi says, "It is not easy breaking into a long-held monopoly, where relationships have been built over a long time. New suppliers must convince customers who have relied 100% on Petronas and Gas Malaysia for their gas supply over the past 30 years. They must offer something better than the existing arrangements.

"Besides, buyers may have become comfortable, even complacent, with the status quo. After all, Petronas and Gas Malaysia are big companies with strong credentials. And they are likely to have enjoyed gas flowing at the flick of a tap. New players have to thus match, more likely exceed, buyer expectations not only in terms of pricing but also in terms of services.

"We also hope that with deregulation, gas users can manage their gas portfolio better. For example, a glove manufacturer can buy gas packages according to its gas consumption pattern that may vary between standard operating times, peak periods and down time. So, instead of being locked into a fixed long-term contract, the manufacturer can buy shorter term packages that are aligned to seasonal needs. With a choice of suppliers, they can scout the market for the best deals, according to the season. This will help reduce the manufacturer's overall energy costs," adds Rumaizi.

UNDERSTANDING THE STORY OF GAS IN MALAYSIA

There are currently 20 gas-fired power plants in Malaysia, accounting for about half the power needs of the country, and making gas the main source of energy. Population growth and environmental considerations are likely to have a positive impact on gas demand for power generation in the future. Malaysia's population, at 32 million in 2017 is forecast to grow to 45 million in 2050, with almost 90% expected to live in cities. Rapid urbanisation will trigger increased demand for energy to sustain city dwellers and satisfy urban lifestyle needs. While cost remains a key consideration with regards to fuel choices – the removal of gas subsidies may make it a relatively costly option - countries are also mindful of their international commitments to reduce carbon emissions.

Malaysia is a signatory to the 2016 Paris Agreement that commits countries to reducing their carbon emissions. With this, renewable energy has gained traction as the fuel of the future. In Malaysia, the target is for renewable energy to make up 20% of the capacity mix by 2025. The preferred renewable source is solar energy that is infinite.

But policymakers know that fuel diversity is the key to energy security. As such, renewable energy needs to exist alongside fossil fuels. According to the Smithsonian.com (Feb 13, 2014) when talking about climate change, not all fossil fuels are created equal. Burning natural gas, for instance, produces nearly half as much carbon dioxide per unit of energy compared with coal. The magazine also says that gas is considered by many as the "bridge fuel" that can help nations lower their carbon dioxide emissions while they transition more slowly from fossil fuels to renewable carbon-neutral forms of energy.

Besides being a fuel, gas is also a feedstock, and herein is a dilemma. So long as there is an abundant gas supply, there will be enough to serve both markets. But shortages will cause prices to spike. But then, this is the reality of the free market, where pricing is determined by supply and demand.

For new suppliers, Malaysia's robust petrochemical industry is a market to explore. And demand is set to grow given the country's ambition to become the oil & gas and petrochemical hub of the Asia Pacific in the near future.

The export market also holds much allure. Gas suppliers can leverage on the country's strategic location at the crossroads of Asia to access the populous and rapidly industrialising Asia Pacific market that includes the power houses of ASEAN, India and China. Besides, Malaysia has long been regarded as a safe haven by domestic and foreign direct investors, attracted by its political stability and pro-business environment.

For now, industry watchers are likely to be watching closely the outcome of the Shell-TNB transaction. There may be some hurdles to cross and issues to fix. But there is no turning back, with the Government pressing on with market liberalisation as part of its agenda to future proof the energy supply industry.

Are Malaysians Complacent about Energy Efficiency?

THE TERM "ENERGY EFFICIENCY" IS USED AS SHORTHAND TO DESCRIBE WIDE RANGING ENERGY SAVING MEASURES. DISTINGUISHED PROFESSOR OF ECONOMICS, DATO' DR RAJAH RASIAH, FROM THE ASIA EUROPE INSTITUTE, UNIVERSITY MALAYA SAYS ENERGY EFFICIENCY IS OFTEN CONFUSED WITH ENERGY SAVINGS, AND THAT EACH HAS ITS OWN DEFINITION IN THE ENERGY WORLD. IN HIS VARIOUS ENGAGEMENTS IN THE COUNTRY, THE WORLD-RENOWNED ACADEMIC FINDS MALAYSIANS COMPLACENT ON BOTH COUNTS.

Distinguished Professor Dato' Dr Rajah Rasiah

Q. How do you define energy efficiency?

A. There is a misconception on how the public understands energy efficiency. It simply means producing a given output of energy at the lowest possible cost. Producers may achieve this by using the cheapest fuel and/or technology. For consumers, it is about paying a lower electricity charge to obtain the same benefit. They can do this by choosing energy saving appliances or machinery to perform tasks instead of energy intensive equipment.

Energy savings, also referred to as energy conservation, however, is about using less energy by adjusting behaviour and habits, for example, by switching off the lights when leaving a room.

Both need not necessarily fulfill bigger and noble objectives. For example, the movement to save the environment by consciously mitigating the effects of climate change requires a focus on renewable energy. But this is likely to incur a higher cost in the early stages, which may then compromise on efficiency. This is where energy effectiveness enters the picture. While efficiency is about saving unit costs, effectiveness is about doing the right things. Energy efficiency is always related to cost, but energy effectiveness is goal related.

Q. Who are the stakeholders in energy efficiency, and what are their roles?

A. In Malaysia, the normal notion of stakeholders is players from the supply and demand side of the energy industry. It has precluded the wider public. From a holistic perspective, stakeholders should cover the entire spectrum of energy producers and consumers.

Then, there is TNB as the national utility company. The Government is also a stakeholder because it determines energy policies, and their implementation and regulation.

With new technologies, private individuals are becoming prosumers, and therefore, they are stakeholders in their own right. I would prefer to have a bottom to top approach when defining stakeholders, and one that is inclusive of the wider public.

Q. How well are these roles being played out, and what more can be done?

A. From my experience sitting in energy-related committees, you have to accept decisions made at some point. A common decision always requires compromises, which obviously will mean that we end up accepting consensus driven decisions rather than the best possible solutions. At the same time, I do feel that with any particular agenda related to energy, we try to address too many issues in too short a time.

However, with priority issues, I agree with what the Government is doing by moving quickly away from fossil fuels towards renewable energy. The Government has set clear targets. It wants to reduce carbon emissions by 45% by 2030, and have 20% renewable energy in the capacity mix by 2025.

From the energy efficiency standpoint, it is better to use fossil fuels because they will be cheaper in the long run when the required sources mature. When you deal with traditional power suppliers, they prefer coal because it is currently the cheapest fuel but we also know that coal generates emissions that will only increase global warming. The Government is trying to change this, but there is resistance from certain stakeholders. I feel these stakeholders need to come together to form a common agreement moving forward as we do not wish to exacerbate global warming. We haven't got there yet, though.

There is also a move by the Government to pro-rate tariffs according to supply and demand. This means consumers will have to pay more when they use power during peak demand times. Most energy demand in Malaysia comes from factories, and they have standardised work schedules. As such, they will face greater challenges adjusting to this tariff schedule. The introduction of smart meters will help consumers organise their power usage patterns according to prices.

For domestic consumers, I think there is a need to build awareness and educate people on how to use appliances during off-peak hours, and save on their energy costs.

Q. Can you share some shining examples of energy efficiency driven countries?

A. There are some countries that have made good progress in producing green energy efficiently, and made it a profitable industry.

In terms of net surplus generated by green energy, Denmark would be a good example. Besides home consumption, it exports a lot of green energy to Germany among other countries. Norway, Sweden and Finland would also be good examples. These countries do a lot to address climate change problems as well as inequalities in society. They continue to explore green energy sources such as wind, waves and so on.

Their goal is to reduce the cost of green energy and make it accessible to larger sections of the population.

Another good example is Germany that was the first to use solar panels on a large scale after the Chernobyl disaster. China's ascension to solar power comes from learning from Germany. In Japan, solar power is also widely used, especially since the Fukushima disaster. There are factories where roofs are completely covered with solar panels, like the Toyota factory.

The 2016 Paris Accord gives each country the leeway to reduce carbon emissions based on their Intended Nationally Determined Contribution (INDC) that is determined by respective governments. The agreement calls upon signatories to adopt strategies for energy and climate change to meet the global 2030 targets, which was extended in timeline terms at the 2016 Marrakesh Proclamation. The target has now been revised to 40% carbon emission reduction, 30% green energy in total energy mix by 2030.

Currently, coal is more efficient than green energy because of a glut in the global market. I think by 2029, there will be an equalisation between green energy and non-green energy in terms of cost and consumption. Green energy will become more efficient from 2029 with the current advancement in technology and the scale of use.

Q. Do you think Malaysians are complacent about energy efficiency?

A. I think they are. Producers are profit-driven, and they will always go for the lowest cost fuel unless there are government policies to incentivise them to do otherwise or prohibit them.

Among consumers, I think there is a strong need to create consciousness, especially with the youth. You have to be a lot more personal and passionate with the youth of today since they have access to much more information than ever before. With the right kind of approach, I think it will work and youths will begin to influence each other in their power consumption habits.

Q. Malaysia is moving towards energy market liberalisation that will see more competition and possibly lower tariffs. Would cheaper electricity make Malaysians more wasteful?

A. If the Malaysian energy industry is driven just by cost, there could be wastefulness. The Government can play a big part in coming up with social programmes that aim to educate consumers on saving energy. If Malaysia starts embracing the civic conscious standards found in Germany and Scandinavian countries, there will be a greater chance of influencing consumers to reduce wastage.

Having said that, I think market liberalisation will be good at breaking down monopolies. While liberalisation is useful, it needs a lot of regulation as a number of sectors are still driven by scale economies rather than scope economies. Currently, there is still a need to strengthen regulation in the country.

Q. How can smart meters drive an energy saving culture in the country?

A. Smart meters give you all the information you need to act rationally, but it depends on whether consumers take conscious actions to save energy. These meters can offer prices determined by demand-supply patterns, which consumers can then follow to lower their bills. Smart meters are a good initiative because current consumption patterns show that people are using energy without thinking.

To raise awareness for energy savings, key players must get households involved. Factories will be conscious of energy savings because it is in their interest to reduce costs. One effective way to raise awareness is to tap into various media and online channels.

Q. Do you think energy consciousness should be integrated into our education system?

A. We already have energy topics in engineering courses at Malaysian universities. They also incorporate greening subjects. Energy as a topic is also part of energy economics courses, though engineering journals are increasingly focusing on the shift from fossil fuels to non-fossil fuels.

I think what needs to be done is for educators to shift the focus to the environment being a global common. My feeling is that the social element of energy consumption should be emphasised much more than what is done now. I don't know if it is taught in schools, but if it's not, then it should start at a young age, from kindergarten itself.

Q. Do you have any more insights to share?

A. I think more can be done in terms of energy efficiency, energy savings and the environment in Malaysia. I am concerned about the issue of waste disposal by Lynas Corporation, the Australia-based rare earth producer that has a manufacturing plant in Kuantan. If it is allowed to dump radioactive waste in the country, it will be sending the wrong signal. There are UN codes on the transportation and disposal of dangerous goods, and Lynas must comply with these. I also take the same position on destroying fishermen's livelihoods and mining sand to create land from the sea. There must be a very strong stance taken on greening the environment and air pollution itself.

Distinguished Professor Dato' Dr Rajah Rasiah obtained his doctorate in Economics from Cambridge University in 1992, and was a Rajawali fellow at Harvard University in 2014. The widely published academic has delivered public lectures, policy talks and keynote speeches at premier universities in the USA, UK, India, China, ASEAN and Australia.

While the prime focus of his research is on technology and international development, he has also worked extensively on foreign investment, human capital, public health and environment. He is the 2014 recipient of the Celso Furtado prize from the World Academy of Sciences for advancing the frontiers of social science (economics) thought. In the light of his outstanding and impactful contributions to scholarship, Malaysia's Ministry of Higher Education made him Distinguished Professor in the field of Economics in 2017. He was conferred the Merdeka (Independence) Award for academic excellence in 2018.

The Quiet Achievers

Youths around the world are rallying to make climate change and energy their business. While Greta Thunberg and other activists are making headlines, there are also hundreds of thousands of quiet young achievers doing their part in schools and campuses, and spreading their knowledge, hoping for decision makers to change their ways.

Sixteen-year-old Greta Thunberg shook up world leaders at the 2019 United Nations Climate Action Summit on 23 September, when she denounced them with:

"HOW DARE YOU! YOU HAVE STOLEN MY DREAMS AND MY CHILDHOOD WITH YOUR EMPTY WORDS."

This emotional outcry has been played time and time again in news channels as a grim reminder of the climate crisis we face today. Once a solo street protestor, this Swedish teen now leads climate change activism with her "Fridays for the Future" strikes that demand action from political leaders to prevent the degenerating impact of climate change.

Thunberg and her followers represent the angry voices of youth urging politicians to act quickly. At the same time, there are bands of quiet achievers scattered around the world, who have been working for some years with authorities to make climate change and energy a priority. They are leading by example, and their actions have started to ripple across their families, communities and decision makers.

ENERGY EFFICIENCY

CHALLENGE SPARKS YOUNG MINDS

Malaysian high school student Noresqandar Dzulqharaaim, 16, convinced his mother to change the fan and air conditioner at home to five-star rated appliances. "They cost more, but I persuaded my mother that these new purchases will reduce our electricity bills. I also told her why it is important to be efficient with energy consumption. My family has now become more diligent about turning off electrical appliances and devices when they are not in use.

"By being sensible about how we use electricity, we save money. Our home electricity bills have come down because of the new appliances and new habits. From what I have learned at school, a few simple actions can help reduce carbon emissions and in turn save our planet. I know climate change is real. When I was young, the weather was not as hot as it is now. My mother tells me that our area is also seeing more floods these days."

Noresqandar was the project head of the 2019 Energy Efficiency (EE) Challenge at his school Sekolah Menengah Kebangsaan (SMK) Paka in the east coast state of Terengganu. His school won the Most Creative and the Most Viral video categories of the challenge that is organised by the Energy Commission annually.

At SMK Paka, 20 student volunteers participated in the 2019 EE Challenge, under the guidance of Kamal Mizan Ismail, a 38-year old science and math teacher. The teacher says, "It is the first time our school entered the competition, and we were encouraged by our principal to go all out to win. Our students became excited and decided to produce a video because we have a recording studio and broadcast channel in our school. Because of the high level of interest, we had to audition students to select our squad. We selected only those with good video production and social media skills."

"We did a lot of research into energy efficiency and how to present the content creatively," says Noresqandar. "We know Malaysians love horror movies, so our submission had a ghoulish character to spook errant energy users. We uploaded our video on Facebook and Youtube and shared it on Instagram and Twitter to create awareness about energy efficiency.

"We also sent our video to broadcast networks in Kuala Lumpur. Astro Awani then invited us for an interview, where our video was shown. We are proud of this because Astro Awani has one of the highest viewership in Malaysia. We also decided to screen our video at a kindergarten so that young children can start learning habits to save energy.

I try to share this with others, but it is not always successful. I asked my tuition centre to change its 3-star energy efficiency rated air conditioner to a 5-star one. There has been no action so far."

"As project head for the competition, I found myself learning the importance of energy efficiency and how climate change will affect my future."

Far left: Nuresqandar Dzulqharaaim

The EE Challenge was launched by the Energy Commission in 2014 to instill an energy efficient culture among students. It began with seven schools in the Klang Valley and Putrajaya and grew to become a national event. As at end 2019, it has engendered the participation of 398 schools over a period of six years.

The Energy Commission's Deputy Director of the Energy Efficiency and Conservation Unit, Zulkiflee Umar, says, "We are happy with the impact the EE Challenge is having on students and its ripple effect at home, the local community and beyond. Initially, the Challenge focused on energy savings in the school environment over a 6-month period. The judging criteria measured energy savings based on the electricity bills, and the whole school became involved.

"We have seen principals, teachers and students coming together to work on reducing consumption and adopt energy efficiency practices for six months. We believe this time frame will help many of them internalise energy efficiency as their way of life.

"The Challenge assesses schools on actual savings, regression savings, energy intensity per class, energy intensity per capita, number of activities, impact of these activities and report creativity. The school with the highest score becomes the winner of the EE Challenge. Since it was introduced, we have recorded a total savings of 1,422,346 kWh from participating schools. This is equivalent to RM561,135 saved in electricity bills.

"In 2017, we decided to introduce two new categories – Most Creative Video and Most Viral Video as part of energy advocacy. We felt that by tapping into the creativity and social media skills of our youths, we could carry the message of energy efficiency more effectively and to a wider audience. The results have been encouraging.

"The EE Challenge 2019 received 48 entries for the Most Creative Video and 56 entries for Most Viral Video. At our count end October 2019, these videos had received 581,168 views, 52,709 likes, 9,449 comments and 38,124 shares."

YES IN THE PHILIPPINES

In the Philippines, utility company Meralco has partnered with the NGO Coalition for Better Education to host the Youth Energy Summit, better known as YES.

According to the YES website: "The youth's role as a catalyst for change in energy use and consumption has always been undermined simply because parents and those older than them make the decision on how to manage energy use in the household. However, over the years, young people have contributed to energy consumption not only in households but in schools and, on a larger scale, the community. The increasing dependence of youth on technology and equipment that require electricity cannot be ignored. There is a need, therefore, for young people to understand their role in promoting the efficient use of energy and drive behavioral change."

YES also has a competition for high school and college students and teachers. Participants are asked to come up with meaningful and innovative strategies and suggest relevant solutions on issues about energy access and energy efficiency.

Scheduled to be held in 2020, the theme of the inaugural YES is "Energy for Social Good," and students and teachers are invited to submit proposals for five tracks: Energy in the Community; Energy Investigation; Energy Innovation; Energy Advocacy; Best Practices in Energy Education.

Energy in the Community invites proposals involving ideas and concepts with the potential to provide and/or improve energy access, conservation, and/or generation in power-poor communities. Energy Investigation, meanwhile, mobilises the high school and college community to undertake research and explore new energy sources and materials, and efficient models for energy use. It also encourages proposals to include studies that examine the viability of alternative energy sources and its implications to the environment.

The third track on Energy Innovation focuses on innovative products and technologies that may enhance energy generation, reduce cost of production and consumption, mitigate adverse impacts of energy use, and improve energy security. Submissions for innovative products/ tech need to have undergone product use testing / quality testing. Participating teams should also be able to present a functional free trial/product demo/prototype with key functionalities.

Energy Advocacy requires the creation, production and dissemination of video material on energy efficiency and access to energy. These materials should be able to effectively position an energy initiative in the eyes of its target audience - be it consumers, investors, government, and other stakeholders. The fifth track on Best Practices in Energy Education invites proposals for innovations in creative and practical teaching in energy education using project-based learning approaches.

YES will culminate in a summit that will see the leading lights of energy discussing current energy trends and issues, energy and technology and alternative energy sources.

ANOTHER YES IN NIGERIA

In Africa, undergraduates in Nigeria organised the first Youth Energy Summit in 2019. Also called YES, the event addressed issues affecting the energy sector in Nigeria that is rich in oil and gas.

The Nigeria summit had a competition for undergraduates from more than 30 tertiary institutions in Nigeria. A total of 120 applications were received, with submissions for a variety of projects. The competition also created student interest in renewable energy sector as a viable career field.

At the summit itself, undergraduates presented recommendations for sustainable energy in Nigeria. The event, which was well attended by prominent figures in Nigeria's energy ecosystem, also heard many conversations among youth delegates. It also heard speakers talking of the need to act at harnessing renewable energy sources available in Nigeria. Green Institute founder, Adenike Akinsemolu, a key speaker said, "We may not be ready for renewable energy in the fullest of forms, but we are ready for the traditional biomass."

GLOBAL GATHERING OF

BEST YOUNG BRAINS

Every other year, the Student Energy Summit (SES) brings together the world's brightest students to learn and discuss the current issues and trends in energy. The SES started in Calgary, Canada in 2009 and has been held in Vancouver, Canada (2011), Trondheim, Norway (2013), Bali, Indonesia (2015), Merida, Mexico (2017) and London, United Kingdom (2019).

SES 2019 was held at London's Imperial University and attended by 650 student delegates from 98 countries. The final report of SES 2019 notes that one of the summit's highlights is the Innovation Jam, a fast-paced brainstorming, collaboration and pitch session that has sparked many ideas over the years and turned them into full-fledged initiatives.

At the 2019 Summit, the following ideas were born. They are:

- *Know your carbon:* How to use blockchain technology to follow the full supply chain of things you buy. This could allow people to make better decisions by seeing how much carbon each product has produced over its life cycle.
- *Efficiently using space to install renewables:* Rather than installing centralised renewable energy systems that occupy large areas of land, which is finite, we could pursue a decentralised, networked system that utilises wasted space on buildings, parking lots, etc.
- *Climate risk pricing:* A think tank to make the insurance lobby effective and work in the public interest to bring data into activism and make climate risk data accessible, by using a climate pricing tool.
- *Just energy transition:* To include indigenous voices in the energy transition by integrating traditional knowledge and relationship to the land through policies that actively consider indigenous knowledge. This could be facilitated through a database that would have information on the indigenous tribes in a certain region, and their knowledge regarding energy and climate projects.
- *Solargency - Energy Storage for Post-Disaster:* The 2004 Indian Ocean tsunami created a lack of energy and clean water. Energy storage combined with solar PV can be used at critical times, as it is sustainable, modular, mobile and reliable, especially when used as part of a microgrid.
- *Smart-E:* The UK has the oldest, least energy efficient homes in Europe, and it needs to reduce demand. A data driven app can support homeowners and communities to better understand technical solutions and connect with smart financing options. Smart-E will also connect with other communities and generate income by creating leads for finance-providers and providing contracts.

The final report also highlighted an interview in Horizon magazine (Article: "Young scientists share protesters' sense of urgency on climate"), where the summit's vice-chair sponsorship, Luciana Miu, said, "Young people who have come to these summits have been really inspired by seeing what is possible and have gone back to their home countries and done amazing things. They have started business enterprises and started movements by working with their own governments. So, my biggest focus is to make sure that the power of young people is truly acknowledged by their counterparts in business and government."

THE GREEN SCHOOL: An Unconventional Education

In 2008, ex jeweler John Hardy and his wife Cynthia started the Green School in Ubud, on the island of Bali in Indonesia. Located in the middle of a lush rainforest, the school's aim was to challenge the fundamentals of education and groom a generation of world changers, armed with a sustainable tool kit to help bring about change as well as solutions to the planet's ailments.

The non-profit private international Green School Bali has about 400 students today, from kindergarten to high school. It is also expanding to New Zealand. There are also Green Schools being developed in Johannesburg, South Africa and Tulum in Mexico.

The Hardys have gained worldwide recognition, and in 2017, the pioneering Green School won the Zayed Sustainability Energy Prize. They used the prize money to install a one-of-a-kind hydroelectric centrifugal vortex system to generate power from a flowing river at the bottom of the valley. The vortex has a theoretical generating capacity of 12,000 watts and would provide 80% of the school's electricity consumption. The remaining 20% comes from solar panels installed when the school was built.

School buildings scattered across the 25-acre property were constructed using sustainable construction materials and techniques. Bamboo structures replace brick and mortar school buildings found in most countries. The 74 structures were largely assembled from bamboo, arguably the world's most sustainable construction-grade building material.

The architecture also takes into account the local climate and as such, there are no walls, just breezeways. Open sides allow natural breezes to cool the interiors that have thatched rooftops and raised floors that keep Bali's tropical torrential downpours from stopping classes. Fans have been installed to keep classrooms cool during the hot and dry season.

The Green School also ditched the traditional teaching curriculum. Instead of students spending endless hours in the classroom, they are more involved in projects thus shifting the educational focus from books to learning how to tackle real-world challenges.

The school uses the 'integrated thematic' approach to education, pulling together multiple school subjects into each lesson. For example, students learn both the business and farming skills required to grow hydroponic crops and bring them to market. Overlapping subjects in real-world applications allow students to see the value of what they are learning in real life. They are also made more aware of their personal carbon footprint.

This unconventional approach to education is starting to deliver the results the Hardys set out to achieve. Currently, Green School's hall of fame includes students who have spoken at the United Nations, converted fryer grease to biodiesel for the school's buses, and developed a sustainable clothing line. Green schoolers Melati and Isabel Wijsen made a name for themselves for starting the Bye Bye Plastic Bags movement that resulted in a Bali-wide ban of plastic bags. They have also helped raise plastic waste awareness and belong to a global movement of activists looking to ban single-use plastics.

The construction of a vortex system to generate power was supported by graduate students from University of Cologne in Germany. Besides generating electricity, the system can use excess electricity generated to pump water up to a series of 17 holding tanks at the top of the hill. The tanks can then be uncorked to flow water down the hill to generate electricity.

Green School uses renewable energy for power consumption; 20% of this comes from solar energy and the remaining 80% from hydro electricity.

Building designs that are playful, creative and environment friendly resonate the Green School's education ethos.

Source: https://cleantechnica.com/2018/04/28/zayed-future-energy-prize-winner-green-school-bali-is-raising-a-generation-of-world-changers/

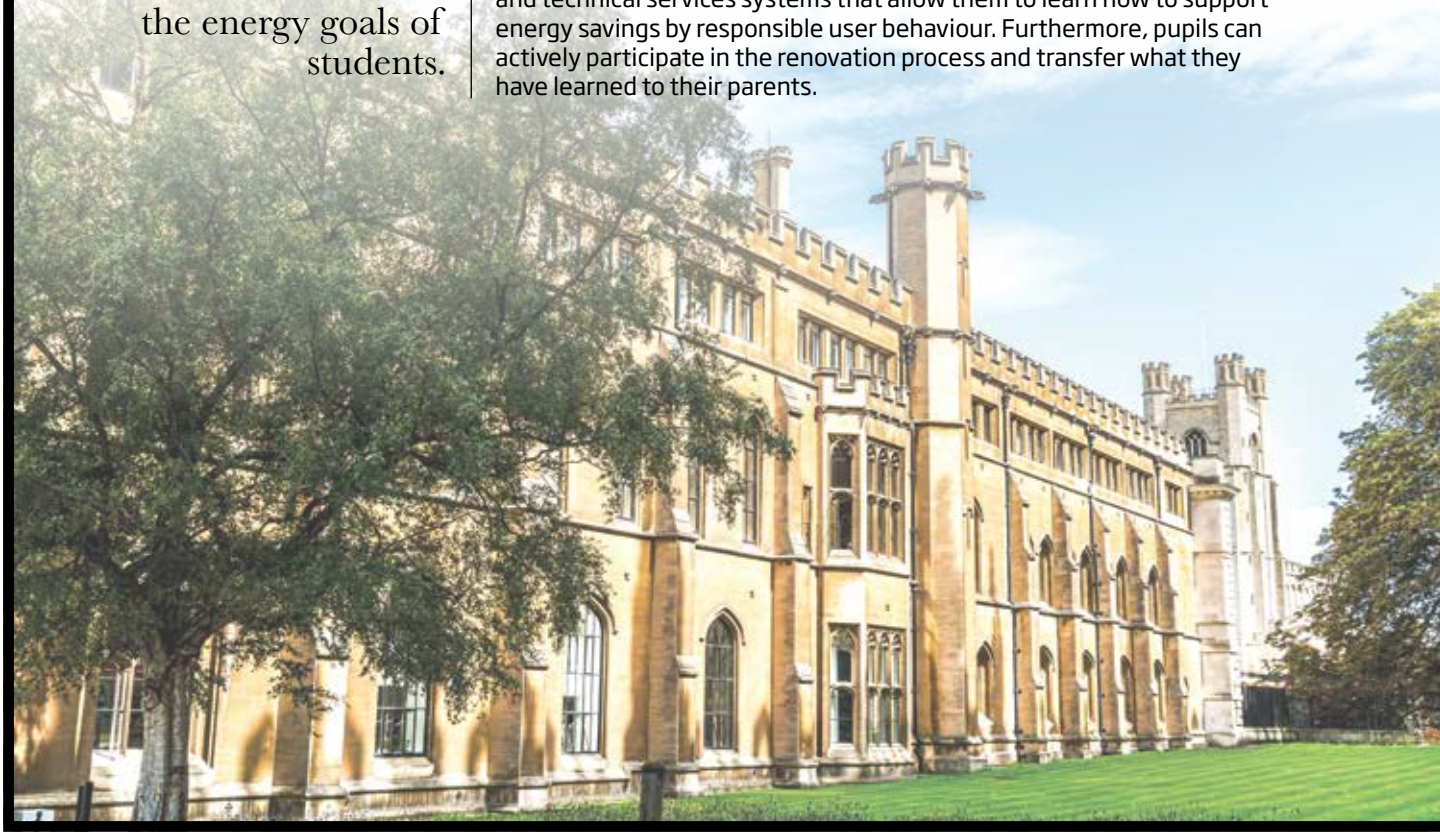
EUROPEAN UNION:

School buildings lead with energy efficient renovations

There is only so much students can do for energy and climate change in schools. Educational authorities too need to play their part, especially by ensuring the physical environment of schools is conducive to realise the energy goals of students.

The European Union (EU) has started to do just that, and it is a part of a wider aspiration for energy efficient public buildings in member states. According to a March 2016 post in Build Up, the European portal for energy efficiency in buildings, schools are serving as models of energy efficient renovation.

The article says that the EU's Recast Energy Performance of Buildings Directive requires the public sector in each member state to lead the way as examples of energy performance of buildings. It was found that among the most promising public building categories to act as lighthouse projects are school buildings. They are visited by people of different age groups such as pupils, teachers and parents. Classrooms also offer pupils first-hand experience of visible improvements to the building envelope and technical services systems that allow them to learn how to support energy savings by responsible user behaviour. Furthermore, pupils can actively participate in the renovation process and transfer what they have learned to their parents.



Between 2011 and 2017, the European Commission co-funded several projects to retrofit schools to become energy efficient. They are:

SCHOOL OF THE FUTURE

The project "School of the Future – Towards Zero Emission with High Performance Indoor Environment" started in February 2011 and was completed in January 2016. The project involved energy efficient renovation of four school buildings in Germany, Italy, Denmark and Norway. Local planning teams were supported by an advisory group consisting of researchers and building industry representatives who provided additional ideas to achieve reduction in total final energy by a factor of three. At the same time, the buildings' indoor comfort was improved and resulted in better academic performance by the pupils.

The design and outcomes of the demonstration building are shared on the project website for others to follow. There are also training materials for pupils, teachers and caretakers to embark on the project's goal for a zero-emission lifestyle at school.

PROJECT VERY SCHOOL

The VERY School project - Valuable EneRgY for a smart school - that ran from 2012 to 2014 integrates smart LED lighting, smart metering, building energy management systems and energy simulation and energy action management software. The project demonstrated technologies in four pilot locations in Europe. Some key project results include a catalogue of optimised scenarios that is an e-book, to help enhance decision-making in the establishment of an efficient energy management programme. Other results include a report on possible Information and Communication Technology (ICT) business models for schools and a guide for financing energy smart schools.

PROJECT RENEW SCHOOL

Project RENEW School (2014-2017) promotes quick, affordable, green and healthy school renovations. It does this by using prefabricated timber façade elements in combination with other energy saving measures such as intelligent ventilation, shading and renewable energy systems. The project facilitates networking, exchange and training activities between research, companies, school owners and financers. The project involved 18 model buildings, which included renovations to schools and nursery school buildings in Austria, Norway, Germany and Slovenia.

Knowledge gathered and actions taken are communicated by the project team during school visits, training sessions, technology talks and other events.

PROJECT ZEMEDS

Project ZEMedS (Zero Energy MEDiterranean Schools) was a 3-year project (2013-2016) that promoted the renovation of schools to become Nearly Zero-Energy Buildings (NZEB) in Mediterranean climates. The project's activities were principally aimed at school policy makers and building designers, by providing technical and financial assistance and support for the successful implementation of school renovations that were in line with the NZEB goals.

These four European projects serve as case studies to help train planners and building users when renovating school buildings, and to share new knowledge and experiences to maximise their impact. This international work was supported by national programmes and projects at the country level.

Source : www.buildup.eu/en/news/overview-school-buildings-leading-examples-energy-efficient-renovation-

[Living Dangerously:]

ARE YOU USING NON-CERTIFIED ELECTRICAL PRODUCTS?

On 30-31 October 2019, the Energy Commission conducted a nationwide raid of 10 telecommunications and IT outlets in nine states. The enforcement team seized almost 7,000 controlled electrical equipment with a market value exceeding RM150,000 that did not have the Commission's Certificate of Approval (CoA) and SIRIM-ST label. The label is mandatory since they are controlled items.

The Commission's Deputy Director of the Enforcement Planning & Coordination Unit Ir Shafie Mohamed said the raid was organised after the unit investigated public tip offs. Topping the list of items seized and confiscated were mobile phone chargers, extension socket outlets, wiring cables, and adaptors (plug top). Sellers who display or sell unapproved and non-certified electrical and electronics equipment could face the possibility of fines not exceeding RM5,000 or imprisonment not exceeding one year or both, when convicted.

"The SIRIM-ST label means that electrical equipment, appliances and devices sold in Peninsular Malaysia and Sabah are safe to use."

- Ir Shafie Mohamed,
Deputy Director, Enforcement Planning & Coordination Unit, Energy Commission

"The label means they have been tested and certified according to the safety standards of the Energy Commission and SIRIM. Electrical equipment without this label may expose users to danger."

The Commission's Guidelines for the Approval of Electrical Equipment" identifies 34 categories of electrical and electronics equipment that must be tested and certified according to specified standards. Adherence to these standards minimises or avoids the risk of electric shocks and radiation exposure that can affect personal safety as well as full blown accidents such as fires and explosions.

News reports of fires or explosions caused by electrical and electronic equipment have shown that such accidents affect not only the safety of the owners but also neighbours.

In densely populated areas, such accidents can cause financial and personal losses for innocent parties.

Data provided by the Fire and Rescue Department identifies faulty electrical sources (overloading, faulty electrical appliances or wiring) as the No. 1 cause of fires in the country. According to its website, out of the total 712 structural fires reported in March 2018, 455 were residential fires, with 267 cases attributed to electrical sources. This high incidence is caused by faulty electrical appliances, and is an indication that there is a widespread use of non-certified electrical products in the country.

According to Ir. Shafie, all electrical and electronic appliances or equipment sold in Malaysia must obtain Certificates of Approval from the Commission. This is issued for both imports and locally manufactured products. His department is entrusted to ensure stores sell only approved electrical equipment or appliances affixed with SIRIM-ST labels.

The Unit's enforcement officers conduct random checks and raids, assisted by other government departments and agencies based on complaints received from the public. The department has annual targets and KPIs to monitor the sale of unsafe electrical and electronic items.

HOW TO LODGE A COMPLAINT

Consumers can help the Energy Commission prevent the sale of non-certified electrical and electronic equipment by lodging a complaint.

They can do so in the following ways:

Visit the Commission's website and file the complaint under eAduan

Email to eAduan@st.gov.my

Call: 03-88708800 (Mon - Fri 8:30am - 5:30pm, not including public holidays)

Fax: 03-88888651

Write to: Unit Hal Ehwal Pengguna, Suruhanjaya Tenaga, No 12 Jalan Tun Hussein, Presint 2, 62100 Putrajaya

Visit the counter at: Suruhanjaya Tenaga, No 12 JalanTun Hussein, Presint 2, 62100 Putrajaya or any of the Commission's regional offices

When a complaint is received, the Commission will send an investigation team to verify its authenticity. When there is wrongdoing, a notice is sent to the offending outlet to stop the said activity. A second team returns to the outlet to ensure compliance. When the outlet fails to comply, the Commission will apply for a warrant to raid the errant outlet and seize all unsafe electrical and electronic equipment.

There are sellers who refuse to comply despite notices issued by the Commission. Ir Shafie admits that monitoring and conducting raids is easier said than done. "During raids, we need the cooperation of sellers to enter their premises. Then, there are also instances of threats made to enforcement officers. "

Ir. Shafie's department also collaborates with SIRIM to ensure that all electrical and electronic equipment are properly certified before hitting the shelves. The first step is the application of the Certificate of Approval that is required for the importation and manufacture of all electrical and electronic equipment sold in Malaysia. This can be applied online via the e-Permit system (http://epermit.dagangnet.com).

"Prior to importing, applicants or their local agents need to register. The Commission will only issue the CoA when the application is in order."

SIRIM's Head of the Electrical & Electronic Certification & Inspection Section Ariza Mohd Yusof adds that besides the Certificate of Approval, electrical equipment must be certified by SIRIM under its Product Certification Scheme or Batch Certification Scheme, and affixed with SIRIM-ST labels.

The SIRIM Product Certification Scheme involves product assessment, testing and annual factory audits. This is to ensure that the appliances comply with manufacturing standards, and that the manufacturer has a sound quality system to consistently manufacture products that meet these standards.

As an alternative to the Product Certification Scheme, imported electrical appliances can be certified through the Batch Certification Scheme, also known as the consignment certification service. Under the consignment certification service, approval is given once the consignment has satisfactorily gone through the product inspection and testing process.

SIRIM-ST label for electrical appliances approved by the Consignment Service.

SIRIM-ST label for electrical appliances certified by the Product Certification Scheme

Ariza says that once a certified product is in the market, SIRIM continues to monitor the compliance of these products. "We make random purchases and test them at our laboratories to ensure that they are compliant with our standards. When a manufacturer or licensee is found to be misusing the SIRIM-ST label or if the product is non-compliant, the licence of the errant manufacturer or licensee will be suspended. When the offending party fails to take appropriate actions, we will revoke their licence. The manufacturer will then be instructed to recall all affected products from the market."

To combat label misuse, Ariza explains that in 2018 SIRIM developed the SIRIM QAS mobile application to help consumers get instant information on the authenticity of labels. This can be downloaded via Google Play Store or Apple App Store. With this application, consumers can simply enter the serial number on the SIRIM-ST label before making a purchase.

Ariza Mohd Yusof, Head of the Electrical & Electronic Certification & Inspection Section, SIRIM

Ariza adds that SIRIM designs specific labels for each category and type of electrical appliances, details of which are published in the Commission's Guidelines for the Approval of Electrical Equipment. When consumers discover label misuse or consider a product unsafe, they can contact SIRIM (call: 03-55446400, email: cserviceqas@sirim.my, or visit www.sirim-qas.com.my).

Even so, there is still a demand for non-compliant electrical appliances or equipment. They are usually of low quality, have a low life span and expose users to bodily harm and/or property damage. Ir. Shafie thinks this is a question of economics combined with ignorance.

"Some buyers knowingly buy these unsafe electrical products because they are cheaper. Some don't realise these products must bear the SIRIM-ST label."

To address these issues, Ir Shafie says the Commission organises electrical and gas safety seminars. They are held mainly at higher educational institutes where there is a high incidence of undergraduates buying non-compliant products.

There is also a grassroots CSR programme called "Touchpoint", which conducts electrical safety inspections at needy schools and charity homes. All unsafe electrical appliances found here are replaced at no cost by the Commission. Other public awareness programmes include regular briefings with relevant stakeholders and public service announcements on television and radio, especially during festivals, road shows and exhibitions.

POWERING ACROS

About half of the world's population lacks access to energy, and this is a serious threat to economic development and poverty reduction. Cross-border power trading via interconnected networks is playing a major part in overcoming these challenges. A 2014 World Bank article notes that trade in electricity can help improve access to power, bring down energy prices, mitigate against power shocks, relieve shortages, facilitate decarbonisation and provide incentives for market extension and integration. Yet, countries have been reluctant to engage in power trading. Currently, global export of electricity hovers around 3% of total production. Here, we look at the pros and cons of power trading.

In advanced economies, the national electricity grid is likely to have developed over a long period of time. As local utility companies grew, they realised that there were substantial cost and quality of service benefits by having interconnected supply between service areas within the country's grid. These companies began cooperating with each other to create "power pools". This meant that electricity loads in one area no longer had to be balanced with electricity generation within that same area. Regions with low cost generation resources could become net exporters of power, while markets in high cost areas could benefit from cheaper imports.

This type of pooled system needed negotiated interchange agreements and mechanisms for dispatching electricity from point to point throughout a grid. Usually a separate Transmission System Operator (TSO) is established to regulate power trading as in the case of the National Grid in England and Wales. In regions with multiple transmission systems, it is difficult to establish a single TSO. Instead, states often create Independent System Operators (ISO) or Regional Transmission Organisations (RTO), where system operation is separated from transmission asset ownership.

Today, we are seeing a rapid rise in the number of wholesale power markets sprouting across the developing world. Vertically integrated utilities that held monopolies for a long time are being disbanded, creating the potential for greater cooperation within the energy sector in these countries.

According to a working paper published by the World Bank, certain criteria must be in place to realise this potential. In the study of six major regional power pools – in Africa, Europe and the Americas – it is clear that openness and commitment to free trade is essential for this to work. The need to have a trade agreement in place is made more important because World Trade Organisation (WTO) rules don't clearly stipulate the conditions for electricity trade.

Infrastructure is another factor to consider, and there must be physical interconnections at borders. Equally critical is adequate cross-border transmission capacity. Because electricity flows in loops, national systems must be able to handle higher loads and fluctuations. The regulatory aspect must also be factored into the market design. A well-designed power pool market usually has less cross-border enforcement actions.

EU leads the way

The development of a cross border grid infrastructure is high on the European Union (EU) agenda. The upgrading of both gas and electricity grids is considered by EU policymakers as being indispensable for achieving the region's climate and energy goals in a cost-effective way.

When European national electricity markets began to open up their borders in the 1990s, interconnections between member states largely served energy security needs. Today, the transnational grid is expected to boost sustainability as well, mainly because it will allow more renewable energy to be absorbed by the system. This is considered fundamental for the EU to transition to a low-carbon economy.

This super-grid is envisioned as a "Pan-European transmission network facilitating the integration of large-scale renewable energy production facilities and the transportation of electricity, with the aim of improving the European market" by the Friends of the Super-Grid. It will connect wind farms in Northern Europe and solar power producers in the Mediterranean and North Africa to massive power consuming centres in the heart of the continent.

Without this infrastructure, it is impossible to buy and sell electricity across borders. The European Commission (EC) says that with this system in place, when a power plant fails or during extreme weather conditions, member countries can rely on their neighbours to import the electricity they need.

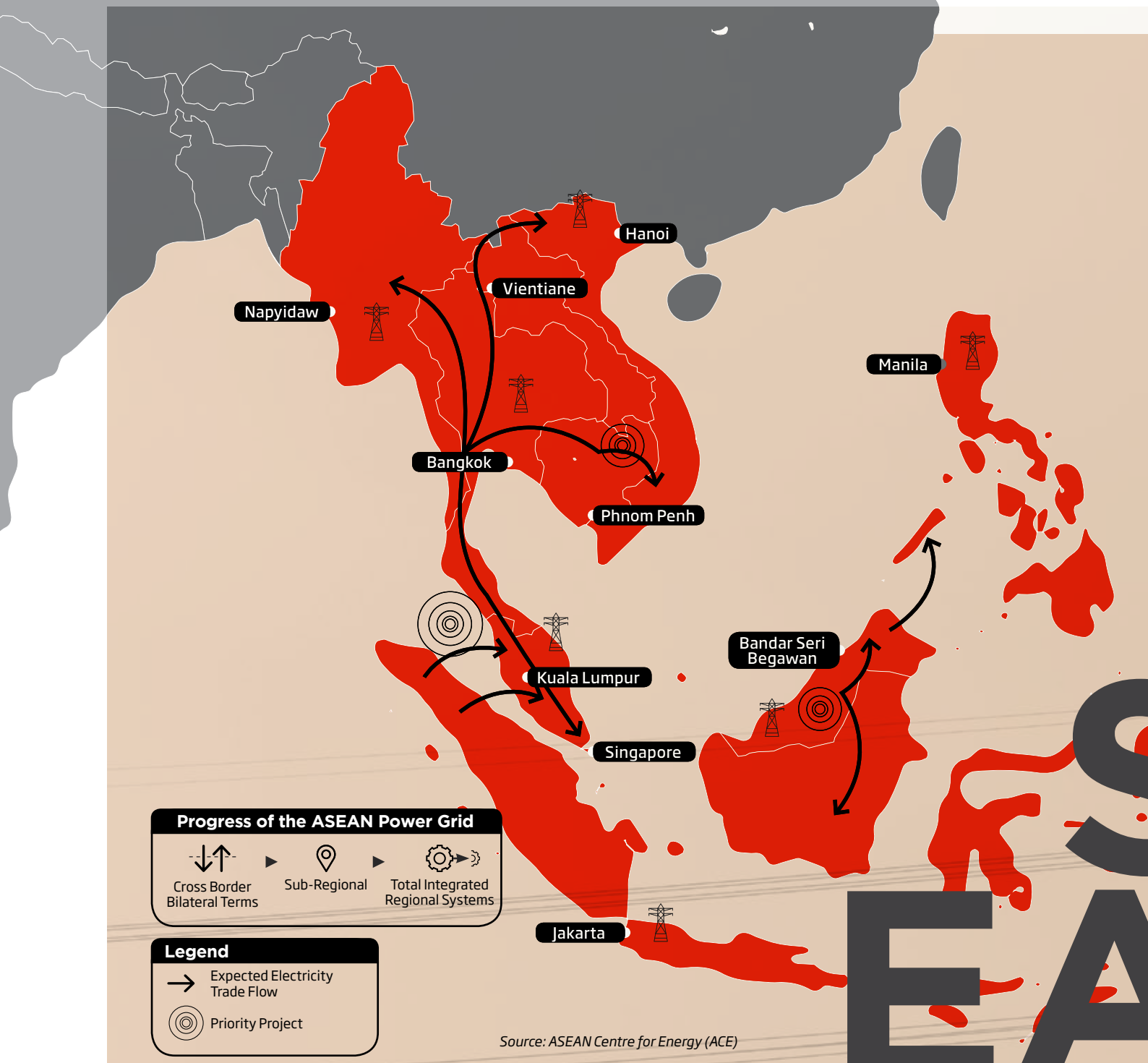
BORDERS

> Reliable interconnections with neighbouring member countries also lower the risk of power failures, reduce the need to build new power plants, and make it easier to manage various renewable power sources such as solar and wind. Surplus renewable energy produced in one country could be used in another country where demand for electricity is high.

In 2002, the EU adopted an interconnection target of 10% by 2020. This meant member countries should have in place electricity cables that allow at least 10% of the electricity produced by their power plants to be transported to neighbouring member states.

This target was seen as the necessary minimum to end the electricity isolation of some member states and boost competition to bring down prices. As at 2016, 17 countries had either achieved this target or were on track.

In 2018, the interconnection target was revised upwards to 15% by 2030, to accelerate the realisation of the EU's climate change goals.



Source: ASEAN Centre for Energy (ACE)

In 2018, Malaysia received 16GWh of power from Lao PDR via the Laos-Thailand-Malaysia (LTM) interconnection. The LTM interconnection showed the feasibility of multilateral power trading under the ASEAN Power Grid. This is the outcome of an Energy Purchase and Wheeling Agreement signed in 2017 between the public utility companies of Malaysia, Lao PDR and Thailand. The agreement covered technical operating procedures and commercial terms of power transfer. Phase 2 of the agreement is scheduled to commence after 2020.

StatFact

ASEAN target for RE in energy mix:

23%

by 2025

ASEAN Power Grid: STILL EARLY YEARS

Established in the late 1990s, the ASEAN Power Grid aims to improve cross border electricity trade to meet rising electricity demand in the fast industrialising region. Tasked with realising this ambitious vision are the Heads of ASEAN Power Utilities/ Authorities (HAPUA).

HAPUA has been entrusted to develop a common regional policy on power interconnection and trading between member countries.

The ASEAN Power Grid encompasses all 10 member states and consists of three sub-systems. They are: 1) the Upper West System covering Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam; 2) the Lower West System covering Thailand, Indonesia (Sumatra, Batam), Peninsular Malaysia and Singapore and; 3) the East System covering Brunei, Malaysia (Sabah and Sarawak), Indonesia (West Kalimantan), and the Philippines.

The development of the grid is to be undertaken gradually and incrementally. Power connections are to be developed on cross-border bilateral terms, then expanded to a sub-regional basis before being augmented into an integrated regional power architecture.

Thus far, interconnection projects are on cross-border bilateral arrangements. Eight out of 16 projects have been implemented with a power exchange and purchase of 5,200 MW. HAPUA has announced three priority projects. These planned projects will connect power grids between Peninsular Malaysia and Sumatra; the Malaysian state of Sarawak and Brunei in Borneo; Lao PDR and Cambodia. They are targeted to double sales to 10,800MW in 2020, and beyond 16,000MW thereafter.

For the ASEAN Power Grid to resemble a regional power architecture, it must evolve from bilateral to multilateral arrangements. The Energy Purchase and Wheeling Agreement signed between Lao PDR, Thailand and Malaysia is a step in this direction. The deal sees Malaysia purchasing up to 100MW of hydro power from Lao PDR, to be transported via Thailand's existing transmission grid. The purchase benefits Malaysia because of its competitive pricing while boosting its renewable energy target.

The immediate challenge to the ASEAN Power Grid is the need to establish a legal framework for interconnections and regional power trading. There is also the lack of technical expertise and funding to see the vision through. Another obstacle is overlapping territorial claims that are likely to hinder free cross border energy trade.

Connecting the world

The idea of national and regional interconnections in a super-grid system is not restricted to Europe. The US has backed 'Connecting the Americas 2022', an initiative that aims to bring power to more than 31 million people in Central and South America who currently lack access to reliable, clean and affordable electricity.

According to the US Department of Energy, "Interconnected power systems allow for greater integration of renewable energy resources as well as power exchanges among countries with varying climate and seasonal needs.

Interconnection expands the size of power markets, creating economies of scale, which can attract private investment, lower capital costs and reduce electricity costs for consumers."

No country or region can thus far surpass the scale and speed of development of China's national super-grid connecting its provinces. China's State Grid Corporation built an enormous inter-regional transmission system to move power generated in coal-rich areas in the northwest and hydropower-rich provinces in the southwest to the dense consumer markets in the east coast that includes Guangdong, Zhejiang and Shanghai.

State Grid has built both Alternating Current (AC) and Direct Current (DC) transmission lines operating at Ultra-High Voltage (UHV) to move power over long distances. China sees the super-grid as vital to meeting the country's surging energy demand.

The Financial Times (June 7, 2018) reports: "UHV had allowed China to binge on dam building in its mountainous hinterland, then transport the power thousands of kilometres to its wealthy, industrial east coast. But by enabling this, and other projects, UHV has left western China with a glut of power so much so that in 2016, State Grid proposed using the technology to export power to as far away as Germany.

"UHV is being now promoted internationally through the Global Energy Interconnection initiative. Designated as a national strategy, it is championed by China's President Xi Jinping.

> "The initiative feeds into one of China's most ambitious international plans – to create the world's first global electricity grid."

All of this fits in with Beijing's goals of expansion and being a global standard setter," says Erica Downs, an expert on China and energy at Columbia University. "It is also linked to China's intention to become an advanced industrial superpower. There is a big prestige element in this."

A word of caution

While nations pursue plans for interconnections and super grids, policymakers are asked to tread with caution because highly interconnected systems are vulnerable. "Vulnerability is an unintended side effect of the nature and organisation of highly centralised technologies," says a report by the US Federal Emergency Management Agency.

It adds that the interconnection infrastructure involves building and linking complex energy devices one by one. Sometimes, there is not enough consideration being given to the ramifications of a flawed system, or parts of it.

Super grids require significant maintenance works to ensure their stability. But the bigger problem lies in how to keep the system balanced in the event of a failure along one of the ultra-high voltage transmission lines. It could also trigger cascading failures in several parts, or even the entire network.This could lead to sweeping power outages at tremendous socio-economic costs.

In Africa, the challenge lies in operationalising interconnections. From the mid-1990s onwards, the continent began to form power pools, considered the best strategy to deal with unevenly distributed energy resources and other energy problems. Four power pools emerged: Southern Power Pool (1995), Western Power Pool (2000), Eastern Power Pool (2003) and Central Africa Power Pool (2005).

In 2018, the European Centre for Development Policy Management (ECDPM) reported that despite the initial success of the Southern Africa Power Pool (SAPP) – with 17 member nations - it suffered from a deficit in investment in generating and transmitting power to nations. There was also a lack of trust among member states and willingness to liberalise their markets.

Furthermore, ECDPM found national power providers were dominated by national politics, and more inclined towards bilateral transactions instead of regional ones.

It says: "The SAPP case highlights the important role that South Africa originally played though this has waned, while a lack of a real energy champion in the West and Eastern power pools appears to limit their immediate potential. Even as Ethiopia becomes an energy giant, it is not clear that this will lead to improved regional energy supplies through a power pool given the political preference for bilateral deals and connections."

> "Effectively functioning power pools will require further investment in underlying infrastructures and a critical mass of distributed generation capacity. It also calls for a shift in thinking, from short-term oriented objectives towards long-term gains, and trust-building among states," added ECDPM.

Another challenge to power trading is political unrest and civil war. Doubt looms over Egypt's Toshka substation, built to supply 15-18 MW every day to neighbouring Sudan, about 100km away. The political turmoil in Sudan could affect the safe and steady supply of electricity from Egypt. The project is part of Egypt's plan to become a regional energy hub.

This aspiration of Egypt is being undermined by its conflict with Ethiopia over the Grand Ethiopian Renaissance Dam. For Ethiopia, the dam is a national project that will help it export electricity and implement development projects. Egypt, on the other hand, is concerned about the dam's impact on the Nile River's already dropping water levels, which threatens Egypt's water security.

IN 2018, TNB ANNOUNCED THAT IT WILL INVEST RM2.7 BILLION FOR ITS "GRID OF THE FUTURE" TECHNOLOGIES TO ENHANCE EFFICIENCY.

POWER to the PEOPLE

Electricity transmission in Peninsular Malaysia is starting a new chapter. Now controlled by public utility Tenaga Nasional Berhad (TNB) as sole owner and operator of the national grid, the future holds promise when the Third Party Access arrangement is implemented as part of market liberalisation in the next few years. It means other private utility companies can lease the grid from TNB to distribute power to their customers.

This will require the national grid infrastructure to become smarter and to recognise multiple users, transactions and delivery points. In 2018, TNB announced that it will invest RM2.7 billion for its "Grid of the Future" technologies to enhance efficiency. There are to be future collaborations to deliver new technologies in strategic partnerships with tech-driven companies. With this, the smart grid can be enabled with a variety of applications to perform tasks that meet customer needs.

With the smart grid, Malaysia will join the league of developed nations, where consumers play a significant role in determining the direction of their country's power industry. The evolution of power transmission in Peninsular Malaysia follows closely behind that in most industrial nations.

LATE 1800s to electrification begins

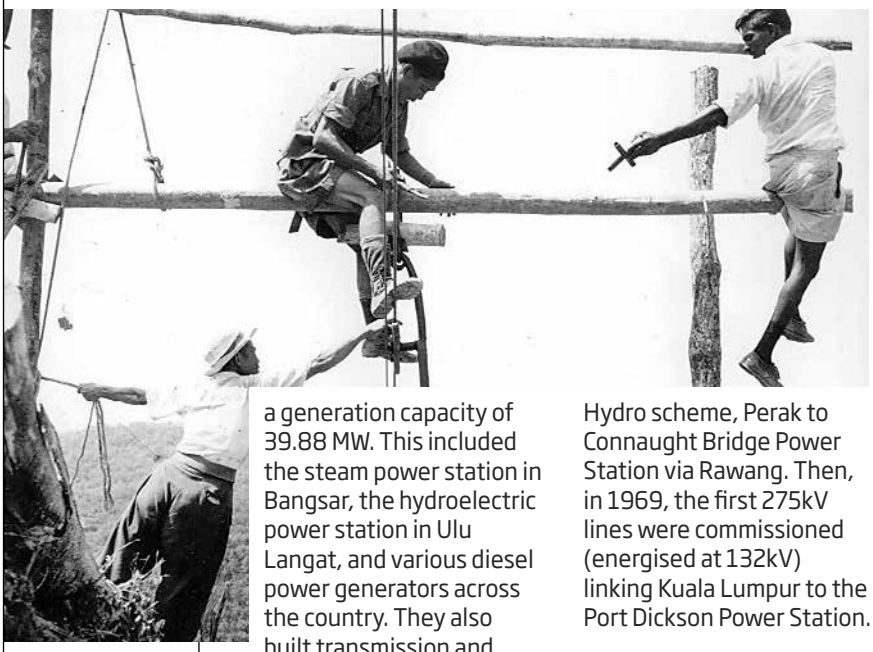
The electrification of Peninsular Malaysia follows closely in the footsteps of developed nations. In 1894, an electric generator installed for private mining operations in Rawang saw the transmission of power to illuminate the town's streets lights. The following year, the Kuala Lumpur Railway Station received its first electricity supply. In colonial Malaya, rail transportation was used to carry raw materials such as tin and rubber to the ports, for export.

The start of electrification in the country occurred 12 years after New York started enjoying electricity supply with the opening of the Pearl Street Station. Power was then transmitted via a 4 kilo Volt (kV) single-phase Alternate Current (AC) transmission line developed during that time. In 1891 the first 12kV three phase AC transmission line was introduced in Germany. The first modern transmission line, the High-Voltage Direct Current (HVDC), came into existence in 1954.

EARLY 1900s: Pioneer operators

According to TNB records, the first transmission lines in Peninsular Malaysia were 66kV lines built in 1929 by the Perak River Hydro Electric Power to connect its 45MW hydro plant to tin mines in Perak.

Power generation was in the hands of private operators then. These pioneers built 34 power stations with a generation capacity of 39.88 MW. This included the steam power station in Bangsar, the hydroelectric power station in Ulu Langat, and various diesel power generators across the country. They also built transmission and distribution systems above and below ground valued at close to RM30 million. Between them, they had 45,495 consumers and 2,466 staff.



A section of the National Grid that came into existence in 1965, and was completed in 1976

1950s -1970s: Public utility formed, National Grid takes shape, 275 kV circuit commissioned, rural electrification rush

In 1949, the Government established Central Electricity Board (CEB) as the national public utility, and it took over the private power companies. CEB was later renamed National Electricity Board (NEB), privatised and then listed as Tenaga Nasional Malaysia (TNB).

Peninsular Malaysia's national grid began to take shape in 1953 under CEB, which constructed 66kV lines to transmit power from Connaught Bridge Power Station to Kuala Lumpur, Seremban and Melaka. Ten years later, in 1963, it built the first 132kV lines linking Cameron Highlands Hydro scheme, Perak to Connaught Bridge Power Station via Rawang. Then, in 1969, the first 275kV lines were commissioned (energised at 132kV) linking Kuala Lumpur to the Port Dickson Power Station.

With the national grid, electricity could travel from power plants to users almost instantaneously. It also made possible the direct transfer of power from sources of production to sources of demand.

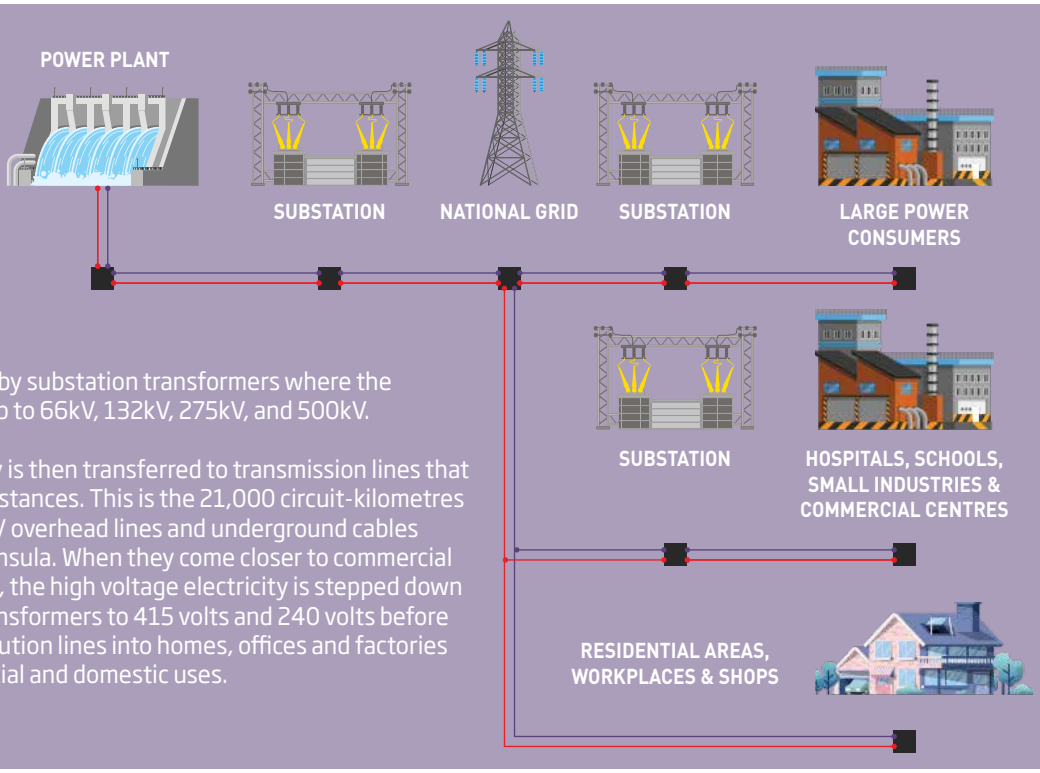
This period also saw a flurry of rural electrification projects that were connected to the grid. Under colonial rule, the focus of electrification projects were urban population centres. Now, the Government wanted to narrow the divide between the haves and have nots through electrification.

"Malaysia's rural electrification programme won World Bank recognition," says Lighting Up Lives, TNB's 60th anniversary book. Today, 99% of Peninsular Malaysia is electrified, mainly via the national grid. For off grid locations, the Government has been allocating budgets under the Malaysia Plans for mini hydro and solar PV installations.

TRANSMISSION 101: From Power Plant to Consumer

The electricity that is generated at a power plant is low voltage in the range of 11-20kV and needs to be converted to high voltage for efficient transport. This is done by substation transformers where the electricity is stepped up to 66kV, 132kV, 275kV, and 500kV.

High voltage electricity is then transferred to transmission lines that will carry it over long distances. This is the 21,000 circuit-kilometres of 132, 275, and 500 kV overhead lines and underground cables criss-crossing the peninsula. When they come closer to commercial and residential centres, the high voltage electricity is stepped down by more substation transformers to 415 volts and 240 volts before being carried by distribution lines into homes, offices and factories for industrial, commercial and domestic uses.



DEVELOPMENT OF THE GRID SYSTEM

2015 **TOWARDS A SMART GRID**

2010 Launch Of New Malaysian Grid & Distribution Codes

1998 Malaysia-Thailand 300MW High-Voltage Link

1996 1st 500kV Circuit commissioned

1994 1st Malaysian Grid Code introduced

1990 TNB established

1970 1st 275kV Circuit commissioned

1953 Peninsular Grid system established

1980s: Forging regional cooperation

In the interest of energy security, Malaysia and neighbouring Singapore and Thailand embarked on interconnections to manage power emergencies.

With Thailand to the north, the original 117 MVA, 132 kV Single Circuit Line interconnection of 80MW was commissioned in 1981, linking Malaysia's grid at Bukit Ketri-Chuping in the state of Perlis to the Thai grid in Sadao in southern Thailand. The line was upgraded to 300MW high voltage link in the 1990s. With Singapore to the south, the National Grid was connected via two 230 kV with a transmission capacity of 200 MW.

Meanwhile, in June 1986, ASEAN leaders mooted the concept of the ASEAN Power Grid, to take interconnections to whole new level: power trading.

1990s - 2000: Demand spikes, transmission overload, remedies suggested

Rapid economic development, population growth and rural-urban migration saw a surging demand for energy. Between 1990 and 2013, consumption grew at an annual average growth rate of 8.2%, to reach 116,087 gigawatt hour (GWh).

Spikes in demand caused transmission lines to transfer more power than they were designed to carry. This caused tripping and blackouts. To ensure the robust health of transmission lines, the Department of Electricity and Gas Supply (precursor to the Energy Commission Malaysia established in 2001) published the Malaysian Grid Code in 1994. This set out the guidelines for the management of the National Grid as well as the roles and responsibilities of the varied stakeholders involved in the construction, maintenance and upgrading of the grid. The code underscored the reliability in electricity supply and healthy competition among players in the value chain.

(Source: The Star, 14 January 2005)

MAJOR BLACKOUTS IN MALAYSIA

JUNE 29, 1985
A sudden 600-megawatt load loss tripped transmission lines on the East Coast and caused a blackout for several hours in 11 states. The trip occurred at 1.37pm on two lines between Paka, Terengganu and Kampung Awah, Pahang and tripped all power stations connected to the national grid. The blackout hit during lunch, causing chaos in major towns.

Proposed Remedies:
- Review the effectiveness of preventive, "load shedding" schemes.
- Port Klang power plant to provide power security.
- The construction of a 275kV transmission line from Paka, Terengganu to Tanah Merah, Kelantan in 1986, as an alternative route to dispatch power to the grid from major plants in Paka and Kenyir, Terengganu.

JULY 31, 1992
A bolt of lightning during a thunderstorm struck four power lines between Paka and Teluk Kalong in Terengganu. It caused a massive power failure across the peninsula at 3pm. Fifteen power stations on the West Coast were put out of action by this accident. This part of the grid supplied power to the West Coast, and the resultant overload caused the 1,000MW Paka Power Station to trip. Power was restored between six and ten hours in most states.

Proposed Remedies:
- TNB to erect an alternative transmission line between Terengganu and the south of the peninsula.
- TNB to improve its protection system in the power transmission system and to allocate 30% spare capacity at any one time in its power generation system. During this time, there was only 10%.
- TNB to provide portable power stations in densely populated areas to ensure supply.

AUGUST 3, 1996
A transmission line near Paka Power Station tripped at 5.17pm causing all power stations in Peninsular Malaysia to collapse resulting in a massive power failure. The cascading effect of the trip shut down supply in sequence at all power stations. Supply was back to normal by 11pm at Paka and Dungun in Terengganu, Kalumpang and Rawang in Selangor, Cheras in Kuala Lumpur and Damansara in Petaling Jaya.

Proposed Remedies:
- TNB recommended that dependence on power generated from these stations be reduced to lower the risk of major system failure.
- TNB is to spend between RM50mil to RM100mil per year in the next five years to improve reliability and security of the nation's electricity distribution.

In 1996, the first 500kV circuit was commissioned. It saw power being transferred from the 2100 MW Manjung power station in Perak to satiate demand in the Central Area, which includes the populous and industrialised Klang Valley.

This period also saw the ASEAN Power Grid, mooted in 1986, inching closer to become a reality with the signing of the Agreement on ASEAN Energy Cooperation by member states in 1997. It was to pave the way for power trading between ASEAN member states.

2000-2010: Expansion of 500kV circuit as grid backbone

The 500kV transmission network was to become the backbone of the national grid. It was planned as a 784 km circuit, stretching from the northern tip at Gurun to Pasir Gudang in the south, via Kapar and Bukit Tarek in the Central Region.

The decade culminated with TNB announcing the implementation of the Smart Grid in 2009.

2010-2020: Towards a Smart Grid, ASEAN Power Grid takes off, new 500kV projects

The Smart Grid's primary objective is to improve operational efficiency via automation. It also has the potential to be used for green energy transfers and transactions and facilitate power trading among ASEAN members, among many other applications.

The connected, digital, data-driven era has made the age of Smart Grid possible for the power industry. Smart Grid technologies will enable the grid to be self healing, flexible and intelligent. In the long run, it will serve the country's urgent need for reliable, affordable and clean energy supply.

Essentially, the smart grid builds on the existing grid infrastructure, strengthening it with intelligent technologies. It is a work in progress, to be rolled out in phases. With the smart grid, manual tasks can be automated, and customers can be empowered through direct communication. It has the intelligence to perform a variety of tasks according to the applications installed.

Meanwhile, the Commission's System Operations Deputy Director Mohd Najib Mohd Shah notes that with the smart grid, the utility must manage the complexity arising from the introduction of new technologies. "There will be sophisticated energy demands that require higher levels of efficiency and reliability."

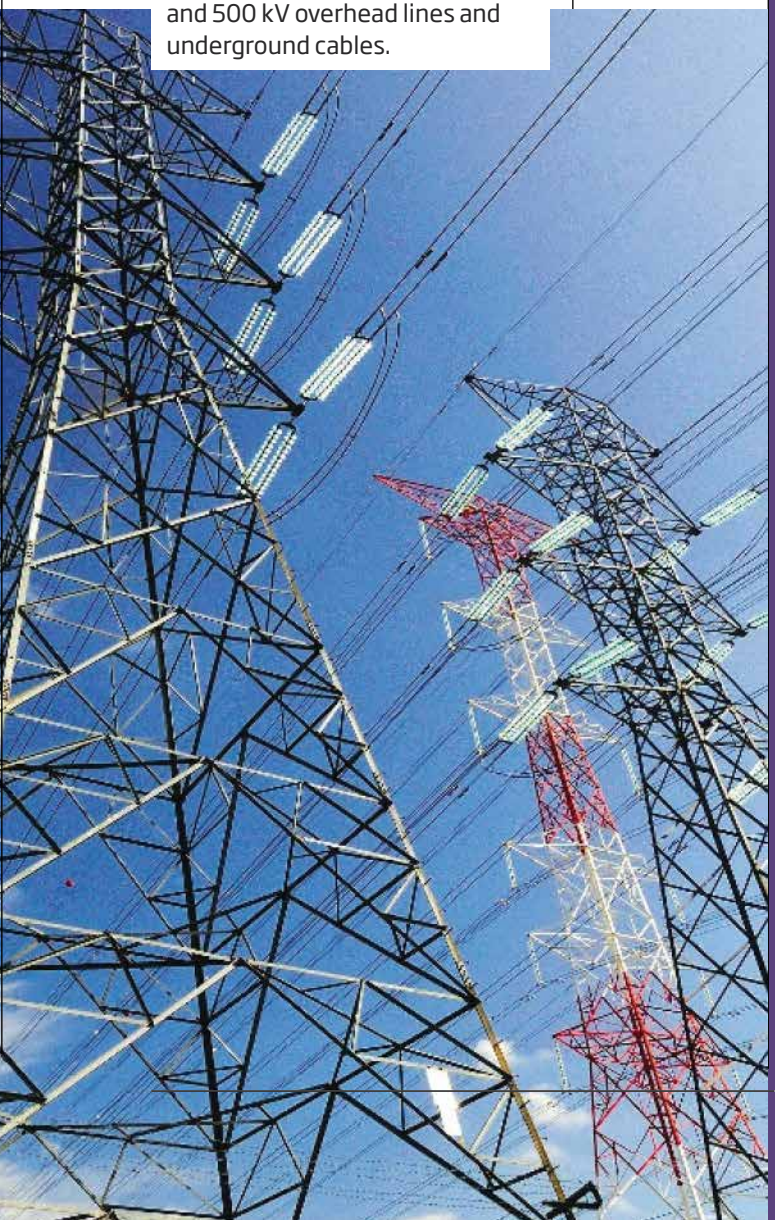
Another milestone of the decade was the 2014 announcement of the Laos PDR-Thailand-Malaysia-Singapore Power Integration Project, which is part of the ASEAN Power Grid. Four years later in 2018, the Lao PDR-Thailand-Malaysia interconnection transferred more than 10GWh of power from Lao PDR to Malaysia.

In the meantime, the national grid's 500kV backbone continues apace, and is scheduled for completion by 2028.

Mohd Najib says, "Currently, we have two new 500kV projects. One covers the southern region and runs from Yong Peng East in Johor to Lenggeng in Negeri Sembilan. The other is a corridor from Air Tawar in Perak to Bentong South in Pahang.

"These lines are necessary to accommodate the heavy load transfer from new and existing power plants to the Klang Valley where power demand is highest. We also keep tab on grid maintenance to keep up with consumer demand."

Today, Peninsular Malaysia's transmission network consists of 420 transmission substations with a total installed capacity of 105,305 MVA. They are linked by approximately 21,000 circuit-kilometres of 132kV, 275kV, and 500 kV overhead lines and underground cables.



ONGOING MAINTENANCE

TNB undertakes continuous maintenance works of its high voltage transmission network. There are three types of maintenance: preventive; corrective; and live.

Preventive maintenance is scheduled whereas corrective maintenance occurs after failure or an unacceptable mishap has occurred. Its aim is to restore the function of the grid. Live maintenance is performed on transmission lines and related equipment without turning off power to customers. This kind of maintenance is relatively new and requires special equipment and training.

The primary maintenance issues are adverse weather, defective equipment, and encroachment. Adverse weather can be overcome with flood mitigation measures, pre-monsoon inspections, and lightning protection improvement works. For defective equipment, there is a monitoring and predictive replacement and rehabilitation programme. To deal with encroachment, TNB turns to surveillance technologies such as the smart camera, Unmanned Aerial Vehicle (UAV) and satellite technology. At the same time, it conducts awareness programmes to highlight the potential dangers lurking in the vicinity of transmission installations. The participants, in this instance, are local authorities, crane operators, developers and local communities.

Transmission lines are built with a certain capacity, using a conductor type and technology available at that point in time. The challenge is to meet new power demand and transmission loads. When new power plants are added to meet growing demand, some transmission lines find themselves overburdened. They are carrying more power than they should.

When this occurs, its protection system will kick in, causing an interruption of power transfer from source to demand point. This is a signal to upgrade the transmission line to a higher line capacity or line voltage.

For this, TNB has an Annual Transmission Development Plan that reviews the adequacy of the transmission system over a rolling 10-year period. The review is a requirement under its licensing conditions as grid owner/operator as well as the Energy Commission's Grid Code for Peninsular Malaysia.

SCHOOLS SAVE RM154,000

at 2019 ENERGY EFFICIENCY CHALLENGE

The 2019 Energy Efficiency (EE) Challenge delivered higher savings in terms of energy consumption and electricity bills compared to the previous year. Chairman Datuk Ir Ahmad Fauzi bin Hasan said an analysis of electricity bills submitted by 37 schools out of 84 that completed the Challenge in 2018 and 2019 showed the trend towards greater energy efficiency among schools. The bills were for the six months of the EE Challenge that is held annually from April to September.

"We found that in 2018, 37 schools used 4,040,457 kWh of electricity compared to 3,743, 019 kWh in 2019. The difference of 297, 438 kWh is equivalent to saving RM154,866.46 in electricity bills. We are proud of this achievement and congratulate the participants of the EE Challenge 2019.

"Since its launch six years ago in 2014, the EE Challenge has recorded energy savings of 1.4 million kWh valued at RM561,135.22. "

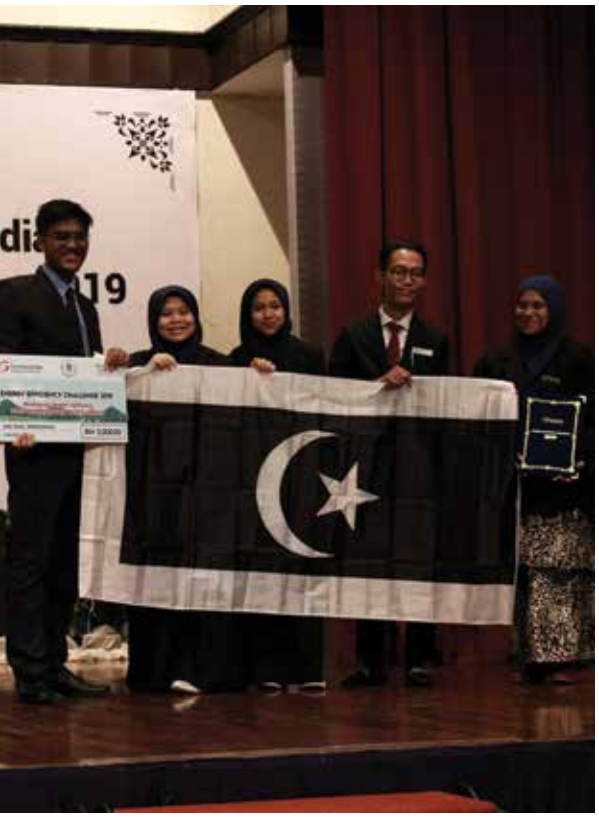
The Chairman was speaking at the 2019 EE Challenge prize giving ceremony held on 13 November. The 2019 Challenge attracted 106 schools from across Peninsular Malaysia and Sabah. They submitted entries to the Challenge's three categories: Overall Energy Efficiency, Most Creative Video and Most Viral Video.

The former Minister of Energy, Science and Technology, Environment and Climate Change, Yeo Bee Yin, gave away the prizes to the winning teams. In her address, Yeo said, "Youths are the catalyst to realise the country's aspiration for energy efficient practices to help reduce carbon emissions and the effects of climate change. Energy efficiency is an important agenda both nationally and globally.

"In Malaysia, the Government is implementing various energy efficiency programmes and initiatives. Among them is the National Energy Efficiency Action Plan (NEEAP) where the Government targets to save 8% energy, that is, 52,223 GWh over a 10-year period from 2016-2025.

"In addition, there is the Energy Efficiency and Conservation Act that has been approved by the cabinet and is to be tabled in Parliament. Through legislation, we can expect energy efficiency initiatives to be implemented more strategically.

"MESTECC has also launched the ESTECC Education Programme to increase student awareness in three key sectors under the Ministry, that is, energy, science and technology, environment and climate change. Developed in collaboration with the Education Ministry, NGOs and government agencies, ESTECC aims to create interest among students in STEM subjects (Science, Technology, Engineering and Mathematics).



The EE Challenge is organised by the Energy Commission, and supported by the Government. Launched in 2014 to instill an energy efficiency culture among students, it had a humble start with seven schools in the Klang Valley and Putrajaya. Then, entries began to grow to 29 (2015), 72 (2016-2017) and 112 (2018). In 2019, the Challenge attracted 106 schools, bringing total participation in six years to 398 schools.

Besides the Challenge, the Commission organises various other energy efficiency activities in schools. In 2019, a total of 1,196 activities were recorded. They ranged from seminars, monitoring/ enforcement by energy efficiency squads, reminder labels to switch off lights, quizzes and audits of electricity bills to ensure optimal functioning of electrical equipment.

ENERGY EFFICIENCY CHALLENGE 2019: WINNERS

Category: Overall Energy Efficiency	
Zone	
First	SMK Taman Nusa Damai, Johor
Second	SMK Kampung Baru Kerteh, Terengganu
Third	SMK Medini, Johor
Northern Zone	SMK Sultanah Asma, Kedah
Southern Zone	SMK Sultanah Engku Tun Aminah, Johor
Central Zone 1	SMK La Salle Sentul, Kuala Lumpur
Central Zone 2	SMK Sekysen 9, Selangor
East Coast Zone	SMK Sungai Koyan, Pahang
Sabah Zone	SMK Tamparulli, Sabah
Category: Most Creative Video	
First	SMK Paka, Terengganu
Second	SMK Dato' Syed Ahmad, Kedah
Third	SMK Sultanah Bahiyah, Kedah
Category: Most Viral Video	
First	SMK Paka, Terengganu
Second	SMK Kerteh, Terengganu
Third	SMK Mutiara Rini, Johor

IGEM 2019: INNOVATING SUSTAINABILITY

Minister announces green tariff and Malaysian Green Attribute Tracking System

Malaysia hosted the International Greentech & Eco Products Exhibition and Conference Malaysia) from 9-11 October 2019 (IGEM 2019). With the theme "Innovating Sustainability", IGEM 2019 focused on technological innovations to help combat the threat of depleting natural resources, carbon emissions and climate change for a more sustainable future.

IGEM has become South East Asia's largest trade event in the green sector. It is an annual event organised by the Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC) to provide a platform for green technology and eco product businesses and government entities to tap into the fast-growing ASEAN region by showcasing the latest innovations and cutting edge technologies.

The 3-day IGEM 2019 celebrated its 10th anniversary with a record 35,000 exhibitors from 35 countries. It witnessed 16 MOUs inked, including collaborative partnerships with co-organiser Malaysian Green Technology and Climate Change Centre. Over the years, IGEM has generated more than RM23 billion in business leads, and attracted over 420,000 delegates, dignitaries and companies from over 50 countries.

At the launch of IGEM 2019, the Guest of Honour, Prime Minister Tun Dr. Mahathir Mohamad, said, "Today is a great day for us to recommit to delivering on our climate change responsibilities. We have seen the emergence of a low-carbon economy that is based on improving human well-being and building social equity while reducing environmental risks and scarcities. Over the past couple of decades, the green economy has emerged as a strategic priority to basically transform economies into drivers of sustainability.

"Malaysia's progress as a longstanding proponent of balancing environmental conservation, technological innovation and economic prosperity has been underpinned by a dynamic innovative ecosystem and affirmative institutional support.

> The country has ramped up efforts to develop an innovative ecosystem to support new start-ups, and to garner greater inclusivity, we have promoted innovation at the grassroots level."

Former Prime Minister
Tun Dr Mahathir Mohamad
at the official launch of IGEM 2019

According to a Green Economy Initiative study, the green economy could grow from its present 6% to 10% of global market value by 2030. Approximately 3,000 globally listed companies already have exposure to the green economy which has been characterised as an economy that is efficient, clean, renewable, collaborative and low carbon.

In her launch address, former MESTECC Minister Yeo Bee Yin said, "IGEM has been through a myriad of transitions over the last decade to stay relevant with changing demands related to the low carbon economy and sustainability actions. Over the years, IGEM has shaped people's mindsets to accelerate acceptance, adoption and appreciation of green technology products and services across ministries, corporations, entrepreneurs, businesses, and the general public.

"IGEM is undoubtedly a powerful platform to simultaneously reach out to various stakeholders, and is of absolute importance today as it will require the coordinated efforts and contribution of all ministries, stronger partnerships between the public and private sectors, and of course, the Malaysian people to ensure we deliver on our country's climate promise."

To encourage greater participation in renewable energy, Yeo Bee Yin announced the introduction of a green tariff that will take the form of a tariff rider to give consumers the choice of buying power that is generated solely by renewable energy.

She also launched the Malaysian Green Attribute Tracking System (MGATS), a national platform for tracking of and trading in renewable energy. MGATS will issue tradable renewable energy certificate, and is aimed at incentivising local and foreign investors to have more participation in the country's green economy.

IGEM 2019 was sponsored by Tenaga Nasional, Cypark Resources and UEM Edgenta. It featured 10 conferences, and opportunities for business networking sessions, business-matching services and industry specific talks.

ZEEPOD, A BREAKTHROUGH IN MARGINAL OIL & GAS FIELD DEVELOPMENT

On 10 November 2019, Petronas subsidiary Vestigo Petroleum held a media briefing on the innovative ZEEPod, an offshore platform built to extract oil and gas from marginal fields. Vestigo commissioned the first Zeepod in Tembikai Non-Associated Gas (TNAG), a marginal field off the coast of Terengganu.

The installation is an important milestone in Malaysia's aspiration to become a regional oil and gas hub. The ZEEPod is developed by ZEE Engineering, a Malaysian engineering consultancy that holds the patent. Its Minimum Facility Well Head Platform will enable operators to develop existing marginal fields without large capital expenditure associated with green field developments.

Constructed by Malaysia Marine and Heavy Engineering Holdings, the ZEEPod is a fit-for-purpose offshore platform. Its streamlined design and easy assembly minimise construction and installation costs and it is faster to build and operate than conventional rigs. The cost savings can be as much as 40% compared to a traditional platform, depending on the offshore spreads deployed for transportation and installation.

Marginal oil and gas fields are important for Malaysia as a significant portion of Malaysian crude oil lie in marginal fields. These fields have not been developed in the past due to their technical challenges as well as high cost incurred in building rigs in these fields. However, to bring these valuable fields onstream, Petronas is encouraging new investments in exploration and production. Petronas defines a marginal field as one that has a potential to produce 30 million barrels of oil or less and 150 to 250 billion cubic feet (BCF) of natural gas.

To encourage the development of these fields, Petronas has come up with Risk Service Contracts (RSC). The RSC is a service contract where a contractor undertakes exploration of marginal fields for a contractor fee. The contractor is remunerated upon commercial production at a pre-negotiated terms and conditions. The fee is subject to taxes.

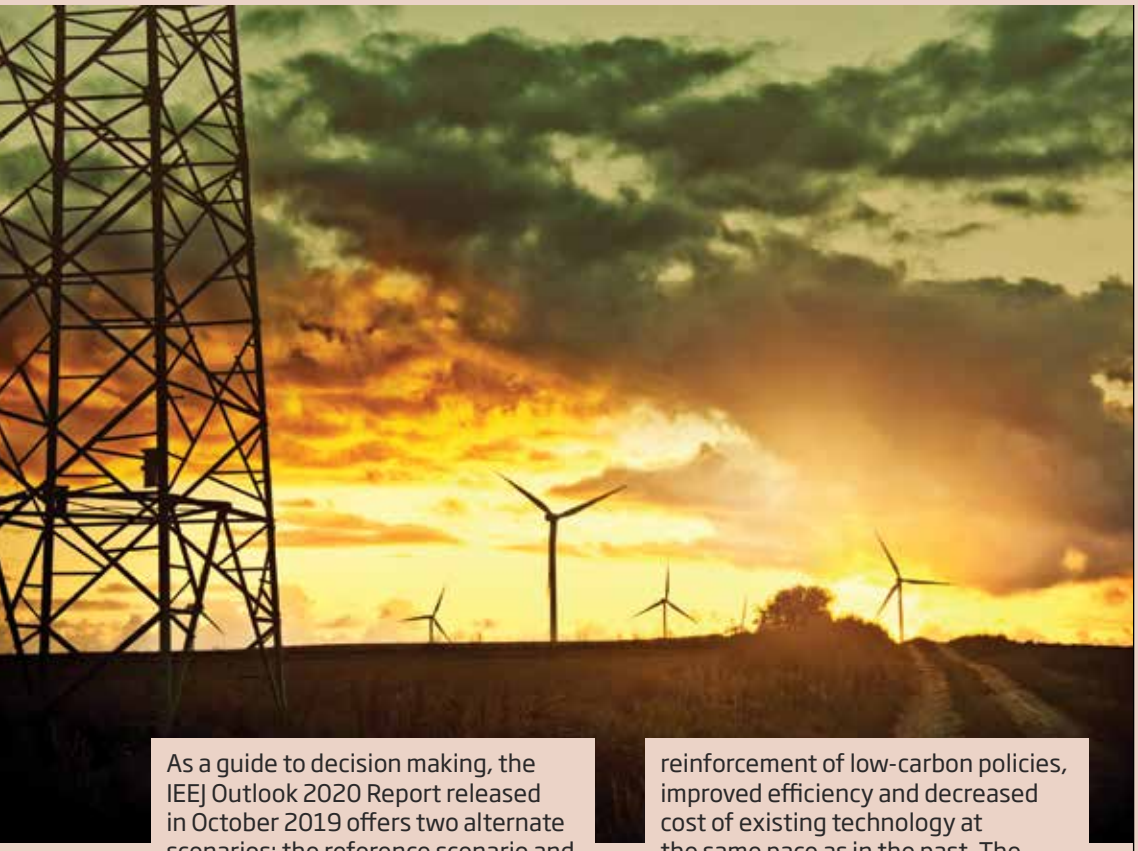
2020 GLOBAL ENERGY OUTLOOK ACCORDING TO IEEJ

The chief economist of the Institute of Energy Economics, Japan (IEEJ) Professor Dr Ken Koyama spoke of the global think tank's 2020 outlook at a talk entitled "Challenges to Overcoming the Global Energy Trilemma". He was addressing undergraduates and energy industry guests at the talk that was organised by the Universiti Tenaga (UNITEN) on 12 November 2019. Dr Koyama is also the International Advisor (Chair in Energy Economics), Energy Commission at UNITEN since 2015.

Koyama said balancing energy security, economic efficiency and environmental protection involves trade-offs between what is viable and what is not. This involves managing the inextricable roles played by market forces, policy makers, innovative technology and surging demand for energy. Dr. Koyama stressed that it is critically important to provide energy that is stable and affordable in an environmentally sustainable manner.

He highlighted the key challenges of 2020 are fluctuating fuel prices and political instability in the Middle East, the world's largest supplier of oil and natural gas. They will affect the stability of supply and cost of energy, and governments and the industry will need to manage them.

Professor Dr Ken Koyama



As a guide to decision making, the IEEJ Outlook 2020 Report released in October 2019 offers two alternate scenarios: the reference scenario and the advanced technologies scenario.

The reference scenario is based on current energy policies in the context of past and present technologies, best practices and benchmarks. The advanced technologies scenario, on the other hand, assumes the introduction of powerful policies to address energy security and climate change issues based on an aggressive stance towards developing low-carbon technologies.

What is similar to both scenarios is that global energy demand will continue to grow. In developing countries, demand continues despite slower population growth and rapid diffusion of energy consuming appliances and vehicles. In developing and emerging economies, energy demand is triggered by the rising middle class.

In terms of energy policies and technologies, these scenarios paint different pictures. The reference scenario assumes a gradual reinforcement of low-carbon policies, improved efficiency and decreased cost of existing technology at the same pace as in the past. The advanced technologies scenario, on the other hand, asserts that policies and technologies need to accelerate at a much faster pace through collaboration in order to meet carbon emissions targets.

The report's findings show that the power sector will use almost double the amount of natural gas in generation while coal will hit peak demand by 2040. Oil will continue being an important fossil fuel in power generation. Renewables will grow rapidly but their share in the primary demand mix will only increase by 2%, showing that declining demand for fossil fuels progresses slowly. Over 60% of global energy demand is expected to come from Asia, and its energy supply cannot match demand. This will see self-sufficiency declining from 72% to 61%. North America and the Middle East are expected to export their surplus capacity and increase their global presence as energy suppliers.

Developing economies in Asia are likely to become more dependent on Middle Eastern oil. The political instability poses the risk of supply disruption, a priority issue for exporting nations to address. While North America and the EU are forecast to rapidly reduce dependence on oil exports, they will be still be affected by higher oil prices as a direct result of higher demand for oil at a global level.

The report also states that the rapid expansion of Variable Renewable Energies (VREs) such as solar and wind to generate energy will continue their upward trajectory. However, the challenge in developing VREs on a large scale comes from the cost of system integration, which remains relatively high especially in Asia. Strong policy measures will be needed to cover these costs for VREs to increase their share in the power mix.

The reports point out that strong and rapid measures are needed to address issues related to climate change. Since this affects the entire planet over many generations, it calls for a mix of different approaches using mitigation, adaptation and damage control.

By: **Dato' Seri Wong Siew Hai**

TIME TO RETHINK

Consumption and the 3Rs

Industries are at the crossroads of gain-and-pain, especially in non-OECD countries engaged in energy intensive manufacturing. While creating prosperity, such industries are recognised as the biggest contributors to global warming.

But not all industries are created equal; some are more polluting than others. For Malaysia that has a robust electronics industry, there is a need for a rethink of how energy consumption is measured and to focus on reducing waste rather than re-using or recycling it. These paradigm shifts would lead to structural changes in the manufacturing sector and deliver more socio-economic value and less power consumption.

Like it or not, the industrial sector is propelling most economies around the world, and this trend is likely to continue unabated. Developed nations have been bastions of industrial societies for more than 200 years. Many developing and emerging economies have jumped on this bandwagon in the 20th century, looking to industries to create more jobs, raise living standards and generate more revenue.

Industrialisation has also played its hand at equalising social structures by creating a large middle class that is relatively well educated and has a respectable disposable income. This was seen in post Industrial Age Europe, and more recently, in countries such as China, India and Malaysia.

But industries, especially manufacturing, have their downside, and are the bogeyman of climate activists. They use up to 54% of the world's total delivered energy, says the International Energy Outlook 2016. The domino effect of energy consumption is well documented. It triggers generation, which in turn triggers the extraction of raw materials, mainly finite fossil fuels. In manufacturing, energy is used for a variety of purposes, from process and assembly, steam and co-generation to lighting, heating and cooling of buildings. Coal, oil and gas fired power plants also have huge appetites for energy.

From fuel extraction to generation and manufacturing, there are a multitude of processes that generate greenhouse gas emissions second to none. This pollution is the primary cause of global warming that has catastrophic effects on weather patterns.

Still, industrial products continue to grow, and along with it energy consumption and carbon dioxide emissions. Some modest improvements have been made in renewable heat uptake, and some positive policy and innovative steps taken. But the United Nations considers progress far too slow. In fact, it declared a climate emergency in 2019.

Energy intensive industries are mostly associated with chemicals, iron and steel, cement, pulp and paper and aluminum. They have a long history and are responsible for shaping many Western industrial societies. Now, they are making their presence felt among more recent entrants to industrialisation. One consolation is that not all industries are big energy guzzlers. At the other end of the spectrum are non-intensive industries, typically high technology companies that gather, manage, control and manipulate information. Examples of these are tech titans such as Apple, Alphabet, Microsoft and Amazon.

However, we must keep in mind that commodities and energy still matter, but perhaps not as much as they did once. What we are witnessing now is that the Organisation for Economic Cooperation and Development (OECD) countries are shifting towards non-energy intensive industries, with non-OECD countries becoming manufacturers of products that are more energy intensive.

The Goose That Laid The Golden Egg

The good news for Malaysia is that manufacturing is led by the electronics & electrical sector (E&E sector), regarded as the goose that laid the golden egg. It spearheaded the country's industrialisation programme that began in the 1970s, and is a significant player in the national economy.

Today, the E&E sector is a significant contributor to the national economy in terms of manufacturing output, employment, investment, exports and imports, according to the Malaysian Investment Development Authority (MIDA). It is also the only industry with a trade surplus. In addition, the semiconductor ecosystem has critical cross-industry linkages and applications that have spurred the development of various internet-capable industrial technologies and global business services.

Malaysia is now a major global manufacturing hub for the E&E industry, with many multinationals choosing the country as their base. Among the global giants here are Intel, Western Digital, Hewlett Packard, Samsung, Flextronics, First Solar, Infineon, Osram, Jabil and Plexus, to name a few. They are technology leaders engaged in high value and cutting edge product manufacture.

These are exciting days for the E&E sector. Global megatrends are expected to impact on, and be impacted by the E&E sector. Such trends include Industry 4.0; pervasive robotics and automation, AI and data analytics in manufacturing; adoption of intelligent home and building technologies; and the digital lifestyle economy.

As a result, Malaysia's E&E sector continues to evolve into high technology, high value manufacturing.

But does this in any way reduce energy consumption? Only when we start rethinking the way power consumption is measured.

Let's Start Measuring Output Value Per Kilowatt Hour

In Malaysia, the industrial sector is the largest consumer of power, accounting for about 40% of total energy produced. E&E companies use a substantial amount of electricity largely because of the size of their plants. There are many buildings scattered across sprawling sites, and companies try to be green and smart wherever possible. Some aim for low carbon or zero carbon environments although they are constrained from using renewable energy because supply is inadequate.

For now, most green initiatives in the E&E sector relate to mobility, factory buildings and product manufacture. It is common to use electric buggies and bicycles to move between buildings and solar panels are installed on roof tops and in car parks. Companies also adopt simple energy savings measures such as switching off the lights and motion detectors to turn them on, and disconnecting machines when they are not in use. There is a factory in Penang, where there is water below the floor that is used to keep ambient temperatures low, saving on energy usage by air conditioning systems.

For these initiatives to be effective there must be staff buy-in. Multinational companies do well in this regard, and have well defined programmes to cascade initiatives down to the factory floor. They also share with staff the outcomes of savings and reduction in carbon emissions.

But I think it is time for Malaysia to look beyond power consumption per se. We need to start measuring output value per kilowatt hour instead. The higher the value, the better. In an export market economy such as Malaysia, we can divide the value of export sales by kilowatt hour of power used. The International Energy Agency calls this "industrial energy productivity" (industrial value added per unit of energy used).

Malaysia needs to adopt this approach. By doing so, it will find itself moving towards high value, high technology industries producing quality products instead of low margin consumer products that use the same amount of energy, if not more. There will then be a structural shift in manufacturing, away from energy intensive industries, with a larger share coming from value-added sectors such as E&E, automotive manufacturing, medical devices and avionics.

This shift will have a multiplier effect on the country. Besides higher returns in terms of revenue and export sales, it also means better job quality, talent creation and higher income. The benefits will be felt at many layers, economically and socially.

As a matter of good business practice, high value industries make energy efficiency part of their strategy to reduce operational costs. They achieve this with the deployment of state of the art technologies, operational adjustments leading to more efficient equipment use, and try to avoid energy intensive practices. With the decline of power consumption by these high value prime movers of manufacturing, demand will decline substantially and along with it generation. In all likelihood, there will no longer be a need to build more power plants of the fossil fuel variety.

I strongly believe this is the way forward for Malaysia and there is a need to incentivise industries with high value per kilowatt hour.

RESPONSIBLE BUSINESS ALLIANCE

The Responsible Business Alliance was founded in 2004 by a group of leading electronics companies. A non profit organisation, its membership now consists of electronics, retail, automotive and toy companies. RBA members commit and are held accountable to a common Code of Conduct and they utilise a range of RBA training and assessment tools to support continuous improvements in the social, environmental and ethical responsibility of their supply chains.

RBA regularly engages in dialogue and collaborations with workers, governments, civil society, investors and academia to gather the necessary range of perspectives and expertise to support and drive its members toward achieving the RBA mission and values of a responsible global electronics supply chain.

Today, RBA and its Responsible Minerals, Labor and Factory Initiatives have more than 380 members with combined annual revenues exceeding $7.7 trillion, directly employing more than 21.5 million people, with products manufactured in more than 120 countries. In addition to RBA members, thousands of companies that are Tier 1 suppliers to these members are required to implement the RBA Code of Conduct.

Focus on Reduce

Another matter close to my heart is for industries to reduce wastage – of energy, water, raw materials and final products.

I understand customers are now keen to work with suppliers with green practices, and asking for precise measurements. Many multinationals belong to the Responsible Business Alliance, the world's largest industry coalition dedicated to socially responsible global supply chains. They expect all suppliers to follow closely in their green footsteps.

While the 3Rs – Reduce, Reuse, Recycle – is their standard mantra, the emphasis now is on the first R – Reduce. With Re-Use, energy is being used to remodel or re-purpose a product, and this involves a one-time cost. With Recycle, there are many costs involved – for transport, disposal, processing and overall management. Also, there are energy costs incurred at every step.

With Reduce, wastage is discouraged. This has become one of the most effective ways of reducing power consumption. If the output is good, it means less energy has been wasted in running factories and machines because there are fewer or no rejects.

One of the biggest challenges to the E&E sector is electronic waste. The Government is trying to come up with a way to recover electronic waste that contains gold, silver, copper and platinum that are expensive. We have a recovery process but it needs further enhancement.

Moreover, all industrial waste in Malaysia has to be sent to a disposal facility in Port Dickson, Negeri Sembilan. Its distance from most industrial sites in the country is inconvenient. To save on transportation costs, factories tend to accumulate enough waste before disposing it. This becomes a risk they then need to manage.

Waste disposal is a worldwide problem, with many countries refusing to accept waste transported from elsewhere. People can make money with waste, but the fact is disposal is becoming more and more difficult. This only strengthens my view that we must focus on reducing waste instead of creating it.

***

Malaysia will continue to industrialise, but by rethinking how consumption is measured and the 3Rs implemented, coupled with the increased uptake of renewable energy, the industrial sector will be able deliver to more value and less emissions.

Dato' Seri Wong Siew Hai has worked for three decades in the electronics industry. He continues to contribute to the industry as Chairman of the Malaysian American Electronics Industry and E&E Productivity Nexus. Wong also sits on the board of the Penang Tech Centre, and with the support of the state government, he pioneered the set up of Tech Dome Penang, a science discovery centre to inspire children and students to pursue science and engineering.

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.

Suruhanjaya Tenaga (Energy Commission of Malaysia)
st_malaysia
ST_Malaysia
Portal ST

No. 12, Jalan Tun Hussein, Presint 2, 62100, Putrajaya
Toll Free Number: 1 800 2222 78 • Tel: 03 8870 8500 • Fax: 03 8870 8637 • www.st.gov.my

Suruhanjaya Tenaga
Energy Commission