Towards a World-Class Energy Sector

Suruhanjaya Tenaga
Energy Commission

ENERGY

MALAYSIA

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Education
The Greening of Young Minds

Innovation
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Publisher
Energy Commission Malaysia

Advisor
Abdul Razib Dawood

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Hilmi Ramli
Kauthar Mohd Yusof
Siti Suhaila Ahmad
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Adnan Abdullah
Noor Hazwani Ghazali

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

tel + 603 7887 5016 / +6019 263 3669
email: premilla@pvmpublish.com.my
www.pvmpublish.com.my

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Dear Readers

Celebrating our 20th Anniversary and Rethinking the Future

This year, the Energy Commission is celebrating its 20th anniversary and this issue carries the milestones of our journey so far.

The Commission was established on 1 May 2001 to regulate Malaysia's electricity and piped gas sectors. On our 20th birthday, to record and in appreciation of our 20 years of achievements, we plan to institutionalise the Commission by planting a time capsule with details of our achievements and aspirations. The capsule is to be unearthed in 20 years' time.

We kicked off our celebrations earlier, with employees participating in the "200 Million Steps in Three Months Challenge". This physical challenge was made all the more meaningful since many of us had to work from home due to the Covid-19 movement control restrictions. The Challenge saw employees coming together to work as one.

It gives me great pleasure to announce that we achieved our 200 million steps target in February, and became listed in the Malaysian Book of Records. During the Challenge, I was encouraged by the teamwork demonstrated, which is critical for the Commission to achieve its goals, embrace new frontiers and overcome challenges along the way.

We have several other events lined up for this commemorative year. Since electrical safety is a top priority for us, we launched the first-ever Product Safety Awards in March. Details of the award can be found in the "Happenings" section of this magazine. In the meantime, we are still hopeful that the current situation will improve to allow us to proceed with the various events lined up for our 20th year celebrations, which include the popular EE Challenge, EE Run, Mount Kinabalu trekking expedition, Treasure Hunt and CSR programmes.

With the ongoing Covid-19 vaccination programme, the world is entering the post-pandemic recovery period. With it comes the realisation that the pandemic has lessons that we should heed as we move forward. These findings form the crux of our cover story entitled "Rethinking the Future" that shows the need for the public and private sectors to ramp up their decarbonisation and digitalisation efforts for a more sustainable future. The story also highlights the Government and the Commission's efforts to ease the burden of electricity consumers when the Covid-19 pandemic broke out.

Youths are a strategic force to reduce our carbon footprint. Our story "The Greening of Young Minds" shows how young people are already taking charge and investing time and effort to reduce emissions and adopt energy efficiency as their way of life. Many of them can relate to Greta Thunberg's famous rebuke of world leaders at the United Nations in September 2019 when she decried: "We will not let you get away with this. Right here, right now is where we draw the line. The world is waking up. And change is coming, whether you like it or not."

In the story "Realities of Building in the Hot, Humid Tropics", architecture Professor TS Dr Mohd Hamdan Ahmad ends with this parting shot: "My advice to the building industry is to touch our environment lightly and embrace temporariness over permanence in their future design solutions. We are obliged as stewards of the earth to hand over a more sustainable Planet Earth to our future inheritors."

On our part, the Commission will continue to pursue efforts to make decarbonisation and digitalisation the priorities of the Malaysian electricity supply industry, while maintaining the fine balance between energy security, affordability and environmental protection.

Abdul Razib Dawood
Chief Executive Officer

Our First 20 Years

The Energy Commission or Suruhanjaya Tenaga (ST) celebrates its 20th anniversary this year with a look at the chronology of events that have shaped the Commission and the Malaysian energy landscape, beginning 1 May 2001.

The Commission was established as a statutory body under the Energy Commission Act 2001 to regulate and promote the electricity and piped gas supply industry in Peninsular Malaysia and Sabah. Its scope of work is determined by legislation, namely the Electricity Supply Act 1990, Licence Supply Regulation 1990, Gas Supply Act 1993, Electricity Regulation 1994 and Gas Supply Regulation 1997.

In performing its many functions, the Commission encourages self-regulation among all parties it is entrusted to oversee.

Before The Energy Commission

Pre-1990

- The National Electricity Board was responsible for the planning and operation of the electricity supply industry in Peninsular Malaysia while in Sabah, this function was vested in the Sabah Electricity Board.
- The Electrical Inspectorate Department, under the Ministry of Energy, was responsible for licensing of private generation and the safety of electrical installations and equipment.
- The Sarawak Electricity Supply Corporation (SESCO) was the supply authority while the State Inspectorate was responsible for licensing and safety matters in the state.

1990

- The Electrical Inspectorate Department was abolished and the Department of Electricity Supply was formed under the Electricity Supply Act 1990 as the industry and safety regulator of the electricity supply industry in Peninsular Malaysia and Sabah.
- In Sarawak, the State Electricity Ordinance was still in force providing the State Electrical Inspectorate with the legal power to continue with its regulatory functions.

1993

- The Department of Gas Supply under the Prime Minister's Department was formed for regulating the gas distribution industry.
- The Director General of Electricity Supply was also appointed as the Director General of Gas Supply. Administratively, the two departments were jointly known as the Department of Electricity and Gas Supply.

2001-2002

- In anticipation of industry deregulation, the Energy Commission Act 2001 was approved by Parliament to take over the functions of the Department of Electricity and Gas Supply.
- Under this Act, the Energy Commission was established 1 May 2001 and became fully operational on 2 January 2002.
- The first Energy Rating Work Group (ERWG) was set up by the Commission.
- Datuk Ir. (Dr.) Mohd. Annas Haji Mohd. Nor appointed first Chairman and Chief Executive Officer (CEO) of the Energy Commission.

2003

- Shift to new office at Menara TH Perdana, Kuala Lumpur.
- Formulation of strategic direction for 2003-2005 Corporate Plan.
- The Commission introduces its Vision, Mission and Objectives

2004

- Organisation of the 5th International Conference on Coal to learn more about coal technology, coal as an alternative fuel source and its impact on the environment.

- Research on industry benchmarking tools to generate periodic reports on the achievements on generation efficiency, delivery, and distribution.
- Evaluation and review of the Peninsular Malaysia Grid System.
- Appointment of the Commission to lead Malaysia at the ASEAN Electrical and Electronic Mutual Recognition Agreement (ASEAN EE MRA).
- The first star rated energy label was introduced by the Commission for refrigerators, where 24 models of refrigerators were tested by SIRIM and their star rating labeled accordingly by the Commission.

2005

- Revision of electricity tariff structure by the Commission.
- First delivery of natural gas to Malaysia from the Malaysia-Thailand Joint Development Area (JDA).
- Proposal for the construction of a sustainable building in Putrajaya to serve as the Commission's Headquarters.
- Y.M. Dato' Ir. Engku Hashim Al-Edrus appointed as Acting Chairman of the Commission.

2006

- Submission of a proposal to raise electricity tariffs to the Minister of Energy, Water and Communications.
- Study on the financial and technical performance of IPPs.
- Renegotiation of the Power Purchase Agreements between TNB and IPPs.
- The Commission took a big step in restructuring the entire safety regulation regime including review of the Acts and legal provisions, work processes and relevant existing practices to guarantee consumers' safety.
- Reassessment study for the Electrical and Piped Gas Safety Regulatory Framework.
- Organisational restructuring in line with current developments and needs of the Malaysian electricity supply industry.
- Appointment of Dato' Ir. Pian Sukro as Chairman and CEO of the Commission.

2007

- Construction begins for the Diamond Building located at Lot PT 7556, Precinct 2, Putrajaya.
- Commencement of preparation for the Energy Blueprint.
- Review of Terms & Conditions of service of the Commission's employees.
- Launch of the Commission's new Vision, Mission, and Core Values.

2008

- Preparation of the draft Electricity Law Bill to replace the Electricity Supply Act 1990.
- Preparation of the Grid Code and Distribution Code for the electricity supply sector.
- Appointment to lead the formation of the Energy Council of Malaysia on July 1, 2008.
- The Commission's Kelab Kristal Suruhanjaya Tenaga scales Mount Kinabalu as part of a social-personal-professional development activity.

2009

- Approval of the Energy Commission Bill (Revised) 2009 by Parliament.
- Implementation of a Management Performance System Study to evaluate staff performance based on Key Performance Index and competency levels.
- Study on electricity and gas tariffs in Peninsular Malaysia and Sabah.
- Preparation for natural gas price revisions in view of declining crude oil prices in global markets.
- Establishment of the Chair of Energy Economics at UNITEN.
- Appointment of Datuk Loo Took Gee as Interim Chairperson of the Commission.

2010

- Recognition of the Diamond Building as a Platinum-rated sustainable building.
- Launch and publication of the Malaysian Grid and Distribution Code.
- Introduction of competitive bidding for Power Generation Projects.
- Introduction of the e-Aduan online complaints channel.
- Inaugural publication of National Energy Balance.
- Appointment of Datuk Ir. Ahmad Fauzi Hasan as CEO of the Commission.
- Appointment of Tan Sri Datuk Dr. Ahmad Tajuddin Ali as Chairman of the Commission.

2011

- Opening ceremony of the Commission's Diamond Building head office held in conjunction with the Commission's 10th anniversary. The new building was officiated by the Deputy Prime Minister of Malaysia.
- Launch of Larian Tenaga, now known as EE Run.
- Provisional Green Building Index (GBI) "Platinum Certified Building" award given to the Commission's head office building.
- Launch of the Energy Industry Awards.
- Organisation of the National Electrical Safety Conference.
- Organisation of the Energy Forum.

2012

- Memorandum of Understanding signing ceremony between the Commission and California Energy Resources Conservation and Development Commission (CEC), USA.
- ST's Diamond Building wins most energy-efficient building award for the category for 'New and Existing Buildings' at the ASEAN Energy Awards (AEA) 2012 held in Phnom Penh, Cambodia.
- Media announcement of selected bidders for the International Open Bidding (Track 1) and the First Generation IPP/TNB Limited Bid (Track 2).

2013

- Introduction of Minimum Energy Performance Standards (MEPS) labeling system.
- Commercial operation of the Regasification Terminal in Sungai Udang in Malacca begins.
- Government appointment of the Commission as the regulator of the Third Party Access (TPA) system that allows private entities to import natural gas.
- Unbundling of TNB and SESB accounts as an initiative under the IBR industry reform.

2014

- Establishment of the Single Buyer (SB) entity, a ring-fenced department within TNB, as part of the restructuring of the Malaysian electricity supply industry under MESI 1.0. SB is one of the prerequisites of the Incentive Based Regulation (IBR) framework for transparent tariff setting.

- Recognition of the Commission as an Outstanding Government Procurer at the PFI Asia Best Practice 2014.
- Launch of the IBR for fair and transparent electricity tariff setting.
- Inaugural publication of "Energy Malaysia" quarterly magazine.
- Launch of the Energy Efficiency Challenge for schools across the country.
- Launch of the Commission's Touchpoint CSR programme that began with assistance rendered to flood victims in Pahang.
- Appointment of Dato' Abdul Razak Abdul Majid as Chairman.

2015

- Implementation of the Imbalance Cost Pass-Through (ICPT) every six months under IBR mechanism.
- Launch of the New Enhanced Dispatch Arrangement (NEDA).
- Establishment of Guaranteed Service Levels (GSL) for utility service providers.

2016

- Launch of the Enhanced Time-of-Use scheme (EToU).
- Formation of the Demand Forecast Committee to ascertain generation commitments.
- Establishment of the Electricity Industry Fund (KWIE).
- Implementation of the National Energy Efficiency Action Plan (NEEAP), 2016-2025.
- Launch of the "Be Energy Smart" campaign.
- Launch of the Net Energy Metering (NEM) scheme to promote self-generation among prosumers.
- Enforcement of the Electricity Supply Act (Amendment) 2015 beginning 1 January 2016. It expanded the Commission's scope of authority as the regulator of the energy industry and consumer safety.
- Approval of the Gas Supply (Amendment) Act 2016 by Parliament.

2017

- Establishment of the IBR mechanism for piped gas tariff setting.
- Enforcement of the Gas Supply (Amendment) Act 2016 which provided the foundation for the implementation of Third Party Access (TPA), in line with the Government's efforts for the liberalisation of the piped gas market.
- Announcement of the Large Scale Solar (LSS) programme which was overseen by the Commission.
- Introduction of the Advanced Metering Infrastructure (AMI) to pave the way for smart meter installation by TNB.
- Commercial operation begins at Regasification Terminal in Pengerang, Johor.

2018

- Implementation of Regulatory Period 2 (RP2) under the IBR framework.
- Formation of MyPower 2.0 to study reforms for electricity supply deregulation.
- Improvements recorded in Sabah's SAIDI turnaround.
- Restructuring of the Commission's organisational structure.
- Standard Accounting System for Government Agencies (SAGA) Compliance Certificate awarded to the Commission by the Accountant General's Department.
- Laos-Thailand-Malaysia Power Integrated Project (LTM-PIP) for electricity transfer from Laos to Malaysia begins operations.
- Launch of 100 Government offices for Building Energy Intensity (BEI) labeling to be implemented by the Commission. BEI is the international benchmark to measure the energy consumption performance of buildings.
- Appointment of Dato' Ir. Azhar Omar as CEO of the Commission.
- Appointment of Datuk Ir. Ahmad Fauzi Hasan as Chairman of the Commission.

2019

- Fourfold growth in renewable energy (RE) capacity, from 179MW in 2018 to 725MW with the rollout of initiatives by the Commission to meet the national goal for 20% RE in the capacity mix by 2025.
- Revision of pricing policy for solar energy generated by prosumers under the Net Energy Metering (NEM) scheme to promote more self-generation.
- Drafting of the Energy Efficiency and Conservation Bill, which will be tabled in Parliament.
- Trialing of the Gas TPA arrangement – the first cargo of imported Liquefied Natural Gas (LNG) arrived at Petronas Sungai Udang Regasification Terminal in Melaka and was delivered to TNB power plants in October.
- Appointment of Abdul Razib Dawood as CEO of the Commission.

2020

- Enhanced digitalisation efforts to be more efficient with the management of and engagement with consumers and stakeholders during the Covid-19 pandemic.
- The Commission's advisory to the Government for an electricity stimulus package to ease the burden of the rakyat affected by the Movement Control Order (MCO) introduced during the Covid-19 pandemic. As a result, the Government allocated RM942 million to be disbursed by the Electrical Industry Fund (KWIE), Ministry of Finance and Tenaga Nasional Bhd (TNB).
- The Commission, together with the Ministry of Energy and Natural Resources, launched the Large Scale Solar (LSS) programme (LSS@MEnTARI). It offered a solar quota of 1,000MW via competitive bidding; it was a move to help stimulate the economy during the Covid-19 pandemic.
- Commencement of the Malaysian Book of Records "200 Million Steps in Three Months Challenge" in conjunction with the Commission's 20th anniversary celebrations (SUTERA20).
- Launch of NEM 3.0.
- Appointment of Dato' Azian Osman as Chairman of the Commission.

MALAYSIA

Avoiding electrical hazards during floods

Malaysia's Energy Commission reminded the public, especially those living in low-lying and flood-prone areas, to take precautionary measures to avoid any electrical hazards during floods.

The Commission said in a statement that before floods hit, the public must switch off the main electrical distribution board and disconnect all electrical appliances from their power sockets. All electrical appliances must also be placed in a high place that's safe from floodwaters. In flooded areas, the public was advised to avoid places with electrical cables especially at night, or locations with fallen electrical cables to avoid electrocution.

When outdoors, the Commission urged the public to avoid flooded power sub-stations or switches, and never move or repair fallen electrical poles and broken cables.

The public should also practise caution in the aftermath of floods as damaged electrical appliances or installations could cause electrocution. Before turning the main switch back on, an inspection must be done on all wiring and electrical appliances in the house and this must be carried out by electrical contractors registered with the Commission.

Source: The Sun Daily, 25 November 2020

Energy Commission's LSS4

30 shortlisted bidders

The Energy Commission has shortlisted 30 bidders for the development of the fourth large-scale solar LSS@MEnTARI. The Commission said the selection was based on bids with the most competitive prices and which meet all the requests for proposal (RFP) requirements.

The Commission shortlisted plant capacities in two packages, of which package P1 is to generate 323.06MW (price range from RM0.1850/kWh to RM0.2481/kWh) and package P2 is to generate 500MW (price range from RM0.1768/kWh to RM0.1970/kWh).

Ten out of 30 companies shortlisted are subsidiaries of public-listed companies:

- ☑ Tenaga Nasional Bhd (TNB) via TNB Renewables Sdn Bhd, shortlisted for 50MW
- ☑ Solarvest Holdings Bhd via Atlantic Blue Sdn Bhd for 50MW
- ☑ Ranhill Utilities Bhd for 50MW
- ☑ KPower Bhd with Perbadanan Kemajuan Negeri Pahang for 50MW
- ☑ JAKS Resources Bhd via JAKS Solar Power Sdn Bhd for 50MW
- ☑ Gopeng Bhd for 50MW
- ☑ Uzma Bhd via Uzma Environergy Sdn Bhd for 50MW
- ☑ Advancecon Holdings Bhd shortlisted via Advancecon Solar Sdn Bhd for 26MW
- ☑ Tan Chong Motor Holdings Bhd via Tan Chong Motor Assemblies Sdn Bhd for 20MW
- ☑ MK Land Holdings Bhd via MK Land Resources Sdn Bhd for 10.95MW

Parties that win the LSS4 project bids are expected to start commercial operations by 2023. Each plant will have a minimum operational period of 21 years.

Elaborating on the costs, Kenanga Research noted that the lowest bid for LSS2 back in early 2019 was at 33.98 sen/kWh while the lowest bid for LSS3 last year was 17.78 sen/kWh (versus the lowest bid for LSS4 at 13.99 sen/kWh).

Source: The Edge Markets, 12 March 2021

TENAGA NASIONAL
Better. Brighter.

New terms for electricity connection charges

TNB announced that it will implement the enhanced terms for the electricity connection charge and connected load charge.

"A connection charge is an upfront payment made by consumers who require new electricity supply infrastructure or an upgrade of existing infrastructure to cater for additional power supply," according to national public utility TNB. "The connection charge is imposed as part of TNB's cost to build infrastructure for electricity supply," said the company on its website.

Meanwhile, the connected load charge is a mitigating tool to discourage consumers from over-declaring their electricity load requirement, which will lead to an increase in reserve margin and waste of resources. "Without connected load charge, consumers will also have to pay for the higher cost of electricity due to wastage by other consumers, which would be unfair to those who do properly declare," added TNB.

On the connected load charge, a new consumer is subjected to the charge for a period of six years from the date electricity supply is connected. Meanwhile, an upgrading consumer is subjected to the new connected load charge for a period of five years from the date the additional electricity supply is connected.

Source: The Edge Markets, 15 January 2021

Impact of MCO 2.0 not severe on electricity demand

According to an AmInvestment Bank report, Malaysia will experience a lower electricity demand growth in the financial year 2021 due to economic uncertainties arising from the Covid-19 pandemic. However, the report contends that the impact of MCO 2.0 won't be as severe as the last one as more industries were allowed to operate.

The research team also noted the commissioning of the Southern Power Generation gas plant that started commercial operations in January. This will increase the country's reserve margin.

Source: Borneo Post (KK), 25 January 2021

Regulatory facilitation for "Ease of Doing Business" in Malaysia

Malaysia Productivity Corporation (MPC), an agency under the Ministry of International Trade and Industry (MITI) has been actively promoting regulatory facilitation (such as power connections) to promote Malaysia's ease of doing business environment among investors.

"With a challenging and highly competitive FDI landscape, business as usual will no longer work with the current Covid-19 pandemic," said MPC Deputy Director General, Dato' Abdul Latif Haji Abu Seman. He added that his team at MPC is stepping up regulatory facilitation through its work with the MalaysiaMudah (#MyMudah) Program and has also received support from Malaysia's Special Task Force to Facilitate Business (PEMUDAH).

#MyMudah aims to reduce unnecessary regulatory burdens on businesses to enable faster economic recovery and attract more foreign investments.

Source: www.malaysiasme.com.my, 4 February 2021

Malaysia averages 52 electrical accidents annually, says Energy Commission

The average number of electrical accidents in Malaysia has stood at 52 cases a year for the past five years. In 2020, 45 cases were reported, including 28 fatalities and 17 non-fatal accidents.

"The use of uncertified and faulty electrical equipment is among the factors that cause electrical accidents. Besides the dangers posed by such products, there is also the loss to the country when lives are put in jeopardy when disaster strikes," said Abdul Razib Dawood, the Chief Executive Officer of the Energy Commission. He also added that the surge in online purchases of electrical equipment since the enforcement of the Movement Control Order last year has been a concern to the Commission as the items often don't have the SIRIM-ST approval label.

In response, SIRIM, the Energy Commission, Malaysian Electrical Appliances Distributors Association and the Federation of Malaysian Electrical Appliances Dealers' Association are collaborating on a 3-month awareness campaign from February to May 2021 to drive safety consciousness among consumers.

Source: Bernama, 16 February 2021

Clean energy is the future, but are we ready?

Renewable Energy (RE) is without a doubt the future in energy consumption and a much debated topic not only in Malaysia but also globally, as it needs the right policies, infrastructures, and funding.

In an interview on the issue, Petroliam Nasional Bhd (Petronas) President and Chief Executive Officer Tengku Muhammad Taufik said if the choice to venture into RE is not undertaken now, he believes there was risk in Petronas becoming less relevant going forward.

"But the kind of investment that we make must be carefully deliberated," he said. There is a promising market for energy mix not only in Malaysia but also in other jurisdictions such as India and Vietnam, adding that Petronas has made calculated investments in India through Singapore-based Amplus Energy Solutions Pte Ltd, also known as M+. According to reports, M+ is one of India's largest rooftop installation providers, and currently has over 800 megawatt peak (MWp) of solar capacity in operation and under construction in India, Dubai, and Southeast Asia. The commercial and industrial installations serve over 200 multinational firms including Honda, General Electric and Halliburton.

As Asia grows, the demand for electricity will also increase, adding that there were varying reports pointing out that there are between 100 million and 130 million people, depending on the time of survey, who do not have access to regular electricity. For now, Petronas is tapping into what is available in abundance, which is solar power.

Tengku Muhammad Taufik said there needs to be a deliberate policy shift when one deals with energy mix that is ever evolving. In 2018, Malaysia announced that it had set a target of 20% of RE in its generation mix by 2025. "So, the accompanying policies have to be refined. Are you going to commit to incentivise the transition? Will our banking system allow transition financing?" he asked.

Source: Bernama, 21 February 2021

INTERNATIONAL

EGAT to operate world's largest floating solar farm in June

The state-run Electricity Generating Authority of Thailand (EGAT) expects to operate a 45-megawatt floating solar farm said to be the largest in the world in Ubon Ratchathani in June.

EGAT signed a contract with B.Grimm Power Plc to develop photovoltaic panels worth 842 million baht on Sirindhorn Dam, where an EGAT hydropower plant is operating. The facility was originally scheduled for operation in December last year, but the launch was postponed due to the pandemic.

Chatchai Mawong, EGAT's Director for Hydro and Renewable Energy Power Plant Development, said construction is now 82% complete. Workers began installing the first lot of floating solar panels in December and are speeding up installation. The floating solar farm is designed to be a hybrid system, working in tandem with 36MW of hydropower generation to increase optimisation capacity.

Under the 2018 National Power Development Plan, EGAT is committed to building more floating solar farms on all nine of its dams nationwide over the next 20 years, with a combined capacity of 2,725MW.

Source: Bangkok Post, 25 January 2021

Underground hydrogen storage in Canada

A group of scientists at the Canadian Nuclear Laboratories have uncovered the potential for large-scale seasonal underground hydrogen storage (UHS) in geological formations in Canada, after conducting geological feasibility studies.

UHS have multiple advantages over conventional above-ground energy storage. They include higher storage pressure, smaller surface footprint, higher safety standards, lower environmental impact, longer operating lifetimes and lower investment costs, said researchers in an article published in the International Journal of Hydrogen Energy.

Their work provides a spatial, geotechnical, and lithological assessment for geological formations suitable for UHS in several Canadian regions. Currently, the best locations for UHS are salt caverns, deep saline aquifers, depleted oil and gas deposits, and lined or unlined rock caverns.

Source: pv magazine, 5 November 2020

Electric cars to double global electricity demand

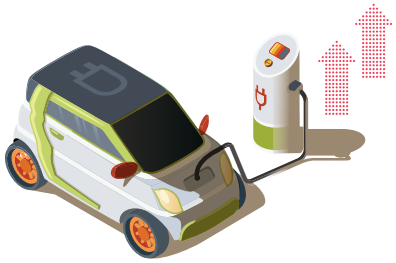
Tesla Chief Executive Officer Elon Musk said that electricity consumption will double if the world's car fleets are electrified, increasing the need to expand nuclear, solar, geo-thermal and wind energy generating sources.

Increasing the availability of sustainable energy is a major challenge as cars move from combustion engines to battery-driven electric motors, a shift which will take two decades, said Musk in a talk hosted by Berlin-based publisher Axel Springer.

"It will take another 20 years for cars to be fully electric. It is like with phones, you cannot replace them all at once, adding that around 5% of vehicles are being replaced every year."

Once electric cars become the norm, electricity from intermittent generating energy sources such as wind and solar will need to be stored, probably through battery technology.

Source: Reuters, 2 December 2020



Smart windows to improve energy efficiency

There is much research into windows to improve the energy efficiency of buildings. Given that carbon emissions from buildings reached a record high in 2019 according to the International Energy Agency, the pressure is on to develop energy efficiency solutions that can keep up with building growth.

Scientists at the Nanyang Technological University in Singapore are addressing this challenge through the development of smart windows, which seal a hydrogel-based liquid between the panels.

Each window consists of two glass panes sandwiching a liquid mixture of hydrogel, water, and stabiliser. The transparent mixture turns opaque when exposed to heat and blocks sunlight. When cool, it returns to its original clear state. By blocking the sun, the smart windows regulate solar transmission into building interiors keeping them cool. As a result, less air conditioning is required during the day. The heat captured by the windows is released slowly during the night.

"The stored heat will be released to the environment and the room," says Yi Long, Ph.D, a senior lecturer at the University's School of Materials Science & Engineering. "The best location to apply this technology is in countries where the daily temperature fluctuation is high. The noon heat can be stored and released during the night when it is cooler."

Long and her research team conducted various tests to evaluate the potential efficiency improvements these windows could deliver. In simulations conducted using real-life building models and weather data from Shanghai, Las Vegas, Riyadh and Singapore, the windows demonstrated that it could save 45% of heating, ventilation and air-conditioning costs over traditional glass windows.

"The research team expects the windows to be of most use in office buildings that operate during the day. An added benefit is that smart windows are 20% cheaper to produce than low-emissivity, energy-efficient glass," says Long.

Source: Civil Engineering Magazine, 8 December 2020

Australia to revamp power transmission

Royal Dutch Shell is betting on its expertise in power trading and rapid growth in hydrogen and biofuels markets as it shifts away from oil, rather than joining rivals in a scramble for renewable power assets, said company sources.

Shell and its European rivals are seeking new business models to reduce their dependence on fossil fuels and appeal to investors concerned about the long-term outlook for an industry under intense pressure to slash greenhouse gas emissions. Unlike Total and BP, the company will focus more on becoming an intermediary between clean power producers and customers. Shell announced in October last year that it would increase its spending on low-carbon energy to 25% of overall capital expenditure by 2025 and its sources said it would translate to more than $5 billion a year, up from $1.5 billion to $2 billion now.

Shell is already the world's leading energy trader, an activity it calls "marketing". It traded about 13 million barrels of oil a day, or 13% of global demand before the pandemic, using one of the biggest fleets of tankers. It is the top trader of liquefied natural gas (LNG), buys and sells power, biofuels, chemicals and carbon credits, and now aims to use its pole position to snare a large chunk of the fast-growing low-carbon power market.

Shell is also betting on future growth in hydrogen, said the sources. While still a niche market, hydrogen has attracted huge interest in recent months as a clean alternative to natural gas for heavy industry and transportation. Hydrogen, and so-called green hydrogen which is made solely with renewable power, comes with high costs and infrastructure challenges though Shell is already investing.

Source: Reuters, 1 February 2021

Energy saving wood windows

Scientists have developed a method for producing a form of transparent wood that could provide an environmentally-friendly alternative to glass windows. The method involves brushing hydrogen peroxide over the surface of wood, leaving it under a UV light to simulate natural sunlight and then soaking it in ethanol and filling the pores with a clear epoxy.

The resulting material is lighter, stronger and provides far better insulation than glass. Researchers from University of Maryland in the US say that the process alters a structural component of wood called lignin that prevents light from passing through the material.

See-through wood has previously been touted as a way to improve the heat-retaining properties of a building while also being biodegradable and easier to dispose of than glass. The new method actually makes the wood stronger, according to the researchers, while also greatly reducing the energy required.

The research, published in the journal Science Advances, also claims that the method is suitable for scalable production for use in energy-efficient buildings.

Source: Independent Online, 2 February 2021

USD100 million carbon capture competition

Elon Musk has pledged to give away USD100 million to fund a carbon-capture competition. His XPrize Foundation gave some details on how the money would be divided up.

Entrants are expected to build and demonstrate ways to pull carbon dioxide directly from the atmosphere or oceans and lock away carbon dioxide permanently in an environmentally benign way," XPrize said in a post announcing the competition.

To win, teams must show they can scale their ideas to gigaton levels of carbon-dioxide removal. It did not give precise details on how contestants would be judged but said they would be evaluated on various criteria, including the amount of CO2 removed, life cycle analysis of the removal process, energy efficiency, land footprint and sequestration capabilities.

However, the winner won't get the full USD100 million. After an 18-month judging period, the top 15 participants will each be given USD1 million to build full-scale demonstrations. Out of the 15, the grand prize winner will receive USD50 million, the runner-up USD20 million and third place winner USD10 million. The remaining prize money will go to student scholarships.

The competition will officially open on April 22, when the foundation will release more specific guidelines for applicants.

Source: Business Insider, 8 February 2021

COVID-19 Pandemic

RETHINKING THE FUTURE

The Covid-19 pandemic brought the world to a standstill. To manage the unprecedented catastophe, Governments closed borders, imposed lockdowns and introduced stimulus packages to relieve widespread hardships.

While on pause mode, this global crisis like many before, highlighted cracks in the way we live and conduct business. It is thus critical for post pandemic recovery plans to fix these cracks by recalibrating national economic priorities with health and environmental concerns in mind.

Insofar as the energy industry is concerned, the pandemic delivered an interesting verdict. It saw renewable energy experiencing growth against fossil fuels that teetered on the brink of collapse with low demand and sharp price declines. The new stay-at-home norm ushered by the pandemic also demonstrated that digital communication and automation are the way forward for many businesses.

The question now is how Governments and the private sector can come together to ride this wave and accelerate the realisation of national de-carbonisation and digitalisation agendas.

The Covid-19 pandemic blindsided the world in 2020. As at end 2020, the World Health Organisation reported that Covid-19 had killed more than 1.1 million people and infected more than 44 million people in every part of the world. The International Monetary Fund (IMF) estimates the pandemic will cost the global economy $28 trillion in lost output by 2025. The International Labour Organization (ILO) estimates that 495 million full time equivalent jobs were lost in the second half of 2020 and the World Bank estimates 150 million people could be pushed into extreme poverty by 2021.

Chances are these numbers are undercounted, says Renato Lima de Oliveira, Assistant Professor of Business and Society at the Asia School of Business, a partnership between Bank Negara and MIT-Sloan School of Management. He says, "The pandemic has had a devastating health and economic effect on the world. On the economic front, we have seen one of the worst contractions since the Great Depression of 1929. The IMF estimates that the world economy contracted 3.5% in 2020.

"The numbers for Malaysia are more negative: - 5.6%, according to the Department of Statistics. It is the biggest contraction since the Asian Financial Crisis, an event which all who lived through those years remember as being transformative."

Renato Lima de Oliveira,
Assistant Professor of Business and Society at the Asia School of Business

Energy consumption is highly correlated to economic growth, adds de Oliveira. "2020 was a year when the world stood still, with jets parked at airports, vehicles left idling, and firms and factories shut down or undermanned due to movement restrictions, low demand and the inability to source materials. These are all major energy consumers and it is only natural for overall demand to come down. The best estimates point to a global energy demand fall of 5%, largely driven by the lockdowns."

Renewables buck trends

de Oliveira says the transportation sector was hit hard by the stay-at-home orders since it prevents the mobility of people, and to a lesser extent, demand for goods. "The transportation sector accounts for about 30% of world energy demand and is almost entirely based on oil. So crude oil was the first commodity to suffer heavily from the pandemic. The year saw oil experiencing an 8% decline in total demand, drastically affecting its price that only recovered because OPEC+ agreed to the biggest volume cuts in its 60 plus years' history.

"Electricity was less affected as people continued to work from home," he adds. "The International Energy Agency (IEA) projected a decline of 2% for 2020, which is more than three times what happened during the last big recession of 2009, when electricity demand went down by 0.6%. Coal had a pronounced dip, with a fall of 7% during the year, followed by a decline in natural gas by 0.3%. Remarkably, renewable-based generation, in particular solar and wind, actually increased by 7%.

Renewable business has been resilient during the pandemic

"For Malaysia, electricity demand fell by 5% for the first ten months of 2020, according to the latest IEA report," says de Oliviera. "In ASEAN as a whole, the drop was expected to be 1%, so Malaysia was more negatively impacted. An estimate by Fitch expects coal to have contracted by 2.4% and natural gas by 2.6% but renewables growing by 4.2%.

"In line with the rest of the world, the renewable energy business has been resilient during the pandemic, including in Malaysia. This is because most large scale renewable projects are based on long term contracts and provide zero marginal cost generation (you don't have to pay for fuel – sun and wind), which gives them priority in the dispatch curve. Besides, there is a growing B2B segment that is installing solar energy on rooftops of factories and supermarkets for self-consumption."

Our records show a correlation between electricity consumption and the Movement Control Order

MCO and consumption

"Our records show a correlation between electricity consumption and the Movement Control Order (MCO) introduced by the Government to control the spread of the contagious Covid-19 virus," says TNB's Chief Retail Officer, Datuk Ir. Megat Jalaluddin Megat Hassan. "The first MCO introduced nationwide on 18 March 2020 for a period of four weeks had the biggest impact on consumption. There was a sharp drop in demand among our industrial and commercial customers, but this was softened by the rise in domestic consumption triggered by the stay-at-home requirements. The net effect was a 20% drop in consumption from March to May, the worst experienced during the year."

The Malaysian Government introduced Movement Control Orders that restricted mobility, business and social gathering, as well as made physical distancing, mask usage, sanitisation mandatory in public spaces, offices, factories and various other places. The first MCO from 18 March-14 April 2020 ranks as the most rigorous to date, and the most damaging for business. During this period, the entire country shut down, save essential services.

Subsequently, the Government adopted a more targeted approach that permitted varying degrees of mobility and business operations to resume under the Conditional Movement Control Order (CMCO) and Recovery Movement Control Order (RMCO). The EMCO (Enhanced Movement Control Order) was for high risk red zones with a high number of Covid-19 cases, where no entry and exit was permitted.

"When Malaysia entered the CMCO phase in the middle of the year," says Datuk Megat, "we experienced a 10% increase in electricity sales compared to the previous MCO. This was because of the opening of some public and private sectors. By the time of the RMCO at the end of the year, offices and factories were

Overall, the electricity sector was not as badly affected by the Covid-19 pandemic as other businesses

almost fully operational and consumption patterns were almost back to pre-MCO levels.

"Year-on-year consumption saw a decrease of 4 – 5% in 2020. We found that the drop in consumption among industrial and commercial customers, however, was offset by a spike in consumption among residential customers.

"The pandemic ushered in the stay-at-home, study-at-home and work-at-home lifestyle that saw increased usage of online devices as well as household appliances, especially air conditioners and lighting that are big electricity consumers.

"The country also celebrated Ramadhan and Raya during the MCO, which required families to stay home for the month long fasting period and Raya celebrations. Breaking fast in hotels and restaurants was no longer an option. There was thus more home cooking, usage of electrical appliances and lights turned on late into the night and into the early hours of the morning.

"Overall, the electricity sector was not as badly affected by the Covid-19 pandemic as other businesses. During this period, TNB's focus was to ease the financial burden of the rakyat during the pandemic that saw jobs lost and families and businesses struggling to keep afloat."

Datuk Ir. Megat Jalaluddin Megat Hassan, TNB's Chief Retail Officer

Discounts and easy payment plans

On 27 March 2020, the Prime Minister announced the PRIHATIN Economic Stimulus Package to relieve Malaysian households and businesses from the harsh impacts of the Covid-19 pandemic. One of the PRIHATIN initiatives was electricity bill discounts for domestic consumers. Initially covering three months from April-June 2020, the discounts were later extended till the end of the year.

The Energy and Natural Resources Minister Datuk Shamsul Anuar Nasarah said about 7.66 million domestic users in Peninsular Malaysia and up to 520,000 and 580,000 in Sabah and Sarawak stood to benefit from the discounts that cost the Government RM2.62 billion. In Peninsular Malaysia, these costs were partly funded by the Kumpulan Wang Industri Elektrik (KWIE or Electricity Industry Fund) while in Sabah and Sarawak, it was borne by the Ministry of Finance.

The Government worked with public utilities in Peninsular Malaysia, Sabah and Sarawak to ensure the smooth implementation of the electricity bill discounts that saw consumers realising savings of between two and 50%. Many consumers welcomed this assistance that helped reduce monthly utility bills.

The NST (11 November 2020) reported lawyer, Mohammad Shafiee Afendi, 37, as saying his average monthly TNB bill is usually RM100 to RM150, but his electricity consumption had increased since the MCO. Shafiee said he expected the spike in electricity bills as he was working from home and spent more time indoors compared with the period before MCO.

"I saved almost RM30 in my recent bills and also in the previous months due to this Government initiative. I can use the money to pay for my other utilities, such as water and sewerage bills. It's also useful because each consumer is given discounts based on their electricity consumption rate," he added.

While the PRIHATIN discount was ongoing, the Government also put into effect the Commission's proposal to ease the burden of consumers. This saw the introduction of another relief package called Bantuan Prihatin Electrik (BPE) that ran from April to June 2020. Some quarters suggested that the BPE was a reaction to the public outcry over electricity over-billing at the start of the MCO.

Electricity bill discounts that saw consumers realising savings of between two and 50%

Datuk Megat explains, "When the MCO was introduced in March, TNB made a decision to suspend manual reading for the entire two month duration. Our bills for this period were based on aggregation reading. It so happened, this period was also the peak of the MCO when we recorded a sharp rise in domestic consumption due to the stay-at-home scenario.

"To appease customers, we adopted a bold approach of explaining our tariff structure in detail to them. We connected with them via TNB's 3C channels – Click (online), Call (call centre) and Come Over (face-to-face). We also used various media to

Electricity rebates for six business sectors heavily impacted by the COVID-19 pandemic

educate customers on our tariffs and billing methods, PRIHATIN discounts and the BPE subsidy.

"When engaging with our customers, we also took the opportunity to provide advisory services on energy savings and energy efficiency measures they could adopt. It was very much a two-way dialogue, where we also gathered their feedback and concerns. This was a period of heightened communication between TNB and domestic customers, and we plan to continue this trend in the future."

BPE targeted TNB domestic customers, who were eligible for free electricity of up to RM77 per month. This is equivalent to the first 300kWh electricity. In addition, domestic customers with a consumption of 601-900 kWh per month were given a 10% discount, on top of the PRIHATIN discounts.

The primary difference between the two relief packages is their duration. PRIHATIN discounts in electricity bills covered the period April to December 2020 whereas BPE covered April to June 2020. According to the TNB website, the one-time BPE payment was to be reflected in the July 2020 bill.

Prior to the MCO, the Government had also announced electricity rebates for six business sectors heavily impacted by the Covid-19 pandemic. This was to be funded by the Government and included contributions from KWIE. The six businesses — hotel operations, theme parks, convention centres, shopping malls, local airline offices, travel and tour agencies — were given a special discount of 10% on electricity bills from January to March.

During the MCO, TNB suspended disconnections for customers who failed to pay, and instead introduced easy payment plans for electricity bills to be paid in installments. This was especially appreciated by industrial customers, especially those in the iron & steel, cement and electrical and electronics sectors.

Revving up with digitalisation

One of the silver linings of the Covid-19 pandemic was the increased interest in renewable energy and digital communication.

Datuk Megat says, "During the MCO, we had customers asking for solar panel installations on their roof tops. The economic slowdown made customers more cost conscious and they were looking for solutions such as self-generation. We are leveraging on this mindset to also promote energy efficiency through energy-rated electronic appliances and smart meters.

"Customer empowerment has become a priority for TNB. We have embarked on large scale literacy programmes so customers can take charge of generation and consumption, while we as a public utility will manage the energy trilemma by maintaining the balance between energy security, accessibility and environmental protection."

TNB is scaling up on the installation of smart meters that empower customers to track their daily consumption patterns and act accordingly to save on their electricity bills. Smart meters are a vital part of TNB's digitalisation plan, and have the flexibility to add new applications, as and when needed, to serve customers better.

"We have installed smart meters in Melaka but our 2020 schedule for the Klang Valley was interrupted by the pandemic," says Datuk Megat. "We plan to catch up in 2021 and target to have 1.5 million smart meters installed by the end of this year. Interestingly, during the MCO, we received the least complaints about high electricity bills from Melaka. Customers there could refer to their smart meters for accurate readings of their consumption."

"During our many customer engagements during the MCO, we found that social media was more effective than traditional media. The restricted mobility saw a surge in online activity, with customers reaching out to us on our digital platforms such as myTNB portal and application, Facebook, and Twitter. Before the pandemic, we had one million users utilising the myTNB portal and application. The number has grown to four million now," adds Datuk Megat.

"This is a good motivation for us to expedite the usage of e-platforms that will also enable us to respond more quickly and effectively. Moreover, there will be less mobility and less pollution on the

roads. At TNB Retail, we are moving towards digital billing to reduce paper transactions, a big plus for the environment as well as in terms of economics. However, we are mindful that some parts of the country are not well served with digital infrastructure and some people may not be online savvy."

de Oliviera notes that the pandemic has forced almost every business to evaluate its operations, to look into continuity solutions to deal with interruptions or restrictions on mobility, and focus on the essential, and be more creative and flexible. "As part of a large research project "Work of the Future" that we are doing with colleagues from MIT (US), Brazil and Turkey, we have seen how Malaysian companies are embracing automation and remote working solutions, including remote trouble shooting on machines. I wish, post pandemic, that this deep analytical introspection and creative mindset will continue, particularly in measuring energy efficiency and the overall carbon footprint.

Riding the renewable energy momentum

Increasingly, there is a convergence in environmental and business agendas. In many cases, it pays to adopt low carbon solutions, says de Oliveira. "One example is solar energy, which already for some years is one of the lowest cost of green energy generation. There are still technical challenges to integrate moderate to high levels of intermittent sources to the grid, but there is still plenty of room to add solar energy in Malaysia since the total share of non-hydro renewables is still small.

"Coal suffered the biggest decline during the pandemic," he adds. "It is time to retire the dirtiest fuel source, and there are technical, environmental, health and business reasons to do so. Malaysia occupies an unusual position because it imports coal and exports gas. It is ironic that the better fuel in terms of environmental footprint is exported while the more polluting one is burned locally," says de Oliviera.

In 2020, there was an enormous boost in climate pledges by global companies such as Amazon, PepsiCo, Walmart and Petronas that committed to become net zero carbon emitters by 2050 or earlier. This can only be achieved by investing in net negative technologies and shifting their businesses with more sustainable energy solutions.

> we may look back to the year of the pandemic as being critical for the acceleration of green energy transition

"Investors have also become increasingly concerned about the environmental, social and governance standards of business decision making," says de Oliveira. "This has shrunk the capital pool available to fund new coal projects, and soon oil too. So, we may look back to the year of the pandemic as being critical for the acceleration of green energy transition."

With more leading companies committed to reduce their carbon impact, their suppliers may also be required to fall in line. "For policymakers, as countries work to rebuild their economies after the pandemic, fiscal incentives should take into consideration environmental impacts and promote sustainable solutions across the board," says de Oliveira.

"I am optimistic that as the cost of going green decreases and more people support it, we can see the green transition speeding up," adds de Oliveira.

Driving post pandemic recovery with clean energy transition

"The pandemic offers Asia a unique opportunity to place the clean energy transition at the centre of policymaking to drive economic recovery and future growth."

Despite global disruptions caused by the Covid-19 pandemic, the transition to clean energy did not come to a complete halt. An EY study commissioned by the European Climate Foundation on clean energy projects in eight economies across Asia – Indonesia, Japan, Malaysia, Philippines, South Korea, Taiwan, Thailand and Vietnam – found a robust pipeline of over 800 projects with a total investment potential of over US$316b. They involved projects in the renewable energy, energy efficiency, electric vehicles, and transmission and distribution sectors.

Particularly, countries like Malaysia and Myanmar have procured large commitments from solar energy developers amid the pandemic, through tender processes. Other Asian economies have dedicated sizeable portions of their Covid-19-related relief packages to clean energy transition. For example, Malaysia earmarked US$2.9 billion for energy efficiency, while South Korea launched its Green New Deal worth US$65 billion.

In many sectors of the economy, the private sector has been badly affected by the pandemic and companies are working to restore their capital and revitalise their businesses. Questions around whether they are willing to continue investing in the green transition, and if there is sufficient capital ready to be deployed, have surfaced.

Yet, the EY study reveals that the clean energy transition remains as attractive as ever, and confirms that the private sector is ready to deploy vast amounts of capital. This represents a unique opportunity to reframe the economic recovery in a sustainable manner.

The findings validate a strong interest in clean energy development and energy management from the private sector. This suggests an opportunity for Governments in the region to reset their short-, medium- and long-term targets for the deployment of clean energy and recognise the opportunity to position the clean energy transition at the centre of the economic recovery. Countries can also leverage this enthusiasm and consider more ambitious green targets.

The path towards clean energy development is not without roadblocks. Recovery in a post-Covid-19 environment requires coordinated action from various stakeholders. With greater collaboration between the public and private sectors, economies can tap into the immense potential that clean energy projects can offer to drive better economic, environmental and social outcomes.

(Extracts from "How Covid-19 can be the impetus for growth in renewable energy" by Gilles Pascual)

The SMART WAY to Power Consumption

No more manual reading, no more human error. Welcome to the world of smart meters, where what you pay is for what you consume monthly. Better still, smart meters usher the era of consumer empowerment, with a call for action to save on electricity usage, save on bills, and collectively work towards reducing our carbon footprint.

When there was a public outcry on high electricity bills in the first two months of the Movement Control Order introduced during the 2020 Covid 19 pandemic, consumers in Melaka were relatively quiet compared with those from other parts of the country.

TNB's Chief Retail Officer, Datuk Megat Jalaluddin Megat Hassan, believes smart meters in their homes enabled these consumers to have accurate readings of their consumption. As such, they did not react when faced with a sudden spike in their TNB bills triggered by the pandemic's stay-at-home lifestyle that saw many households switching on their lights, electrical or electronic gadgets longer than usual. With smart meters, you pay for what you consume monthly. There is no manual reading and no human error.

Smart meters are wired to provide accurate remote readings. They are the public face of the Advanced Metering Infrastructure (AMI), which is part of the smart grid. AMI uses 2-way communication between consumers and the utility provider 24/7/365 via three components: smart meters, communication network and the backend system that processes the billing data. Smart meters collect and transmit the meter data via the communication network to TNB backend system on a daily basis. The data will then be processed for multiple purposes including preparing monthly bills.

"Melaka is the first state in Malaysia with smart meters that are being rolled out across the country as we speak," says the Commission's Suraiya Nadzrah Ramli, Deputy Director of the Commission's Electricity Supply, Service Quality and Distribution Unit. "TNB, which is spearheading the smart meter implementation in Malaysia, has installed more than one million smart meters in Melaka and some parts of the Klang Valley. Concurrently, works are underway to facilitate smart meter installations in Johor and Penang."

On TNB's Online Customer Engagement and Feedback, Melaka consumer Mohd Ruzaini Hashim posted on 27 August 2018: "I just had my TNB digital meter replaced with a smart meter at my home. I am pleased with it because we can now check online how much electricity my family is using on a daily basis, and how much it will cost us. This is all done by the smart system."

In another post on 28 May 2019, Melaka consumer Yusri Sahat said: "Three months after a smart meter was installed in my house, I found a reduction in my electricity bill. I find it helpful that I can monitor my electricity usage by referring to the data on the myTNB application that I have downloaded onto my mobile phone."

How smart meters work

There are more than one billion smart meters installed worldwide as nations work at driving down electricity consumption to reduce generation using fossil fuels.

Suraiya explains, "Smart meters are electronic devices that record the consumption of electricity and communicate the information to the electricity supplier for monitoring and billing purposes. Like digital meters, there are no specific behavioural instructions or manual booklets given to consumers during installation because the law requires the licensee, that is TNB, to maintain the meters in optimum condition.

"The good news is that with smart meters, consumers can track their power consumption in 30-minute intervals. This means power usage data is made available to consumers 48 times a day. I would like to encourage consumers to utilise this smart technology wisely – to make use of their consumption data to make energy efficiency a habit and part of their lifestyle.

"The data can be sighted on the myTNB portal and application. As consumers, we need to download this application on our computers and/or mobile phones and view our power consumption pattern at any half hour interval. From this information, we can then extrapolate our daily as well as peak consumption patterns and take corrective actions, if and when needed.

"At this point in time, our smart meters also provide information on projected electricity costs for a particular month; issue digital bills; and inform consumers on their environment impact. This is really empowering because it allows consumers to make informed decisions.

"As power consumers, we need to understand that savings can only be achieved when we proactively alter our lifestyle and behaviour based on the wealth of data made available by our smart meters. In the UK, a study has shown that smart meter consumers can save an average of 2-4% on monthly electricity bills. There are no official numbers in Malaysia yet as the enrolment programme is still in its infancy."

Suraiya Nadzrah Ramli,
Deputy Director,
Electricity Supply,
Service Quality and
Distribution Unit,
Industry Operations
Department

"Smart meters in Malaysia are guaranteed as safe and accurate, and designed and produced in accordance with international standards that are enforced by the Energy Commission and authorities such as the Malaysian Communications and Multimedia Commission (MCMC), National Metrology Institute of Malaysia (NMIM), SIRIM and the Department of Standards Malaysia. The Energy Commission has published the "Guidelines on Advanced Metering Infrastructure (AMI)" that outlines the obligations of various parties involved in Malaysia's smart meter exercise. It is mandatory for all smart meters to be affixed with the ST-SIRIM and MCMC label to confirm their authenticity. "

Energy Consumption Info via Web Portal/ myTNB app

Customers can view their electricity costs, consumption and environment impact details online

Installation and benefits

"Smart meters empower consumers to have more control over their consumption," agrees Ir Mohamed Ghous, TNB's Project Director, Distribution Network Division (AMI-Klang Valley). "By installing smart meters, TNB is providing customers the tools to better manage their energy consumption, while at the same time help create a more sustainable energy future. One of the biggest benefits is that smart meters provide customers more accurate and timely billing."

The rollout of smart meters is being carried out in three phases. The first phase from 2018-2021, covered Melaka and parts of the Klang Valley. Phase 2 from 2022 to 2024, will cover the rest of the Klang Valley, Johor and Penang; and Phase 3 and beyond will be for the rest of the country.

Consumers do not have to pay for the installation and maintenance of the smart meters. These capital and operational costs will be borne by TNB and will be recovered through the Incentive-Based Regulation (IBR) mechanism, where the Energy Commission reviews tariffs every three years during what is called a Regulatory Period.

"To date, TNB has installed more than 1.1 million smart meters and we plan to install up to 1.8 million by end 2021," says Ir. Ghous. "The overall goal is to install smart meters for all 9.2 million ordinary power consumers across Malaysia within the next 10 years.

"We learned various lessons from other countries, such as Japan on their deployment rollout strategies as well as other European and North American utilities with regard to smart

meter technologies, capabilities and performance. Strategies may differ slightly from one country to another, but generally all utilities in other countries agree that the support from regulators and consumer education are key towards better acceptance of smart meters.

"In Malaysia, we are fortunate that our Energy Commission is fully supportive of the smart meter programme and participates actively in educating consumers on the benefits of smart meters," adds Ir Ghous.

Immediate benefits of smart meters

1. Energy consumption information via the web portal/myTNB app for customers to better manage their energy consumption.
2. Automated billing for more accurate and timely billing to improve their overall billing experience.
3. Net Energy Metering (NEM) feature that enables consumers to participate in the Government NEM programme.

Suraiya explains Net Energy Metering (NEM): "When a consumer enrolls in the NEM programme, the smart meter can automatically record the energy import and export data without having to install an additional export meter. We really hope that smart meters will lead to the proliferation of solar energy prosumers in the country."

TNB is also developing a variety of other smart meter features for consumers. Among them are:

- High Bill Alert – a notification sent to consumers once they have reached their threshold limit. The alert will make them more aware on their energy consumption, which will be reflected on their bills.
- Outage Notification to proactively inform customers of power outages.
- Time of Use (ToU) pricing that offers consumers with different pricing based on usage at different times of the day e.g. peak and off peak rates.
- Smart payment plans for customers such as pre-payment and incentive options.
- Faster power reconnection to improve lead time for new customer supply application.

Suraiya adds, "It is also important to note that smart meters can facilitate a dynamic tariff pricing ecosystem that is essential to avoid higher peaks in Malaysia's electricity maximum demand and the capital expense to build more power plants. These savings can later be translated to reasonable CAPEX allowance in our IBR regime, which means the inflationary tariff pressure can be contained in the future. And I would like to stress again that dynamic tariff pricing can only be offered to smart meter consumers.

"Besides dynamic tariff pricing, smart meters can be connected and reconnected remotely. This means consumers can now open new accounts and move house almost immediately. They no longer have to wait for the licensee's technician to come and install meters/connect the power at their new premises."

Installation under 40 minutes and the importance of regular calibration

"Smart meters were installed on my street of 17 houses in Bukit Damansara, Kuala Lumpur in December 2020. It took less than 40 minutes at each home.

"We knew our area was scheduled for smart meters when we first received a flyer from TNB in early November. It stated that there its team is coming to our area in Taman Setia to change meters in December. We were advised to book appointments on a day that was convenient to us. Two days prior to the appointment date, we received a phone call from TNB confirming their visit.

"If the meter is inside your compound, there has to be someone at home to give them access to it. Since mine is located at the main gate, there was no need for me to be home but I was given to understand that the TNB team preferred to have someone from the household witness the switch over.

"The switch over was done quickly (less than 40 minutes) and efficiently. The TNB team dismounted the old meter, proceeded to bolt the smart meter in its place and tested the current. There was no power supply then.

"It is still early days for my family to track our electricity usage because the MCO has disrupted our consumption pattern. Besides, with the MCO restrictions, my children sometimes work from home and on other days they would go to office. We need to settle into our usual routine, and my household of four can then start using the smart meter, smartly.

"I look forward to the proper maintenance and calibration of smart meters to ensure the accuracy of readings and to prevent tampering. In this regard, I think smart meters can follow what is being done at our petrol pumps.

"It was reported in the media that in a move to curb fuel fraud, the Government appointed a private company in 2017 to check petrol pumps on its behalf. As such, pump machines at petrol stations must adhere to pre-defined standards and rules and each petrol station operator is required by law to perform fuel pumps calibration annually.

"I believe by having someone independent verify the proper calibration of the meters, we can prevent the tampering of smart meters and the manipulation of power usage."

Edwin Chia, Bukit Damansara
Residents Association Committee Member

Awareness and caution

Following initial resistance to smart meters when they were first rolled out in Melaka, TNB ramped up awareness campaigns on different platforms to reach different customer demographics.

"With smart meters, data has to flow smoothly across the three components of the AMI infrastructure," explains Ir Ghous. "In the early days of the implementation in Melaka, a few homes along the radio frequency (RF) poles did not have smart meters hence affecting the communication mesh and meter data transfer to our data centre. This led to estimated bills for those customers and hindered their ability to enjoy smart meter's benefits. To rectify the issue, we had to send meter readers to manually read those meters. Rebates were also given accordingly to affected customers. Since then, we have also installed repeaters in selected locations identified to cover loopholes in the network communication mesh. With this solution, data can flow smoothly from customer houses to RF poles and eventually to our BCRM system, where bills are prepared.

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

"Our publicity and awareness campaigns include talk shows on television and radio, articles and interviews in local newspapers and digital platforms such as the TNB website and social media. We also turned to several influencers to promote smart meters. According to our data, these campaigns saw a sevenfold increase in customer requests for smart meter installation and a 3% decrease in rejections from consumers in the Klang Valley."

The Commission's Suraiya advises: "If you are chosen to be a smart meter user, please check on the installation works done by the licensee and report immediately to the licensee if there are defects in the meter board, cables or the smart meter itself.

"If there is any further dissatisfaction, please make a formal complaint on e-aduan in the Commission's website www.st.gov.my. "The Commission is keen to achieve the smart meter rollout objectives and for it to be amplified further for the benefit for all stakeholders."

Ir. Mohamed Ghous Ahmad
Project Director (Advanced Metering Infrastructure)
Distribution Network Division
Tenaga Nasional Berhad

Malls have become a way of life in urban Malaysia with their multifaceted functions, from shopping to dining, entertainment and recreational facilities.

Much is invested to attract footfalls - cavernous spaces, tasteful lighting and fully air conditioned interiors. These come at a high-energy consumption cost, and malls are starting to recognise that by taking the less-is-more green approach they stand to gain. Two award winning malls share their stories, of how they took measures that have less impact on the environment and saved substantially more on their energy bills.

When Less is More

Shopping malls are cool, comfortable and large spaces designed with user convenience and a pleasant atmosphere for shopping and socialising. In tropical Malaysia, they not only entice shoppers to their array of retail outlets but also those escaping the heat outside. They are a sanctuary of sorts, with some people even going to malls for their daily walks.

In Malaysia, malls operate from 10am to 10pm daily, with business hours extended during festive seasons. Fully air conditioned and usually brightly lit, they are energy guzzlers unless steps are taken to control consumption. It is estimated that air conditioning and lighting systems alone can account for as much as 85% of their electricity bills. According to the Energy Commission's Outlook Report 2019, the commercial sector accounts for 35% of total energy consumption, tagging closely behind the industrial sector that accounts for 40%. Malls are by far the largest energy consumers in the commercial segment, which is not an enviable record these days.

Malls are by far the largest energy consumers in the commercial segment, which is not an enviable record these days

Many malls are springing to action to reduce their energy bills. Energy efficiency is no longer a buzzword. It is a harsh reality especially with rising operational costs. And they have to contend with competition from online shopping, made worse with new malls set to enter the market place, although the Covid-19 pandemic has put on hold several new entries. Regardless, managing energy efficiency is regarded a long term strategy for the sustainability of malls.

In 2018, the Ministry accelerated the momentum for more energy efficient buildings by launching the National Energy Awards (NEA) in Malaysia to recognise energy efficient and renewable energy practices across public and private sectors, while encouraging further innovation in this field.

Winners of the NEA represent the country at the ASEAN Energy Awards (AEA), which has three categories: Energy Efficient Buildings (new, existing, retrofitted, tropical); Green Buildings (small, medium, large); Energy Management of buildings (small, medium, large); industry (small, medium, large) and special submissions.

Both awards celebrate excellence by recognising exemplary organisations who are driving innovation for greater energy efficiency and by extension a sustainable future.

SUBANG PARADE

From Longest to Greenest

Malls such as Subang Parade in Selangor and IKEA Cheras in Kuala Lumpur decided to confront energy efficiency head on. They recognise that energy efficiency is not only about sustainability of the environment, it is also about elevating the company's reputation and instilling confidence among investors, which will lead to long term profitability. Their efforts did not go unrecognised.

On 1 August 2019, Subang Parade Mall in Selangor won the best-retrofitted building in the Efficient Buildings category of the 2019 National Energy Awards. The 32-year old mall was the sole winner in this sub-category. Also honoured was IKEA Cheras, as runner up in the Green Building (Large Buildings) category.

Both malls scored again at the 2019 ASEAN Energy Awards held in Bangkok. IKEA Cheras took the top spot by winning the Large Green Building category award while Subang Parade was runner up in the Energy-efficient Retrofitted Building category.

Their green route has delivered big. Subang Parade's average monthly electricity bill has shrunk by about half since 2016, and hovers around RM300,000. IKEA Cheras reported savings of about a RM1 million a year.

Subang Parade officially opened for business on 13 August 1988, and quickly earned the title as the "longest mall in South East Asia". Today, it is recognised as one of the most energy-efficient commercial buildings around.

This popular mall that is owned by Hektar Real Estate Investment Trust (REIT) has a gross floor area of 1,169,038 square feet. The building has three floors of retail space, a basement floor and an annex car park of four floors.

In the fourth quarter of 2017, Hektar REIT appointed Intellisense Sdn Bhd, an energy services company registered with the Energy Commission, as the lead consultant and the Engineering, Procurement, Construction and Commissioning (EPCC) contractor for its energy efficiency retrofitting project. Retrofitting works included structural improvements, interior design works, retrofitting the Air Conditioning & Mechanical Ventilation (ACMV) system and the installation of an automated building management system. The project was completed in February 2018 and the mall began to realise the benefits almost immediately.

According to Dato' Hisham Othman, Chief Executive Officer of Hektar Asset Management that manages the mall, Hektar REIT was concerned about high energy consumption and its impact on the environment.

He said, "We found that more than 65% of energy consumption came from the ACMV that was relatively old and inefficient. Subsequently, we planned for the overhaul of the chiller plant system and mechanical and electrical works in the building. We adopted several measures. Among them were reviewing and re-adjusting the loading of all chillers, controlling the temperature, re-setting all major equipment operating times and enforcing stricter servicing requirements for the Air Handling Unit (AHU) and Fan Coil Unit (FCU) systems. We also applied for the Off-Peak Tariff Rider (OPTR) scheme, which meant launching a systematic and coordinated effort between landlord and tenant to improve the efficiency of equipment operating times to reduce energy demand."

> **"Substantial energy savings can be generated with an autonomous and fine-tuned ACMV system that is designed to operate dynamically with factors such as external weather, building load or building utilisation, indoor human activities and statistical sensory analysis."**
>
> **Fairuz Mohd Azrul**
> Managing Director,
> Intellisense Sdn Bhd

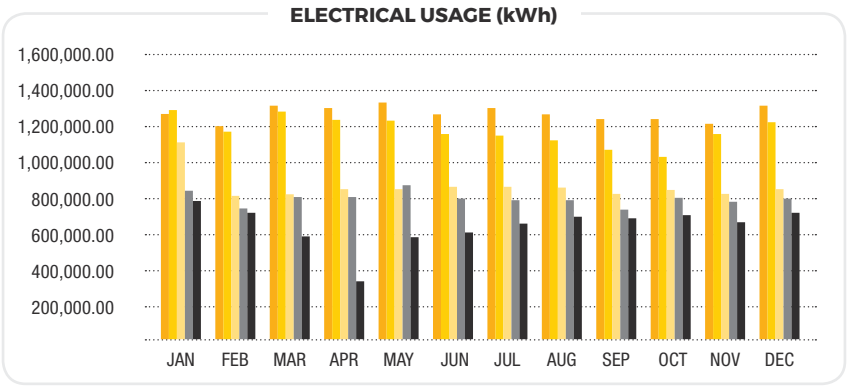
The initiatives at Subang Parade resulted in a clear reduction in energy usage in the four year period from 2017- 2020. Despite the increase in commercial tariffs due to the Energy Commission's Imbalance Cost Pass-Through (ICPT) in July 2018, Subang Parade was still able to achieve significant savings to its bottom line. In 2017 energy-saving measures included de-lamping (reducing redundant lighting), Light Emitting Diode (LED) bulb retrofit, reconfiguration and fine-tuning of ACMV equipment such as setpoint adjustment, capacity capping and load balancing.

In late 2017, the chiller plant was totally overhauled with an optimisation programme. It is estimated that 23.7% of energy savings for Subang Parade came from the chiller plant system retrofit due to the replacement of high efficiency, MyHijau certified chillers, along with efficient new pumps, cooling towers complete with Variable Speed Drive (VSD), detailed set points and configuration of the Building Automated System (BAS). These achievements were made while maintaining the comfort of occupants using the MS1525 standards with 24˚C ambient temperature and 65% Relative Humidity (RH).

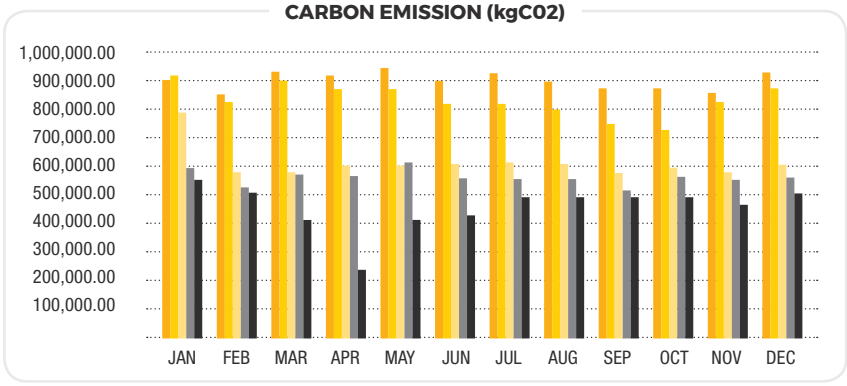
SUBANG PARADE: REPORT CARD

From 2016 to 2020, Subang Parade's average monthly electricity consumption fell 49%, maximum demand declined 43% and annual carbon emissions declined 49%. Ultimately, Subang Parade's average electricity billing per month in 2020 declined by 52% to RM278,614 monthly compared to RM583,701 in 2016.

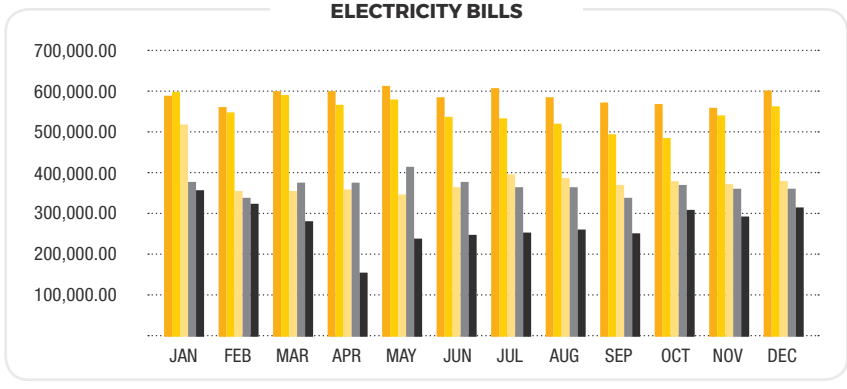
Subang Parade Energy Statistics (2016-2020)	Average Monthly Consumption (kWh)	Average Monthly Maximum Demand (kW)	Average Monthly Electricity Cost (RM)	Annual Carbon Emissions (CO2)
2016	1,278,417	3,134	583,701	10,647,206
2017	1,184,325	3,233	544,877	9,863,570
2018	846,096	2,462	422,291	7,854,735
2019	696,979	2,037	370,689	6,658,639
2020	649,353	1,786	278,614	5,423,398
Change	**-49.3%**	**-43.1%**	**-52.3%**	**-49.1%**



Electricity Usage for Subang Parade (labels show data after retrofit)



Carbon Emission based on electricity usage for Subang Parade (labels show data after retrofit)



Electricity Bills for Subang Parade (labels show data after retrofit)

Impact of Covid-19 Pandemic and MCO

During the MCO period from March 2020 to May 2020, energy consumption at Subang Parade reduced significantly due to the following reasons:

- Most businesses at the mall except for essential services (supermarket and pharmacies) were not allowed to operate
- Shortened mall operation hours

The table below illustrates the significant decrease in electrical usage, carbon emissions and electricity bills with year on year comparisons for the months of March, April and May. The decline was mainly attributed to the chillers' timing, lighting, lifts, and escalators as the operating hours set by the Government were limited. To further reduce consumption and cost, the management team decided to close several parts of the shopping mall, including some car park sections.

Electrical Usage	March	April	May
2019 (kWh)	816,152.00	808,275.00	874,482.00
2020 (kWh)	585,237.00	343,261.00	587,012.00
Variance (kWh)	230,915.00	465,014.00	287,470.00
Variance %	**28%**	**58%**	**33%**

Carbon Emission	March	April	May
2019 (kgCO2)	566,438.87	560,971.95	606,921.99
2020 (kgCO2)	406,175.55	238,235.49	407,407.46
Variance (kgCO2)	160,263.32	322,736.46	199,514.53
Variance %	**28%**	**58%**	**33%**

Electricity Bills	March	April	May
2019 (RM)	376,645.00	376,827.00	413,205.00
2020 (RM)	283,395.09	163,285.38	243,502.31
Variance (RM)	93,249.91	213,541.62	169,702.69
Variance %	**25%**	**57%**	**41%**

Plans Moving Forward

Greatly encouraged by the National Energy Awards (NEA) and ASEAN Energy Awards recognitions, Hisham says Hektar REIT plans to further expand the "go green" initiatives at its other malls, wherever possible. Hektar REIT owns five other malls. They are Mahkota Parade in Melaka; Wetex Parade in Muar, Johor; Central Square in Sungai Petani, Kedah; Kulim Central, Kedah; and Segamat Central in Johor.

"Similar energy saving initiatives have been applied to our other shopping centres and the management is monitoring and analysing the efficiency of these initiatives. All centres showed positive savings and a general downward trend in accumulated electricity usage. Overall, energy usage declined across the portfolio by 19.1% in 2020 as compared to 2019," said Hisham.

Centre	2019 Total (kWh)	2020 Total (kWh)	Savings (kWh)	Savings (%)
Subang Parade	9,594,083	7,792,239	1,801,844	18.7%
Mahkota Parade	9,408,426	7,442,313	1,966,113	20.8%
Wetex Parade	3,505,754	2,944,788	560,966	16.0%
Central Square	11,250,062	8,855,459	2,394,603	21.2%
Kulim Central	7,394,429	5,890,974	1,503,455	20.3%
Segamat Central	3,452,113	3,158,323	293,790	8.5%
TOTAL	**44,604,867**	**36,084,096**	**8,520,771**	**19.1%**

Existing measures under Hektar Reit's Energy Efficiency Programme will be enhanced in order to gain the maximum benefit from selective improvements, as identified below:

- Enforcement of fit-out guidelines such as fully covered ceilings to prevent air leaks
- Installation of heat-repellent materials in the building to minimise excessive air conditioning;
- Converting all lighting to LED systems across all six shopping centres; and
- Effective management and monitoring of ACMV systems, lifts and escalators.

"The REIT also plans to introduce the "green lease" by providing new and existing retailers with green guidelines for store fit-out and educating tenants on various energy efficiency awareness activities. We will also carry out more educational campaigns for shoppers and the public to help us reduce the carbon footprint of our malls," adds Hisham.

In September 2020, Subang Parade welcomed Village Grocer as a green tenant. This is the first Village Grocer store with the eco-friendly plan of becoming plastic free by 2023.

"Moving forward, Hektar REIT is also exploring opportunities in renewable energy (RE). Hektar REIT's malls are currently looking at implementing Solar Photovoltaic (PV) this year and explore rainwater harvesting to further strengthen our commitment to participate in green causes and sustainability initiatives," Hisham added.

IKEA CHERAS

The Swedish Factor

In 2012, IKEA's head office in Sweden released an ambitious global sustainability strategy called 'People & Planet Positive'. This is part of their long-term sustainability and growth strategy, with key commitments such as removing all single use plastic products from the IKEA range globally and from customer and co-worker restaurants in stores by 2020.

Other commitments are for all IKEA products to be designed using circular economy principles, of using only renewable and recycled materials. With these climate positive actions, IKEA targets to reduce its carbon footprint by an average of 70% per product. Other targets include achieving zero emission home deliveries by 2025 and using 100% renewable energy by 2020.

According to IEN Consultants (Malaysia) Sdn. Bhd, the environmentally sustainable design consultants for IKEA Cheras, the Swedish Group's clear and measurable sustainable goals became the yardstick for designing and constructing IKEA Cheras. As a result, IKEA Cheras became the first IKEA store in the world to achieve both the GBI Malaysia Gold final certification as well as gold certification in the Leadership in Energy and Environmental Design (LEED).

Construction of IKEA Cheras was completed in June 2015, and the store opened for business in November 2015. It is the second IKEA outlet in Malaysia, after IKEA Damansara. IKEA Cheras has a gross floor area of 50,640 square metres, and is about 40% larger than its sister store that has a gross floor area of 27,000 square metres.

Up until the new IKEA stores opened in Johor and Penang, IKEA Cheras was the most energy efficient IKEA store in South East Asia. IKEA Tebrau in Johor and IKEA Batu Kawan in Penang have usurped this position, having learnt from the IKEA Cheras experience.

Energy consumption at IKEA Cheras (by store area) is lower by 30% than its sister store IKEA Damansara. As a result, it saves as much as RM1 million a year. There was also savings in water consumption, which is 50% lower than that at IKEA Damansara.

It comes as no surprise that the IKEA Cheras has a solar PV clad rooftop. A 1.0MW peak capacity solar PV system was installed on the roof top, the largest installation for self consumption by a commercial building at the time it opened. This solar PV system offsets about 9-10% of the total energy used by the store.

According to IEN's website, the store also has an energy metering and a central energy management system that was verified as part of the NEA submission. This system facilitates the tracking and trending of various energy uses in the building. It was commissioned and fine-tuned to achieve optimal energy efficiency.

Reducing consumption by lighting systems is another priority at IKEA Cheras. The design of the building allows the flow of natural light, thus increasing access to daylight and views to the external environment

from within the store. This was achieved by installing skylights at strategic locations in the warehouse and greenhouse. Lights in offices, the greenhouse and warehouse are automatically controlled by photo sensors that react to the level of brightness outside. There are also sensors that cause lights to come on only when there are occupants.

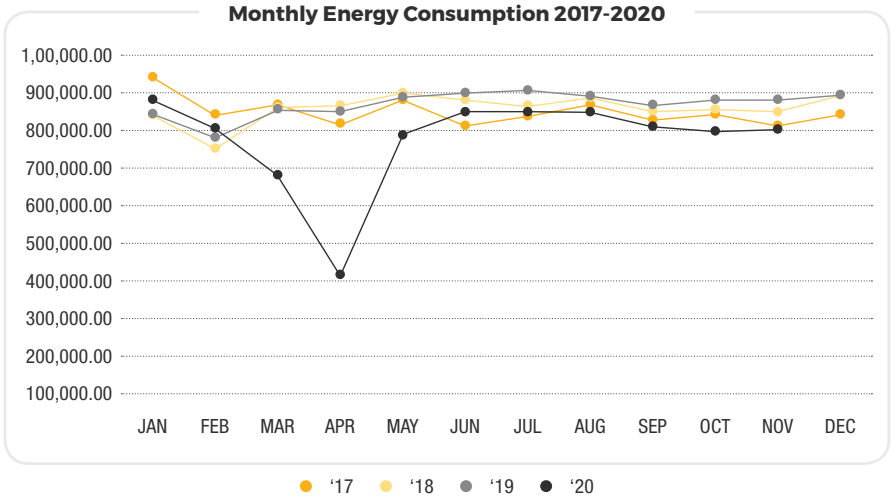
The entire store uses LED lights, including in the car park. Energy efficient LED lighting reduces energy consumption and maintenance substantially. Lighting specialists designed the electric lighting to achieve the required illumination without over lighting. Over lighting translates to unnecessary energy consumption.

For energy savings from air conditioning systems, the building design ensures there is sufficient outdoor air for ventilation of all enclosed occupied spaces. Additionally, outdoor air supply is modulated whenever occupancy is low in order to reduce energy consumption.

IKEA Cheras uses about 50% less water than the older store in Damansara. This is achieved through rainwater harvesting to irrigate the gardens as well as washrooms where rainwater is used for flushing. Washrooms here come with low flow fixtures that include lower flow basin taps and dual flush systems for all toilet bowls.

The design also takes account of shopper comfort and convenience. The building uses better performance external glazing to help reduce the sensation of radiated heat that can be felt by occupants seated close to windows. Additionally, by incorporating car parking guidance systems in the two car parking levels, motorists stand to benefit from using less fuel and wasting less time looking for vacant parking lots.

IKEA CHERAS: REPORT CARD



ENERGY SAVINGS AS COMPARED TO AVERAGE MALAYSIAN RETAIL BUILDINGS

58 percent

OVERALL THERMAL TRANSFER VALUE (OTTV)

6.1 w/m2

(88% lower OTTV compared to MS 1525)

1MW ROOFTOP PHOTOVOLTAIC PANELS

8.75 percent

building energy 23% lower peak demand (11am to 2pm)

BUILDING ENERGY INTENSITY (BEI)

169.5 kWh/m2/year

Based on 2017 data (National average: 250 kWh/m2/year)

The GREENING of YOUNG Minds

With education as one of the most powerful and dominant influences shaping the world today, there is no better time to re-emphasise the importance of environmental education. Global warming, climate change and the depletion of resources are very real and threaten all life forms and livelihoods on Planet Earth.

In 2019, the Secretary-General of the United Nations António Guterres urged countries to declare climate emergencies until carbon neutrality is reached. As at December 2020, five years after the Paris Agreement, at least 38 countries have already declared a state of climate emergency. The Declaration of Climate Emergency is a piece of legislation passed by a governing body or country that puts on record emergency actions taken to reverse global warming.

As 2020 drew to a close, the UN weather agency reported it leaves in its wake the warmest decade on record and with one of the three hottest years ever measured.

Amid this alarming state of affairs, educationists and youths are already taking the lead to ensure our planet can serve future generations as well as it has done the current and past generations.

Youths today have become increasingly aware of the need for environmental protection and carbon neutrality. These phrases are buzzwords at schools, in the media and among celebrities, and become strong motivation for young people to take action to reverse global warming and its attendant ills.

Given this context, Governments have also started to seize this groundswell of youths raring to save the planet. This has seen a wave of environmental education policies and awareness programmes tailor-made for students. Such a strategy is also expected to help meet national deadlines to reduce global warming as pledged under the 2016 Paris Agreement.

Environmental education is already part of the educational curriculum in many countries and there are also many extra-curricular activities designed around it. It is a platform that has seen policymakers, educators, activists and students coming together to deliver some encouraging programmes as shown in the following cases.

Eco-Schools Programme in Malaysia

The Eco School Programme is the brainchild of international non-profit organisation Foundation for Environmental Education (FEE). This international initiative seeks to promote environmental and sustainable development in schools, and has been adopted in more than 40,000 schools in about 50 countries.

In Malaysia, the programme made its debut in 2011 and offers the promise of consolidating various environmental education efforts that are already in place in schools. As at end 2020, more than 200 schools had registered for the programme.

At the heart of the Eco School programme is a structured 'change management' process called the Seven Steps that is used by schools for students to work towards continuous improvements in environmental action. Eco schools focus on activities that aim to show students how their everyday actions can benefit or damage the environment. To drive home this key message, the programme is structured around ten eco-themes:

Model Low Carbon School: SMK Kalumpang in Kerling, Selangor

A low carbon school project was trialed at SMK Kalumpang, a secondary school in the state of Selangor, Malaysia. This model project is a collaboration between the Department of Geography and Environment and Sultan Idris Education University.

A low carbon school is defined as a school that emits very low to zero carbon emissions. The programme is seen as the starting point to develop next generation citizens who live in a low carbon society by adopting a lifestyle of using more renewable energy sources, conserving more energy and practising the 3Rs of reduce, reuse and recycle.

SMK Kalumpang is a pilot project that aims to see the adoption of the low carbon concept in more schools across Malaysia.

10 Eco Themes

- Biodiversity & Nature
- Climate Change
- Energy
- Global Citizenship
- Health & Well Being
- Litter
- School Grounds
- Transport
- Waste
- Water

With these themes, the Eco School Programme aims to educate children on how their individual actions can add up to have a big impact on the quality of the environment.

In Malaysia, the programme is run by WWF Malaysia, an associate member of FEE. The programme is supported by a National Eco-Schools Committee and also involves partnerships with various Ministries, Government Agencies, universities and non-profit organisations.

Environmental Literacy in Taiwan

In Taiwan, the private sector is stepping forward to promote a sustainable future in the island nation. Taiwanese semiconductor manufacturing services company Advanced Semiconductor Group (ASE) has become a leading advocate for raising environmental awareness.

To get communities involved, ASE Group partnered with the National Kaohsiung First University of Science to launch the Southern Taiwan Environmental Education Project in 2014. The project developed courses for senior citizens, community volunteers, teachers and youths by involving them in outdoor activities. With this, the project sought to draw on the strength of local communities to nurture a deep awareness of their immediate environment and Nature as a whole. Following the success of the project, ASE brought in "seed teachers" to plant the roots of environmental education at the community level.

Another project, the Environmental Educational Flagship Video Project, was initiated to take advantage of the wide reaching impact of videos and their ability to influence people's actions. ASE also collaborated with the Environment Quality Protection Foundation to establish the Taiwan Environmental Education Dialogue (TEED) that was launched on World Environment Day in 2015.

The TEED platform has since held 21 forums, produced 230 short films, three documentaries, nine radio shows and designed three environmental education courses, according to the website. A toolkit that packages environmental knowledge in sounds and images has been adopted in schools. Meanwhile, ASE and CommonWealth Magazine collaborated on the Creative Environmental Education initiative to encourage teachers to use local resources in promoting environmental education. The programme rewards teachers who are able to translate their natural surroundings, including people, events and ecological systems, into teaching programmes that motivate children to learn and participate in environment friendly practices.

UNIVERSIDAD EL BOSQUE

Year of Producing and Consuming Sustainably in Colombia

Youths in the Colombian capital of Bogota are actively participating in and promoting an urban lifestyle that will lower the country's carbon footprint.

In 2018, the UN Environment Program and El Bosque University worked together to create the sustainable lifestyle initiative called The Year of Producing and Consuming Sustainably.

The initiative monitored youth actions to reduce their environmental impact. It saw the development of a mobile application to track the consumption of food, consumer goods, energy and transportation in the city, and gauge excesses that can be scaled down.

A 'Sustainable Store' was also opened to educate the young on the importance of growing, producing and consuming food sustainably. In addition, it saw university research programmes exploring how primary schoolchildren can be moulded to adopt sustainable lifestyles. Assessments were also made of secondary schoolchildren's diet habits and energy saving actions. Research was also undertaken on how playful teaching methods on sustainable living can be used to shape children in their pre-teen years to adopt environment-friendly habits.

Initiatives such as these represent the growing interest for alliances between universities, Government agencies and media networks to promote sustainable living in Colombia.

EE Challenge for Malaysian Schools

In 2014, the Energy Commission launched the EE Challenge to develop an energy efficiency culture among students. The annual event requires schools to take proactive measures to reduce their school's electricity consumption over a 6-month period.

After a modest start with seven schools in the Klang Valley and Putrajaya volunteering to participate in the event, the Challenge has grown to become a national event attracting schools from all over the country. As at end 2019, a total of 398 schools had participated in the event. The event was not held in 2020 because of the Covid-19 pandemic that saw the closure of schools.

According to the Commission's Deputy Director of the Energy Efficiency and Conservation Unit, Zulkiflee Umar, "The EE Challenge has become an inter-school competition, and we have seen principals, teachers and students coming together to win. In addition to the "Energy Efficiency Award", we introduced the "Most Creative Video" and "Most Viraled Video Awards" in 2017. This has seen students researching more for creative concepts and taking their messages to the wider audience through the social media.

"For the Commission, the Challenge is about creating awareness and educating schools on what they can do to be energy efficient. After that, we wish to see participants internalising these new learning as everyday habits. We also believe students are the best energy efficiency ambassadors. Besides putting their new found knowledge into practice at school, we want them to influence others at home and in their community. We have already seen this happening."

During the Challenge, the Commission's officers travel to participating schools to guide them on how to make their submissions. They are assessed on actual savings, regression savings, energy intensity per class, energy intensity per capita, number of energy efficiency activities undertaken and their impact, and the creativity of their final submission. The school with the highest score is declared the winner of the EE Challenge, with complementary prizes awarded to the other categories.

> We believe students are the best energy efficiency ambassadors.

Since it was introduced, the EE Challenge has recorded a total savings of 1,422,346 kWh, which is equivalent to more than half a million ringgit saved in electricity bills.

The Commission has invited schools to register for the 2021 EE Challenge in May. EE Challenge 2021 consists of five categories – EE Challenge, Best Poster, Best Video, Best Article and Best Promotional Advertisement. *(please refer to next page for details).*

Suruhanjaya Tenaga
Energy Commission

ENERGY EFFICIENCY 2021 CHALLENGE

The EE Challenge started in 2014, and it has attracted 398 schools nationwide so far.

This year, the EE Challenge has five categories, where participants stand to win attractive first, second and third prizes as well as several consolation prizes in each category.

#1: MAIN CHALLENGE

#2: VIDEO CHALLENGE

- Submission of video on energy efficiency and electrical & gas safety
- Individual or Group
- Open to 13-19 year old students
- 2 Sub-Categories:
  - Creative Video
  - Viraled Video

#3: POSTER (NEW)

- Submission of illustrated colour posters on energy efficiency and electrical & gas safety
- Individual only
- Open to students aged 7-12 and 13-19

#4: ARTICLE (NEW)

- Submission of article/opinion/case study on energy efficiency and electrical & gas safety
- Individual (English/ Malay articles)
- Open to students aged 13-19 and 20-26

#5: PROMOTE THE CHALLENGE (NEW)

- Submission of commercial to promote energy efficiency and electrical & gas safety
- Duration: 30-120 seconds video
- Individual or Group
- Open to students aged 13-19 and 20-26

www.st.gov.my/eechallenge

2021 ENERGY EFFICIENCY CHALLENGE

Be Energy smart

SUSTAINABLE CITIES:

When Low Carbon meets Smart

MOST PEOPLE AROUND THE WORLD WILL BE LIVING IN CITIES IN THE NEXT FEW DECADES. THE WORLD BANK ESTIMATES THAT BY 2050, TWO THIRDS OF THE WORLD'S POPULATION WILL BE URBAN DWELLERS. WE ARE WITNESSING AN UNPRECEDENTED RURAL-URBAN MIGRATION, WITH RURAL POPULATIONS DRIVEN OUT BY DROUGHT, FAMINE AND FLOODS CAUSED BY GLOBAL WARMING. AT THE SAME TIME, CITIES ARE MAGNETS FOR THOSE SEEKING BETTER JOB OPPORTUNITIES, DIVERSITY OF SERVICES AND A HOST OF OTHER THINGS THAT CONSTITUTE A GOOD QUALITY OF LIFE.

THIS MIGRATION INTENSIFIES PRESSURE ON CITY MANAGEMENT AUTHORITIES WHO HAVE TO GRAPPLE WITH DIMINISHING RESOURCES WHILE MEETING 21ST CENTURY EXPECTATIONS. IT IS A STRONG CASE FOR SUSTAINABLE CITIES, WHERE LOW CARBON AND SMART INITIATIVES CONVERGE. HERE, WE LOOK AT WHAT IT MEANS TO BE A SUSTAINABLE CITY, AND HOW MALAYSIA IS MOVING FORWARD WITH THIS.

Many countries are looking at their cities as engines for socio-economic growth. "Cities account for about 80% of GDP generated worldwide," says the World Bank. As the world continues to urbanise, the highest concentration of growth is expected to be in Asia and Africa, regions that are home to some of the poorest countries in the world.

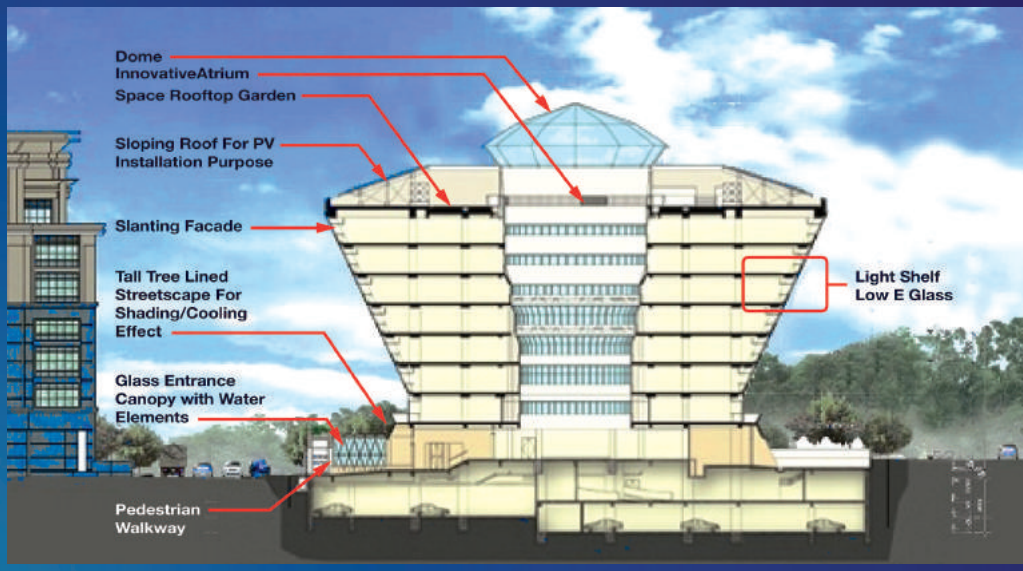
Innovative ideas are being implemented globally to efficiently manage urbanisation on a large scale. Although they face challenges, they are being confronted head on. Local Government authorities are becoming more administratively empowered so they have the resources to serve their growing populations – with efficient public transport, access to clean water, effective waste management and other essential services.

As national Governments recognise the importance of urban areas to their overall economic growth, the World Bank is increasingly being asked to support sustainability projects. Assistance is being sought to improve revenue streams, create urban infrastructure and access to transport, or operate cleaner, cheaper energy efficient industries.

Cities are also at the heart of climate change issues and initiatives. They are the highest consumers of energy and responsible for 70% of greenhouse gas emissions. Natural disasters and economic crises tend to hit cities the hardest as the concentration of people and assets makes them particularly vulnerable.

A 2018 report by the United Nations Development Programme (UNDP) forecasts that 1.6 billion people would be regularly exposed to extreme high temperatures by 2050. Food supplies would be under threat with 2.5 billion people living in over 2,500 cities facing food shortages due to climate change. Affluent cities are not spared, with Barcelona, Istanbul and Los Angeles included in the hit list.

In Malaysia, carbon emissions occur mainly in urban settings, with the energy and transportation sectors identified as the biggest contributors, accounting for about 80% of total emissions. A joint study by UNDP and the Ministry of Economic Affairs estimated that just by improving energy efficiency in buildings and transportation, about RM47 billion could be saved by 2030.



Many cities in Malaysia have a low-carbon vision and action plan. One of the pioneering green townships in the country is Putrajaya, the Federal Government administrative capital. It's taking the lead in becoming a low carbon city, with a goal of reducing emissions by 60% by 2025, making it cooler by two degrees Celsius.

The Energy Commission leads by example with its head office, which is Putrajaya's first Platinum Office with the GBI and Green Mark certifications. Known as the Diamond Building, it has been designed to meet the following considerations: sustainable building materials, low fossil fuel usage; provisions for water conservation; high indoor air quality, among other factors. The highlights are its east-west orientation, diamond shape and roof skylight that provide for 50% of the building's lighting needs during the day to be met by sunlight. The building also has solar PV panels that account for approximately 10% of its energy needs, and an insulated concrete roof to reduce heat absorption.

Occupied since 2010, the building has an energy index of 85 kWh/m2/year compared with the standard 135 kWh/m2/year (MS1525). As a rule of thumb, the Diamond Building uses 102,000 kWh of power per year, which is equivalent to RM40,000 cost savings annually or an avoidance of 63,000 kg annual carbon dioxide emissions when compared to buildings of a similar size and floor space.

In 2018, the Ministry launched the National Building Energy Intensity (BEI) labeling programme to encourage Government buildings to optimise their energy usage.

Since then, 54 ministries and buildings in the Prime Minister's Department have been BEI-labeled. BEI uses the star rating system, and the higher the star, the more energy efficient the building. The majority of these buildings are located in Putrajaya. In the longer term, BEI labeling is to be extended to the private sector.

Other initiatives in Putrajaya include the installation of solar PV on the rooftops of public buildings, LED street lighting, electric buses and wide bicycle lanes and electric vehicle (EV) charging stations. The city has also adopted rainwater harvesting, urban farming and composting in its many parks, gardens and other patches of greenery as part of the city's green drive. Homes, meanwhile, will be fully smart metered by 2020, so households can play their role in making energy efficiency an integral part of the city culture.

A LOW CARBON CITY

Saiful Adib Abdul Munaff

Director, Sustainable Cities Division, Malaysian Green Technology and Climate Change Centre (MGTC)

MALAYSIA SNAPSHOT: A TALE OF TWO CITIES

Malaysia is home to more than 30 million people, and the capital city Kuala Lumpur is one of the densest cities in Southeast Asia. It is estimated that 90% of Malaysians will live in cities by 2050.

We find out what is being done to manage this. And it involves two parallel perspectives – **ONE FOR LOW CARBON CITIES AND ANOTHER FOR SMART CITIES**. Both are related and yet different. Two leading authorities tell us what the differences and similarities are between the two, and how they contribute towards Malaysia's sustainability goals.

> There really is no set definition of a low carbon city, even globally. Different organisations and entities have their own interpretation. By and large, a low carbon city is one that has a low carbon footprint while meeting the environmental, social and economic needs of the city. This basically covers everything a city needs to sustain – from its environment (land, air and water) to the livability of its people and how businesses in the city are run. In a low carbon city, all initiatives gravitate towards managing and mitigating carbon emissions to reduce its impact on climate change.

The Malaysian Green Technology and Climate Change Centre (MGTC) was tasked by the Government to oversee the reduction of carbon emissions in the country through various initiatives.

We measure carbon emissions of a city across four areas: energy, water, waste, mobility and carbon sequestration from trees in the city. We have a 10-year programme called the 'Low Carbon Cities 2030 Challenge', where we have set a target of reducing greenhouse gas emissions in the city by 45% by 2030.

Our goal is to lower carbon emissions in cities throughout Malaysia. MGTC presents the idea of a low carbon city to Malaysians as one that is cleaner, cooler, healthier and cheaper. Cleaner because there is less air pollution and waste that goes to landfills. Cooler, with more trees providing rainforest cover and shaded areas. Healthier, with more people being encouraged to walk or cycle. And cheaper, by reducing electricity, waste and water consumption.

By 2030, we aim to have 200 low carbon zones and 1,000 low carbon partners nationwide. To date we have worked with more than 25 Local Authorities and have identified 15 Low Carbon Zones across the country. In these zones, the Local Authorities have begun implementing energy and water efficiency measures, waste recycling and building walkways for pedestrians and cyclists. Ultimately, these zones are meant to improve the quality of life for its residents.

We are benchmarking ourselves against low carbon cities ranked highly in the Sustainable Cities Index. Scandinavian cities, Dubai and Singapore are good examples we cite as having a fully integrated approach to low carbon cities. But we don't just

replicate a model from another city entirely as Malaysia's unique topography, population and environmental conditions must be taken into consideration. In 2018, Kuala Lumpur was ranked 67 out of 100 cities listed in the index.

Our primary challenges are issues relating to energy, mobility and waste that need to be addressed urgently. For energy, we need to focus on improving energy efficiency in buildings and promoting the uptake of renewable energy; for mobility, we need to encourage more public transport usage, cycling, walking and the adoption of new mobility options such as e-scooters and for waste, we need to focus on food waste composting and collection of recyclables. Most importantly, we need to encourage the public to adopt a greener lifestyle.

We have to take both a bottom-up and top-down approach in the implementation of our initiatives. From top down, we implement Government policies and plans. From the bottom up, we work directly with city authorities because they understand what people living in their municipalities need and want. Another key stakeholder are Universities. Universities have the intellectual capacity to play a big role in making people more environmentally-friendly. They also have the facilities for research and development to help create new green solutions or improve existing ones. On the industry side, incorporating low carbon or green strategies into their decision making will allow businesses to thrive in the future.

Smart technologies can help cities lower carbon emissions by providing real time data to make informed decisions. For example, through smart meters, TNB can provide us with energy consumption patterns for buildings, street lighting and so on to enable us to not only measure emissions by user but also detect inefficiencies to reduce wastage.

As we work towards the 45% reduced emissions by 2030 target, we are looking to innovation in green technology to help us. We are looking to innovations in saving energy, converting waste to energy or even moving towards a work-from-home model. Another forward-thinking idea could be that food consumed within a city is grown within the city. There is an example of this in Cyberjaya that is experimenting with establishing urban farms in public transport areas where people can buy vegetables on their way back from work. This reduces the commute to supermarkets, thus lowering their carbon footprint.

By 2030, we hope all 200 low carbon zones identified have successfully implemented low carbon measures and significantly reduced their emissions. We are working with State Governments and municipalities to ensure they are moving to reach this target. The states of Selangor, Melaka, Penang, Perak and Johor are driving hard to achieve this with their own low carbon agendas.

As a regulator, the Energy Commission has a twofold role here. One is to increase energy savings by encouraging energy producers to reduce wastage. The second would be to nurture more renewable energy producers to play a bigger role in the fuel mix. Energy generated has to be clean, stable and affordable.

The challenges we face in transitioning is the readiness of the municipalities themselves. Getting the structures and people in place takes time. A growing number of municipalities are starting to roll out a variety of initiative and learning best practices from each other.

Another challenge would be to make the public more conscious about saving the environment. There are programmes in schools that teach children about these things. But once they enter the workforce and the workplace does not have environment friendly practices, the early learning tends to get lost. This goes back to capacity building. The knowledge and understanding of why we're doing this is not there yet.

We have a long low carbon journey ahead. The initial steps of creating low carbon zones and awareness building and training in the private sector have already started. Although it may seem a daunting task to achieve the Low Carbon Cities 2030 Challenge target, if we approach it diligently it can surely be met. ”

Dr Mohamad Fahmi Ngah

A SMART CITY

Managing Director
Smart Selangor Delivery Unit

A smart city is a designation given to a city that uses information communication technologies to improve the quality and efficiency of urban service delivery such as energy, transportation and utilities. It is a more intelligent way to balance the production, consumption of resources, wastage and overall costs. Where a smart city differs from a low carbon city is that it has initiatives to improve city management and citizen's quality of life. The decrease in carbon emissions is an inevitable by-product of smart city management. A low carbon city in comparison, has a singular focus: to reduce carbon emissions. When both work together, there will be an ecosystem of co-dependency and interdependency that will contribute towards the overall sustainability of the city.

The Smart Selangor Delivery Unit has been mandated to deliver the Smart Selangor, Smart State programme with the objective of making the state more liveable, economically productive, and environmentally sustainable by deploying suitable digital technologies. Some are already in place since 2017.

Selangor has come a long way over the years. We are proud to be the most advanced state in Malaysia. When it comes to digital infrastructure, our high-speed internet penetration is 60% in 2019, and under the Smart Selangor initiative, we plan to make it close to 100% by 2025. The state is also the country's economic powerhouse, with a Gross Domestic Product (GDP) of approximately a quarter of Malaysia's annual GDP.

Three of our cities - Cyberjaya, Petaling Jaya and Subang Jaya - have already implemented several smart initiatives. The majority of the population here are internet savvy and these cities have decent 4G communications infrastructure that is considered a prerequisite for smart technologies to function. Cyberjaya, along with the Federal Government administrative centre of Putrajaya, are set to be the first two cities in Malaysia to be presented with 5G communications infrastructure in the near future.

Our smart cities are leveraging on the internet of things to enable real-time data collection and become more responsive to the needs of residents while ensuring that the impact of their annual spending is more quantifiable. This will allow us to track wastage closely and take the necessary steps to optimise public expenditure. Ideally, cities should understand power supply and demand fully so that future improvements can be made based on real-time data. This is a challenge for us. Currently, we have no proper data on power consumption and supply, or even if there is, the data is not shared directly with the state. We do not have visibility but we are working with the relevant stakeholders to rectify the situation. Other challenges include having only a single power supplier and distributor, slow approvals for new public power points, security of public power infrastructure, dismal tariffs for renewable energy, a protected energy market and slow-to-adopt innovation culture.

These impediments ought to be addressed quickly as 'reliable affordable power' becomes the basic commodity to guarantee the smooth operations of a true smart state.

In 2020, the state updated its earlier 2016 Smart Selangor blueprint, called the Smart Selangor Action Plan 2025. It is a 5-year road map to make Selangor a liveable smart state in ASEAN by 2025. Smart Selangor is unique in a sense that it is the only one in the world to implement the smart concept beyond established urban hubs. The goal of Smart Selangor is to ensure everyone in the state, from city dwellers to village folk, from white collar executives to fishermen and farmers will benefit from the smart state initiatives.

Smart Selangor aims to enhance liveability across the state by boosting economic growth, creating quality employment, strengthening the fiscal position of the state and protecting the environment. We have identified 60 key initiatives in 4 main domains to achieve this namely, the smart digital infrastructure, smart governance, smart economy and smart community.

Smart Selangor essentially focuses on developing a 'Smart Digital Infrastructure' layer and embed this into state operations, which involves the selection and development of suitable, scalable and highly reliable digital technologies that will result in the delivery of more responsive services, greater accountability, encourages innovation and future proofs the Selangor State Government.

Smart Selangor 2025

4 Domains of Smart Selangor

More than 50% of Selangor's Budget 2020 went to infrastructure development to meet the Smart State 2025 vision. The state has thus far spent RM47 million over three years on Smart Selangor projects and another RM300 million has been allocated for 2020-2025. We expect most of the initiatives to be public-private partnerships, funded by private investment.

There have been setbacks caused by the slowdown in the Malaysia economy. Yet, we are encouraged by the still strong domestic investment and recent inflow of investments in the aerospace and life science industries, both of which deploy advanced technologies. In all that we do we put forth the United Nations for Smart Sustainable Cities Goals (U4SSC) as our targets. By following these goals in the spirit that they are intended, we will have smart cities and a smart state that is all-inclusive, impactful and self-sustaining.

Sustainable Sunway Cities

Sustainable urban development has been on the Malaysian agenda since the 1991 Rio Earth Summit. Malaysia then pledged that it will retain 50% forest cover to reduce pollution and mitigate global warming.

This was a time of hyperactivity in the construction and property market, with private developers rushing to meet demand for residential, commercial and industrial properties. The concept of garden townships and eco development began to take root, although there were recalcitrant developers who took short cuts and removed precious green cover.

Sustainable development is more than about climate change. You have to look at the United Nations' 17 Sustainable Development Goals. We are talking about good values for future generations, for humanity.

In the late 1980s, the Sunway Group decided to build on a derelict tin mine land that had seen better days. Tin was the pillar of the national economy for almost 150 years, but when demand crashed so did tin mines that were left to waste. Sunway began to rehabilitate a 324-hectare wasteland of sand, stone and tin tailings, and transformed it into a vibrant township named Sunway City Kuala Lumpur. The development in the outskirts of Kuala Lumpur became Malaysia's first fully integrated green township.

With a built-up area of more than 60 million square feet, Sunway City Kuala Lumpur consists of condominiums, office towers, hotels, shopping mall, education and healthcare facilities and the popular theme park Sunway Lagoon. The development was awarded the Green Building Index certification and recognised as a low carbon city by the Malaysian Institute of Planners. In 2017, Sunway City Kuala Lumpur was named among the top smart city initiatives in the Asia Pacific. It went on to win the Integrated Smart and Low-Carbon Township category award at the IDC's Smart City Asia Pacific Awards, in a tie with Hong Kong.

Sunway City Kuala Lumpur succeeded in managing and operating an entire ecosystem, using the build-own-operate model. All components in the development were put in place to build, own and operate from scratch, so that they are profitable and can grow organically.

According to Sunway Group chairman and founder Tan Sri Dato' Seri Dr. Jeffrey Cheah, "When people talk about sustainable development, they always think that it is about climate change, it is more than that. You have to look at the 17 Sustainable Development Goals of the United Nations. We are talking about good values for the future generation, for humanity, like no poverty, quality education, quality healthcare and overall well being of residents. All these are part and parcel of sustainable development."

The Sunway Group is currently developing Sunway City Ipoh in the state of Perak and Sunway Iskandar in Johor. Both are to be sustainable developments, like Sunway Kuala Lumpur. The developer is also looking at similar projects overseas.

E-rebates to Promote Energy Efficiency

The Ministry of Energy and Natural Resources (KeTSA) launched the Sustainability Achieved Via Energy Efficiency (SAVE 2.0) programme on 7 January 2021 to promote energy efficiency, and reward consumers making the effort.

At the launch, the Minister of Energy and Natural Resources Datuk Dr Shamsul Anuar Nasarah said the Government allocated RM30 million for SAVE 2.0, and this was approved by the 2021 Budget. SAVE 2.0 aims to benefit 150,000 households.

SAVE 2.0 offers e-rebates for the purchase of air conditioners and refrigerators rated as four or five stars by the Energy Commission and certified by SIRIM. Consumers or owners of electrical accounts registered with electrical utility companies such as Tenaga Nasional Bhd, Sabah Electricity Sdn Bhd, Sarawak Energy Bhd and NUR Power are eligible to apply.

Datuk Dr Shamsul Anuar Nasarah
Energy and Natural Resources Minister

"The e-rebate is limited to one account only, for every air conditioner or refrigerator purchased in 2021 or until the quota runs out, whichever comes first," the Minister added.

Applicants can obtain e-rebates by bringing their latest electricity bill to make a physical purchase at an electrical shop or supermarket that is registered under the SAVE 2.0 Programme. They can also apply for the e-rebate for online purchases on a recognised e-commerce platform.

For online purchases, e-rebate applications through Shopee Malaysia began on 1 January 2021. E-rebate applications for physical purchases started on 7 January.

The Minister advised buyers to refer to the electrical equipment list and reference price guide at the SAVE 2.0 official website www.saveenergy.gov.my before buying, as well as to make price comparisons to get the best and most cost effective prices.

He said that SAVE 2.0 encouraged consumers to adopt energy efficient practices while contributing to savings of energy consumption and electricity bills. It also supports the Government's aspiration to promote energy savings and efficiency, low carbon and sustainable energy initiatives.

The e-rebate is for the purchase of air conditioners and refrigerators rated as four or five stars

"From this programme, the Government is targeting an energy savings equivalent to RM22.26 million and reducing carbon emissions by 39,164 tonnes per year, which is equivalent to planting 56,430 saplings over 10 years to absorb the carbon," he added.

The e-rebate was first announced during the 2021 budget tabled in Parliament in October 2020. The Ministry appointed the Sustainable Energy Development Authority (SEDA) to implement the SAVE 2.0 programme.

Energy Commission launches Product Safety Awards 2021

The Energy Commission celebrates its 20th anniversary in 2021, and in conjunction with this milestone, it is organising the Product Safety Awards 2021.

Inspired by the Product Safety Awards of the Ministry of Economy, Trade and Industry (METI) of Japan, the event aims to promote exemplary safety standards among manufacturers, importers, sellers and providers of online sales sites for businesses involved in the supply of electrical equipment to deliver high quality products.

"The Commission is confident that with the involvement of these participants, compliance with existing laws and policies can be improved, thus ensuring that electrical equipment marketed in Malaysia is safe to use and of good quality," said the Chief Executive Officer Abdul Razib Dawood at the soft launch of the Products Safety Awards on 22 March 2021.

In addition to the awards for electrical equipment, there will be special awards given to the Commission's accredited institutions in recognition of their efforts to promote electrical safety to their students.

> the event aims to promote exemplary safety standards among manufacturers, importers, sellers and providers of online sales sites for businesses involved in the supply of electrical equipment to deliver high quality products

The Products Safety Awards consist of five categories – Manufacturers, Importers, Sellers, Providers of E-Commerce Platforms and Accredited Institutions.

The winners will be announced at the Awards Ceremony by the end of October 2021. The top three winners of each category will receive Platinum, Gold or Silver Awards, along with Certificates of Appreciation and cash prizes.

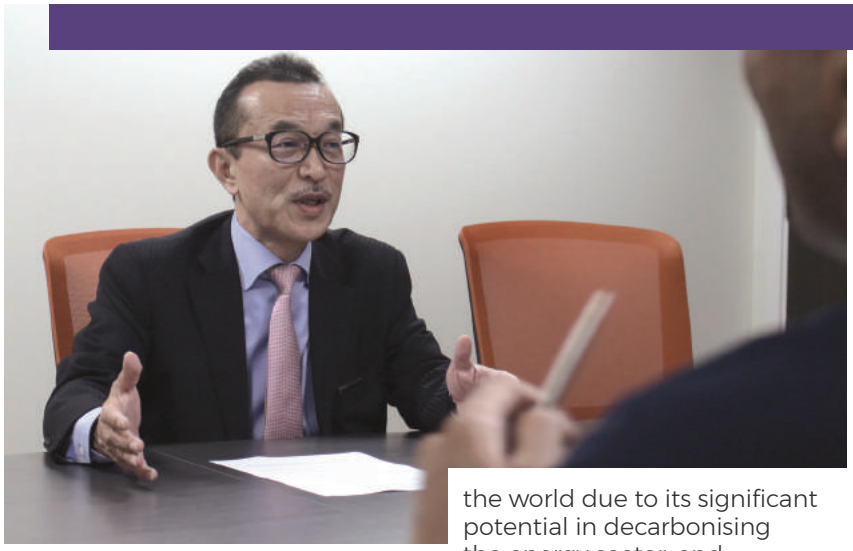
Global Energy Outlook in the Post-Corona World

In the second of a series of live webinars on the impact of Covid-19 on energy, Professor Dr. Ken Koyama, Chair in Energy Economics of the Energy Commission at UNITEN and Chief Economist at the Institute of Energy Economics, Japan (IEEJ) spoke on the *Global Energy Outlook in a Post Corona World*.

The webinar was held on 21 October 2020. Earlier on 12 May 2020, Dr Koyama spoke on the Impact of the Covid-19 Pandemic on Global Energy Markets. The 21 October webinar explored the energy landscape in the post Covid-19 world.

Dr Koyama said there can be challenges in the global energy transition, especially how the pandemic will affect world responses to the energy trilemma of balancing energy security, economic efficiency and environmental protection of natural resources. He highlighted that the pandemic is likely to force Governments to make structural long term changes in terms of decarbonisation of energy and find a balance between funding cleaner sources of energy and trade & technology.

For Malaysia, he noted that the implications of energy



Dr. Ken Koyama
Chair in Energy Economics of the Energy Commission at UNITEN

> need to amplify the decarbonisation of the energy system via the integration of other clean and renewable energy resources in Malaysia.

in these changing times will require swift action from the Government and regulators. Malaysia is largely dependent on coal and natural gas, which has over time contributed towards global warming, climate change and pollution. Although some energy market targets have been achieved in Malaysia, there is a need for continuous efforts to achieve a highly efficient and resilient energy system for the country.

Following the success of initial efforts of incorporating solar energy into the country's electricity grid, Dr. Koyama stressed on the need to amplify the decarbonisation of the energy system via the integration of other clean and renewable energy resources in Malaysia.

He observed that hydrogen energy is receiving attention in the world due to its significant potential in decarbonising the energy sector, and suggested that Malaysia consider exploring hydrogen technology from readily available resources such as fossil fuels, solar, biomass, and municipal waste. Hydrogen is a zero-carbon energy source that can be utilised for multiple applications, including power generation, transportation, cooling, heating, and industrial uses.

The live webinar was organised by the Institute of Energy Policy and Research at UNITEN, and supported by the Energy Commission and Tenaga Nasional Berhad.

Safeguarding Supply Chains in a Disrupted WORLD

The Institution of Engineers Malaysia (IEM), Standards Malaysia and Petronas held the IECEx National Virtual Conference 2020 to discuss the security of supply chains, safety standards and resources in the uncertain Covid-19 pandemic-stricken global landscape.

The virtual conference highlighted how the Covid-19 pandemic has forced industries to rapidly adopt digitalisation and automation to manage disruptions in their supply chains, and utilise their existing resources more efficiently.

The conference provided participants with expert insights on the latest electrotechnical standards, technology, best practices, improvements in standards and regulation and the challenges and opportunities in engineering technology.

Keynote presentations centred on the following themes, namely, Global Certifications & Current Trends, Electrical Installation Design and Selection, MRO of Ex Equipment, Area Classification and Protection Techniques, and Certification of Personnel Competence.

One of the highlights of the virtual conference was the panel discussion on 'IECEx Global Supply Chains, COVID-19's Impact on the Energy Sector, Opportunities and Challenges', which was designed to bring together various experts in the industry to share their views on how the energy sector is moving into the future of a 'new normal'.

Abdul Razib Dawood, CEO of the Energy Commission chaired the session on the *Energy Industry Regulatory Framework and Roadmap*.

IECEx National Virtual Conference 2020 was held on 20 October.

Covid-19 pandemic has forced industries to rapidly adopt digitalisation and automation to manage disruptions in their supply chains, and utilise their existing resources more efficiently.

IGEM 2020: Garnering more support for green global economy

IGEM 2020 deliberated on diverse topics ranging from energy, green technology, green finance, climate action, waste management, policy analysis and women's empowerment.

The International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM) held its 11th consecutive annual event with a first-of-its-kind virtual exhibition from 23 – 27 October 2020. Themed Energising Sustainability, the year's event focused on encouraging more participation in the green economy and combating climate change.

"In the past ten years, IGEM has grown to not only being a flagship event for Malaysia, but also for the overall green technology sector globally," said Shamsul Bahar Mohd Nor, CEO of Malaysian Green Technology and Climate Change Centre (MGTC). "Notwithstanding the uncertainties in the global economy and the Covid 19 pandemic, I am glad that we were able to yet again bring together Governments, policymakers, corporations and individuals, opening up new avenues and innovative solutions that are the need of the hour."

During the five-day virtual event, 57 conference sessions and 77 pocket talks were held by both local and international key industry leaders and green experts. They deliberated on diverse topics ranging from energy, green technology, green finance, climate action, waste management, policy analysis and women's empowerment.

Organised by the Ministry of Environment and Water (KASA) and co-organised by its agency MGTC, the event featured more than 160 exhibitors.

IGEM 2020 also saw a host of awards being presented. Petronas won the Overall Best Booth Design, Sabah for Best State Booth Design, Canada for Best Pavilion, RWDI for the Best Microsite, Huawei for Most Creative Pocket Talk, Ant Futures for Most Viewed Pocket Talk and Fujian Antai for Most Interactive Business Matching and Live Chat.

IGEM 2002 was attended by 10,000 online visitors from 75 countries.

THE REALITIES OF BUILDING IN THE HOT, HUMID TROPICS

by
Professor TS Dr
Mohd Hamdan Ahmad

In hot and humid Malaysia, air conditioning and lighting account for a significant chunk of electricity bills. Air conditioners have become a fixture at many homes and lights are turned on even when the sun is shining bright outside. Yet, just a few decades ago, this was not the case. What happened, and how can we reverse this hunger for power that does not augur well for a nation and world striving to be carbon neutral.

Professor TS Dr. Mohd Hamdan Ahmad, Professor of Architecture, Universiti Teknologi Malaysia (UTM) tells us how Malaysia can break its energy hungry habits by designing buildings that are better suited for the hot and humid tropics and the good health of our Planet Earth.

The majority of Malaysian homes built in recent years do not take best advantage of our natural assets, that is, natural daylighting from the sun, natural ventilation from the wind and harvesting rain that is plentiful. As a result, we consume more energy than we actually need.

Let's start by looking at how we manage heat in our tropical climate. We keep hearing people complaining about feeling hot, hot and hot! Strangely, in our hot, humid weather, we seldom complain about humidity. The simplest thing under such circumstances is to switch on the air conditioner. We have become helpless without them. Some of us keep it on even when it gets cooler at night and use thick blankets to keep warm in bed. Based on our living experiences today, we consider natural cooling as too arduous a task. It may mean having to step out of the home to catch the breeze!

Our forefathers, on the other hand, chose to use the gifts that Mother Nature had endowed upon us. In Malay vernacular architecture, for example, there was a passive design strategy at work. It maximised natural ventilation and day lighting and minimised heat from direct sunlight to reduce humidity and glare. Our *kampung* (village) homes often added tree canopies as the first layer of shade over the roof to keep the indoors cool. There were also air wells between different parts of the house. In traditional Chinese shophouses, there was the courtyard in the middle of the house that allows natural daylighting and breezes to keep residents cool and comfortable.

However, we probably have become spoilt by having cheap energy supply so much so we have adopted whatever technology is available to build and live in homes and offices without thinking of the energy and environmental penalties. We simply started abusing technology for our indoor comfort by relying on artificial lighting and air conditioning and other modern devices that consume electricity. These attitudes have created a disconnection between past ways and our current lifestyle. It is the result of what I call the inappropriate or unnecessary use of technology.

Internationalisation and globalisation movements have also contributed to this disconnect. What has happened is that imported temperate climate design solutions that are assisted by mechanical means have become more popular than our local tropical solutions.

That said, I must admit that it is much easier to accommodate the physics of nature or nature's technology in designing homes that are personally controlled spaces. Offices, on the other hand, involve large spaces for a large number of people performing a multitude of different functions. It is more difficult to apply the same natural principles in office settings.

Regardless, I think it is time for designers, property developers and regulatory authorities to rethink and commit themselves to adopting the underlying principles of passive design strategies first before incorporating technologies and mechanical means to achieve indoor comfort. I call this the back to basics approach.

Malaysia has taken some steps in this direction with the Low Carbon Society Blueprint, Green Rating Tools and Smart Resilient Cities Vision and the like. However, they are nice documents and good tools but probably too slow in delivering results. Moreover, the adoption of the green building principles advocated by these tools, plans and visions are voluntary, and so far, they have had a negligible impact.

Budding movement

On a positive note, I am encouraged to see a steady movement towards respecting natural assets again in Malaysian home and office building designs, thanks to a budding green building and building wellness movement.

Again, I must reiterate that it is easier to apply green principles to smaller scale buildings. While large office buildings may adopt day lighting easily, it is hard for them to be ventilated naturally. But with creative design thinking and innovation,

> their green credentials are only good on paper. In reality, they do not have the necessary data to prove their green performance

harnessing natural assets is not impossible.

One advancement we are seeing is rainwater harvesting, which is possible for both home and office buildings of all sizes. It was not considered important in the past because our forefathers were more concerned about solving efficient rain discharge and managing roof leaks and avoiding rain penetration.

We are also seeing a trend for sustainable property developments. They are usually residential and commercial buildings that are benchmarked or certified as green or energy efficient buildings by rating agencies such as the Green Building Index or equivalents such as the Energy Commission's Building Energy Intensity (BEI) labeling. However, if you are talking about buildings that rely totally on natural assets, it is easier to find good examples among houses and almost none among office buildings.

Many of the sustainable office buildings built today, however, stress on energy efficiency. This can be seen in the case of the Energy Commission head office, Malaysian Green Technology and Climate Change Centre head office and the KETTHA LEO Building. These buildings have data to prove that they are energy efficient.

Unfortunately, there are green rated buildings that were certified as per their design assessment (DA), but they have discontinued their completion and verification assessments (CVA) during operations. As such, their green credentials are only good on paper. In reality, they do not have the necessary data to prove their green performance when they are ready for occupation.

There is also a trend for smart buildings. These buildings are usually operated by smart systems and sensors that aim to understand user behaviour and needs. Smart buildings are also responsive to external and internal factors to maintain certain indoor conditions. They aim for optimum energy usage and occupant comfort. Smart buildings are not supposed to consume more power compared to conventional buildings.

But the question I have is this: If simple solutions can work, why do we need smart systems?

How to build better, naturally

Let's pluck the low hanging fruits of design principles by going back to our roots. Let's adopt the passive design strategy we see in vernacular architecture before moving higher up with mechanical aids and high technology.

Our planners, designers and builders also need to give more attention to some geographical realities. Malaysia is near the equator and the sun is directly above us most of the day. This means that in lower rise buildings, the roof is most vulnerable to direct sunlight and they must make provisions for this. For high rise buildings, the orientation becomes important and large facades facing the direction of the sun need to be protected. They also need to look at ways to channel the available wind, breezes and natural diffused daylight to improve comfort levels inside the building.

Our buildings should also capitalise on solar radiation for their energy needs. But when doing so, they have to avoid direct sunlight and reduce the heat trap. I would also prefer to see property developers choosing low embodied energy, low carbon and energy efficient and green materials and products.

Moreover, smartness must not be about building systems only. We must also practise smart behaviour such as opening windows when feeling slightly hot and using the fan first before switching on the cooling unit.

The tricky part of these developments is that they are likely to cost more. Granted, the capital cost maybe more than that of conventional buildings, but in the longer run the operational cost will be much lower by comparison. It was once estimated the construction cost could be 30% higher but I think it may have gone down now.

But if we plan and incorporate green designs into buildings from the beginning, I do not see the need to compare them with conventional buildings. The additional costs incurred represent their ranking as green buildings, and contrary to the popular notion, such buildings with their innovative green solutions are cheaper to manage in the longer term.

Back to wood

Believe it or not, wood is making a comeback as a building material. After being dismissed for decades as being hostile to the environment, more for the environmental damage caused by unscrupulous foresters, it is now being recognised as a natural, renewable building material that stores carbon, resulting in the long term reduction of carbon emissions. Studies also show that wood has a lower net environmental impact than most other building materials such as steel, aluminium and concrete that are produced using vast amounts of energy.

The biggest boost for wood came from recent breakthroughs in the development of industrial wood for construction purposes. The global timber industry has seen heavy investments in new production units for prefabricated modules and various construction systems based on wood, such as glulam[1], Laminated Veneer Lumber (LVL), lightweight joists and beams and mass timber construction using Cross Laminated Timber (CLT), all of which make it possible to increase production capacity while at the same time reduce their impact on global warming.

The low weight of the raw wood material opens up opportunities for greater prefabrication and industrial production of components, which are then assembled at the construction site. Greater load-bearing capacity and longer spans can be achieved using glulam and CLT elements. This makes it possible to build taller wooden buildings with prefabricated walls and floor systems and on-site assembly. Apartment blocks of over eight stories are already being built this way in Sweden.

A high degree of prefabrication in the construction industry also drastically reduces the number of deliveries to the construction site, a major benefit not only for the environment in terms of traffic movements but also from noise and air pollution.

In Malaysia, we have a relatively mature timber industry that is stepping up with its downstream production efforts. However, there are many factors inhibiting the use of timber products by local developers. Among them are the high cost of timber, restrictive building codes and by-laws, as well as the material's low fire resistance. Perhaps it is time to address these concerns, and at the same time, for our timber companies and the authorities to embark on an aggressive promotion of Malaysian timber products as viable construction materials, if not for the main structure, than at least for components and parts such as floors, doors, windows, partitions and joints. In the interest of sustainable development, it is also timely for policy makers to consider providing financial incentives to increase the utilisation of domestic timber products for construction in Malaysia.

Taking the lead

While building materials and construction processes are important considerations for emission management in property developments, the emphasis for occupied buildings is on energy efficiency.

In 2018, the Government launched the BEI labeling for public buildings to reduce their energy intensity, electricity bills and the national energy consumption.

While I applaud this initiative with the Government taking the lead and setting an example, I have some reservations about its implementation. Many Government buildings are based on a prototype design that did not focus on energy efficiency. BEI labeling is a voluntary initiative, and the focus of most Government buildings appears to be on energy efficiency measures such as switching to LED lighting systems, energy management programmes, retrofitting initiatives and audits to reduce consumption. There is, however, a need for them to embrace BEI in its full form and impact.

As I see it, there is a need for another initiative plus budget, to replace inefficient lighting and cooling systems in our Government buildings, especially the existing and older ones. There is also a need to make behavioural changes among staff to support the energy efficiency transformation of their organisations.

As a parting shot, I wish to state that building sustainably is about caring for the health of our environment and keeping it in good condition for our future generations. They must inherit a better Planet Earth. The climatic challenges we are encountering today are due to inconsiderate development, including irresponsible designing and construction of homes and offices. Therefore, we should start making amends by reducing the negative impacts of the man-made environment on our natural surroundings.

[1] Glued laminated timber, also abbreviated glulam, is a type of structural engineered wood product constituted by layers of dimensional lumber bonded together with durable, moisture-resistant structural adhesives.

> My advice to the industry is to touch our environment lightly and embrace temporariness over permanence in their future design solutions. We are obliged as stewards of the earth to hand over a more sustainable Planet Earth to our future inheritors.

World's Tallest Timber Skyscraper

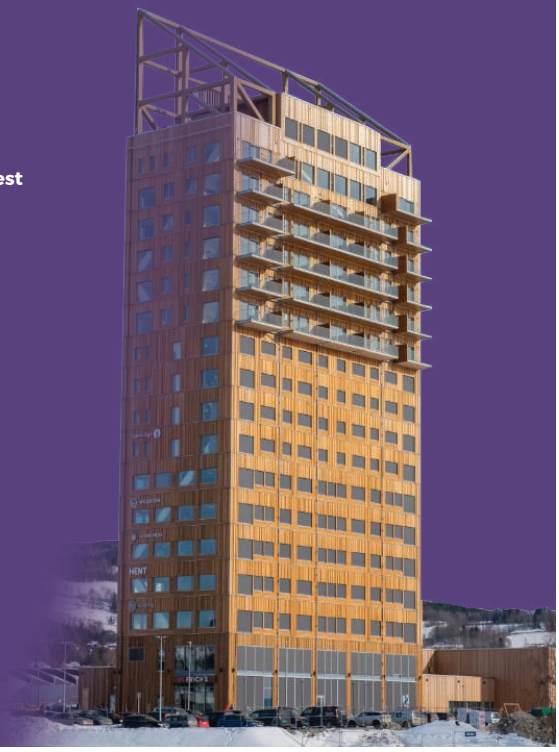
Worldwide, buildings produce about 40% of all carbon dioxide emissions. While net-zero energy buildings and retrofits can improve these numbers, the construction industry, and specifically the materials it uses, has an intrinsic role to play. In Norway, a new high-rise structure built almost entirely of timber opened its doors in March 2019.

The 18-storey Mjøstårnet is a 280-feet-tall structure that has been hailed as pushing the limits of architecture and setting a path for the sustainable cities of tomorrow. The building, which includes a hotel, restaurants, offices and apartments, is the tallest timber-frame structure in the world.

Wood-construction products company Moelven built Mjøstårnet using local renewable resources, and since wood stores CO2 throughout its life cycle, no further emissions will be released.

Mjøstårnet is located in Brumunddal, a small city in central Norway, in an area known for its robust timber industry. To construct the tower, builders used glulam and laminated timber beams; both strong enough to replace carbon-intensive concrete and steel, and which require less energy to produce.

Wood buildings, however, present certain challenges. One of them is fire safety and the other is due to the materials being light, and therefore shift more easily under extreme exterior forces. To overcome the latter, large-scale columns and trusses were used; and many were left exposed as a vital part of the interior design. The building was also designed to withstand a complete burnout and tests showed it will not collapse under such conditions.



Mjøstårnet, the world's tallest timber structure
Photo courtesy of Moelven

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, Precinct 2, 62100, Putrajaya
Tel: 03 8870 8500 • Fax: 03 8870 8637 • www.st.gov.my

Suruhanjaya Tenaga
Energy Commission