

Towards a World-Class Energy Sector

# ENERGY



## MALAYSIA

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### THE NATION'S GREEN HEARTBEAT

*Energy Malaysia interviews Dato' Sri S.K. Devamany as he discusses energy efficiency (EE) initiatives within the nation.*

### LONG TERM ENERGY SECURITY

*Delve into Malaysia's state of energy security, its challenges and improved measures it must take.*

# Energy in Malaysia: Towards a Brighter Future

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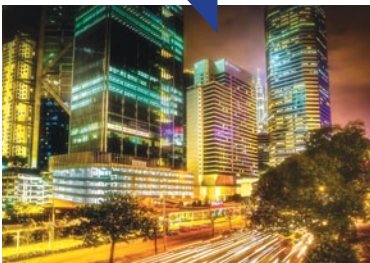
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Zairulliaty Mali

Syarizman Mansor

Mohd Shafiz Amzary Abd Rahim

Energy Malaysia would like to express its appreciation to the following personnel for their input in this issue:

### **Dato' Sri S.K. Devamany S. Krishnasamy,**

Deputy Minister of the Ministry of Energy, Green Technology and Water (KeTTHA)

**Mohd Rizal Ramli,** Head of Capacity Development Unit at the Energy Commission

**Ir. Gopal Narian Kutty,** Director of Environment and Energy Efficiency Branch, Public Works Department

**Hasiah Aziz,** Homeowner and Contributor

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Fax: +603-7729 4887

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# Security for All

The energy industry has continuously recognised the importance of a secure energy supply, as an essential element for national economic development and ensuring the continued growth of a sustainable trade and industry.

In our unyielding pursuit of energy security, it is imperative that we remember its basic elements. The Asia Pacific Energy Research Centre (APEREC) laid out three main components namely the physical, economic and environmental aspect. The physical feature deals with the availability and accessibility of energy resources. The affordability of the resource acquisition and building of energy-relevant infrastructure is another important aspect that realises energy security in the economic sense. As security is linked to the sustainable growth of a nation, it is also relevant to ensure that it ticks the environmental box, by ensuring that there is an acceptability of the resource supply.

For added operational security, Malaysia will continue to expand and optimise its fuel mix conscientiously. The implementation of various diversification strategies will ensure sufficient procurement logistics, whilst under the 11th Malaysia Plan, a solid roadmap will set the nation to manage its apparent over-dependence on fossil fuel while gradually working towards reducing its reliance on energy imports.

The system has a reserve margin of around 30%, on a total maximum demand of 17,788 MW. This is deliberately acknowledged as we need to balance the security on capacities of the different generation plant technologies installed in the system. This level of reserve margin ensures adequacy of generation capacity allowing for scheduled maintenance and unplanned outages too.

Having said that, we also recognise that the energy issue has always been a global one. In view of that, we are proud to be a part of the ASEAN master plan towards building an integrated ASEAN gas and power supply infrastructure network such as the multilateral power trade titled the Laos-Thailand-Malaysia Power Integration Project (LTMS-PIP) which will be realised in 2018. Beginning with a modest 100 MW capacity, with a potential for upscaling, this is a significant milestone and a much-needed stepping stone for the future, linking the ASEAN nations towards realising the ASEAN Power Grid (APG). The APG will allow for the selling and buying of energy at a competitive price, assisting the nation in conquering its ideal energy sharing and network security dreams.

In light of the current state of the global energy sector, it would be opportunistic for policy makers, regulators and industry players to come together and strategise how to



reach out for a win-win resolution for all. We must continue to exert all efforts towards balancing the needs of the economy, people and the environment in forging ahead towards a sustainable and secure energy industry. It is also desirable that we manage risks well, taking all necessary action to preserve our resources for the future endurance and sustainability of our economic development.

I would also like to take this moment in recognising our Chief Executive Officer, Datuk Ir. Ahmad Fauzi Hasan in all of his dedication and services to this agency, who is retiring in the month of June. He has played a pivotal role in ensuring the Energy Commission maintain consistent, quality standards when it comes to regulating effective energy and as an authority on energy matters and I wish him well on his future undertakings. **EM**

**Dato' Abdul Razak Abdul Majid**  
*Energy Commission, Malaysia*



# Tribute to Our Outgoing Chief Executive Officer, Datuk Ir. Ahmad Fauzi Hasan

“**E**nergy is what drives national growth. The Energy Commission is honoured to play a role in guiding the sector in Malaysia as we steer it towards world class standards.” This statement was echoed by Chief Executive Officer Datuk Ir. Ahmad Fauzi Hasan when this magazine was first published three years ago, and this sentiment still holds weight.

Driven by the aim to enhance supply security as well as improve efficiency and quality in the energy sector, the Energy Commission was established under the *Energy Commission Act 2001*. With the appointment of Datuk Fauzi as the CEO, he has kept the Commission's objectives consistent, fostering a balance between the needs of consumers and providers of energy.

Datuk Fauzi has held this prestigious position since 1 April 2010. Datuk Fauzi takes his role in stride as he has held prior positions, namely as Chief Operating Officer, Deputy Chief Executive Officer (Supply and Safety) and Director of Gas Regulation Department.

Having received his bachelor's degree in Mechanical Engineering from the University of Manchester, Institute of Science and Technology (UMIST), United Kingdom, and his master's degree from the University of Michigan, United States of America, Datuk Fauzi is well versed in his field of engineering, marking 38 years of regulatory experience.

Besides overseeing the agency, he takes an active role in developing and implementing energy policies, plans and standards as well as awareness programmes on national and global

levels with industry stakeholders. His achievements do not end there, with his membership in the Atomic Energy Licensing Board of Malaysia and the President of the Malaysian National Electrotechnical Committees (MyENC).

All parties affiliated with the energy supply industry are taking the initiative to play their roles, with the highest standard of professionalism possible. All of this could not be possible without the insight and guidance of Datuk Ir. Ahmad Fauzi Hasan. **EM**



## Our Heartfelt Appreciation and Thanks To

**Datuk Ir. Ahmad Fauzi Hasan** for his dedication and service as **Chief Executive Officer of the Energy Commission of Malaysia** (*Suruhanjaya Tenaga*) from 1 April 2010 to 30 June 2017. His guidance and mentorship were invaluable, and we at ST thank him for his tenure.



## Green is in the Bag

**T**he initiative started by Selangor to ban the use of plastic bags has been up and running since 2010 with their “No Plastic Day” campaign every Saturday. Since then, the ruling has evolved to totally remove plastic bags for every day of the week. In line with that, Selangor residents are encouraged to bring their own reusable bags and containers.

The ruling of limiting the sale of plastic bags has seen a 30 to 50% reduction of overall use in Selangor. Selangor Tourism, Environment, Green Technology and Consumer Affairs Committee Chairman Elizabeth Wong explained that the campaign's target is to have a 60 to 70% reduction in the sale of plastic bags from 2017-2018. This requires the team effort of residents as well as retailers to push for reducing plastic waste since its biodegradability is very low. **EM**

# Sarawak's Secret Weapon

**A**t the International Conference on Materials Technology and Energy (ICMTE) 2017 held at Curtin University in Sarawak, Deputy Chief Minister of Sarawak Datuk Amar Awang Tengah Ali Hasan said foreign investors are interested in producing hydrogen fuel branching from the state's generous supply of water resources. He also added that this positive step greatly assists in Sarawak's goal of becoming a greener region. The conference has enabled the scientific community to come together to discuss and identify strategic moves needed to be taken to reach the goal.

Sarawak is notably a major producer of a variety of energy supply ranging from hydrocarbon to solar energy. In 2016, the state has an installed capacity of 4,696MW from hydro (74%), natural gas (13%) and the rest are from coal, diesel and renewable sources (13%). This capability proves that the state is moving in the positive direction. **EM**

*The state has abundant resources of hydro and natural gas.*







*The Sikal Elektrik Rakyat 1Malaysia (SER1M) initiative aims to kickstart the society in living a greener lifestyle.*

## Malaysia, Future Marketing Hub for Electric Vehicles

**T**he country is expecting big changes towards a much healthier, greener direction by 2030. Targets include usage of 100,000 electric cars, 100,000 electric motorcycles, 2,000 electric buses and 125,000 charger stations, an achievement conceptualised by the government.

The green technology sector needs to be developed aggressively to keep up with the transition of using electric vehicles. Changes are needed to improve the landscape of the green technology currently available as to

reduce the stress on fossil fuels and the size of the national carbon footprint. It is noted that society needs to be aware of the changes and ways they could help in advancing the project.

There have been a few incentives that have gotten the ball rolling. At the launching of the Sikal Elektrik Rakyat 1Malaysia (SER1M) event in Sabah last April, the Minister of Energy, Green Technology and Water (KeTTHA) Minister Datuk Seri Panglima Dr. Maximus Johnity Ongkili said that RM4 million has been allocated for the

SER1M programme by the Finance Ministry. He also added that Sabah and Sarawak would receive additional costs as logistics and transportation fees.

The programme sees a total of 1,200 electric bicycles or Electric Pedal Assisted Bicycles (EPAB) provided by local startup Voltron Malaysia Sdn Bhd to six public universities such as Universiti Putra Malaysia, Universiti Tenaga Nasional, Universiti Utara Malaysia, Universiti Teknologi Malaysia, Universiti Malaysia Sarawak and UMS. **EM**





*Left: The humble Ice Plant contains world-changing potential.*

*Bottom: John Cushman will be leading the research to uncover the mystery of the plant.*

# Carpobrotus To The Rescue

**T**he Carpobrotus or also known as the ice plant gets its name from the tiny, glassy dots that appear on the top of the yellow and purple flower petals that resemble luminous ice. Originating from a Namibian desert of Africa, it is said that the ice plant contains a solution to help address the global warming situation. This is due to the fact that ice plants contain genetics that enable the change from C3 photosynthesis (a daytime process) to Crassulacean acid metabolism (CAM) photosynthesis (night time occurrence),



five to six times more water-use efficient than the C3 photosynthesis plants.

John Cushman, Biochemist and Molecular Biologist of University of Nevada, Reno said it would take a few years to completely understand the components of the common ice plant. CAM is a water-conserving photosynthetic process that helps plants survive in drought and under salinity stress that is "present in more than six percent of all vascular plant species across 36 different plant families, so it is a fairly widespread ecological adaptation", said Cushman. A gene atlas will be outlined by him to further understand the potential of this process.

The Joint Genome Institute will provide high-end resources and facilities as Cushman's proposal was one of the selected researches to be included in the Institute's yearly programme for researchers who are keen to explore solutions to energy and environmental challenges. **EM**





# Brighter Days Ahead

**U**niversiti Teknologi Malaysia (UTM) and VSolar Group Berhad has signed a memorandum of understanding to collaborate in research and development (R&D) of solar energy generation facilities. The agreement was signed by VSolar Berhad's representatives, Executive Chairman Datuk Manan Md Said and Executive Director Leung Kok Keong while UTM's representative was its Deputy

Vice-Chancellor of the Research and Innovation Department, Prof Dr Ahmad Fauzi Ismail.

In the proposed arrangement, UTM is said to be providing 20-acre site for every 10 to 30 MW for solar energy generation facilities while VSolar Group Berhad is looking to allocate a sum of up to RM2 million to the JV Company over the next four years for photovoltaic technology

research. VSolar is looking to develop the innovation with the goal of commercialising them to the public in the near future.

Trive Property Group Berhad will also be assisting the JV by supplying various solar components such as solar panels, solar inverters, batteries, trackers among many others. The gross development value of the entire project has been valued at RM150 million. **EM**





# OUR ENERGY LAN

**E**nergy is undeniably one of the most significant driving forces necessary for a nation to advance. It is not only an essential ingredient for economic development; it is decisive in ensuring the continuous growth and prosperity of a nation. The International Energy Agency defines energy security as “the uninterrupted availability of energy sources at an affordable price.” The physical unavailability of energy and uncompetitive or overly volatile prices will have an adverse effect on the economic and social standing of a nation. Thus, it becomes extremely important for a country to attain energy security in two dimensions, namely, in the long-term and short-term scope.

Long-term energy security deals with opportune national investments in supplying energy in consonance with economic developments while maintaining sustainable environmental requirements. While interim energy security emphasises on an energy system’s ability to react quickly to abrupt fluctuations within a country’s supply-demand balance. **Energy Malaysia** delves into the present state of Malaysia in terms of energy security, challenges we are facing and the energy industry’s relentless efforts in enhancing and cementing a secured future for the nation.



# RGY DSCAPE

Forming a  
Fortified Future



*Malaysia's economic and infrastructure landscape has gone through a rapid expansion in the last three decades, with no signs of slowing down anytime soon. Attaining energy security is, therefore, crucial to ensure its prolonged sustainable development.*

## The Current Scene

Malaysia is a nation that has seen massive development in the last three decades, with outstanding landmarks like the PETRONAS Twin Tower, Kuala Lumpur International Airport (KLIA), Light Rail Transit (LRT), SMART tunnel system, new Mass Rapid Transit (MRT) with much more to anticipate in the future. The nation boasts large-scale buildings and infrastructures, expanding its real estate sector while providing ample job opportunities. High-rise buildings and housing sectors are also sprouting tremendously in major cities such as Kuala Lumpur, Penang, Kuching and Johor Bahru. Its gross domestic product (GDP) and Human Development Index (HDI) also rank among the highest in the Asian region. Malaysia's HDI is ahead of its Asian peers ranking 57th out of 169 countries, recording an impressive 38% increment from 1980 to 2000.

The country has undoubtedly gone through a process of massive development owing mostly to its abundance of fuel supplies. A harrowing question now lies as to whether these developments can be sustained in light of an inconsistency of the future fuel market.

Currently owning the 14th largest gas reserve and 27th biggest proven crude oil reserve globally, Malaysia is undoubtedly blessed, not only with an abundance of conventional, but also renewable energy sources. However, as one of the global oil and natural gas suppliers, Malaysia is incessantly coping with huge domestic and international demands thus making the nation vulnerable to energy security issues.

As of 2016, Peninsular Malaysia alone is dealing with an electricity demand of up to 82% from

Malaysia's population of 31 million, with an average increment at a 1.8% rate annually. Electricity generating capacity, on the other hand, is adequate with comfortable margin to meet demand.

According to Mohd Rizal Ramli, the Head of Capacity Development Unit at the Energy Commission, "Energy security and reliability are among our topmost priorities. Reviews are continuously being conducted on a regular basis through various working groups and committees comprising of industry stakeholders. The primary criteria used to gauge energy security and reliability is the loss of load expectation (LOLE), reserve margin and Herfindahl-Hirschman Index (HHI). Currently, reserve margins are at 29% for Peninsular Malaysia, 35% for Sabah and 36% for Sarawak with LOLE criteria ranging from 1 day/year to 1.5 day/year depending on the system size and interconnectivity.

Mohd Rizal also expressed a concern that currently, consumers' expectations are outgrowing the minimum criteria, thus necessitating the need for its review. He also added that "There needs to be a balance between security and reliability with the overall cost of supply. Due to the fast changing environment, supply system must be kept responsive to those changes in terms of price, technological advancement, market structure, society's needs and environmental obligation." One way to ensure flexibility is to keep supply cost structure lean and supply adequacy within the planning criteria, in that whatever equipment invested or will be invested must be put to effective and good use to serve its purpose during its lifetime.



## In Curtailing Challenges

Malaysia is essentially blessed with a good generation mix of energy resources varying from conventional sources such as oil, natural gas, and coal to renewable energy resources from the likes of solar installations, hydropower plants and biomass.

During the period of 1990 to 2016, more than 90% of electricity generated for Peninsular Malaysia was attained from fossil fuel. In 2016 alone, for example, coal provided up to 52% of the energy generation while gas contributed 44%. This current scenario coupled with a decline of domestic fossil fuel reserves will consequently push Malaysia to resort to importing fossil fuel at a marginally higher market price which comes with the hazard of purchasing energy resources in a volatile and foreign fuel market. As domestic fossil fuel depletion threatens the development of the country, it becomes imperative now to overcome the nation's over-zealous reliance on fossil fuel.

In terms of power generation, concerns are centred towards the energy supply security of fuels at the power plants. A large percentage of electricity generation is produced with coal and natural gas. However, current trends show a decline in domestic gas production with a supply system that is stretched to its limits. Coal, on the other hand, is mostly supplied by foreign sources, imported mainly from South Africa, Australia, and Indonesia. A UNITEN Proceedings for National Energy Security Conference back in 2012 revealed that the amount of imported coal has increased steadily from 11.9 million tonnes in 2009 to 19.2 million tonnes in 2011.

Additionally, according to the International Energy Agency, Energy Balance for Non-OECD Countries – 2012 Edition, energy import numbers have increased at a fast rate of 7.2% per year, to cope

with growing energy demands of up to 5.8% per year. These issues expose a liability on an energy security front for the nation.

Another challenge for the energy sector in achieving security in Malaysia's energy supply is to ensure power plants maintain the required reliability and efficiency levels. Apart from that, there is also the added task of increasing the use of renewables while ensuring competitive supply to consumers, the end-user through a reliable supply and affordable tariff.

Furthermore, Mohd Rizal also affirmed that past experience suggests the country's over-dependency to specific fuel sources can, in fact, expose our system to a higher possibility of major electricity interruptions. To curb this, there is a need to have a balanced fuel mix of gas, coal, and renewables. "Dependency on fossil fuels is expected to continue until renewables plus storage technologies can be commercially integrated into the system, with the Energy Commission continually monitoring its development and progress. The use of renewables is also encouraged through programmes such as Feed in Tariff (FIT), Large Scale Solar (LSS) and Net Energy Metering (NEM). Currently, more than 20% of the total installed capacity in Malaysia is from renewables which is inclusive of off-grid installation and cogeneration. Approved LSS programmes generating up to 1,000MW and NEM generating up to 500MW will, indeed, increase renewables share in future."

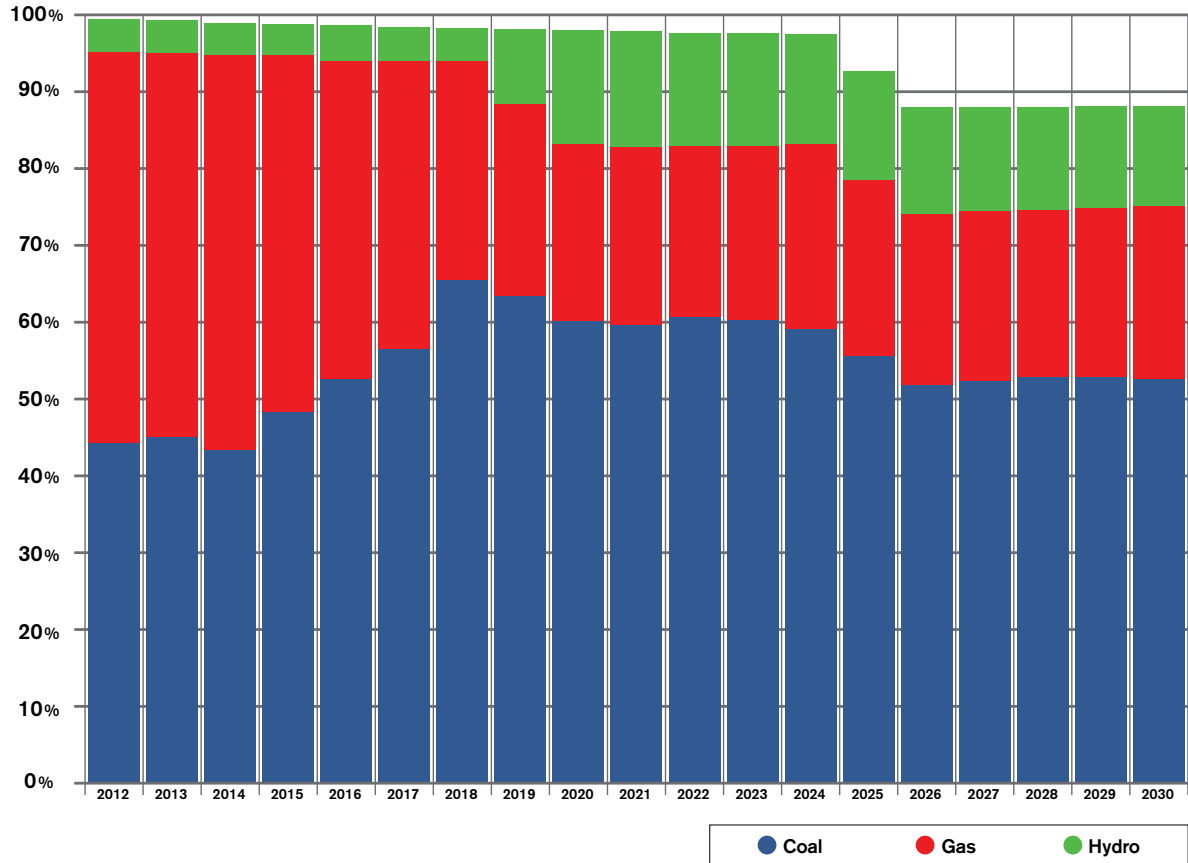
As energy costs increase annually along with a depletion of fossil fuels, sustaining a stable development for the nation is proving to be more expensive. It is now time to take the necessary action to establish energy security in the most financial savvy method towards ensuring future sustainability for Malaysia.

## Malaysia's Electricity Generation Capacity, Demand and Reserve Margin

	GENERATION CAPACITY	PEAK DEMAND	RESERVE MARGIN
PEN. MALAYSIA	<b>22,919</b> MW	<b>17,788</b> MW	<b>29%</b>
SABAH	<b>1,279</b> MW	<b>945</b> MW	<b>35%</b>
SARAWAK	<b>4,126</b> MW	<b>3,040</b> MW	<b>36%</b>

Source: Energy Commission

## Peninsular Malaysia and Sabah's Projected Generation Mix



Source: Power Policy & National Development Plan, KeTTHA

### Commendable Industry Initiatives

The government established several policies and programmes designed to cater to the energy demand in the country. Energy-related policies may be traced back to the National Energy Policy implemented back in 1979 to ensure adequate, secure, cost-effective and environmentally sustainable supplies of energy. In 1980, the National Depletion Policy was introduced, another one of the nation's commendable recognitions of the energy depletion on the global and national front. Among the policy's objectives were to prolong the lifespan of the nation's oil and gas reserves.

Other policies ensued addressed arising issues and concerns within the energy sector. This included the likes of the 1981 Four-fuel Policy which aimed at ensuring reliability and security of supply through the diversification of fuel (oil, gas, hydro and coal). That policy was then revitalised with the 2001 Five-fuel Policy which encouraged the utilisation of renewable resources such as biomass, solar and mini-hydro plants. The national energy scene was then given new life with the Renewable Energy Policy and Action Plan in 2010 which outlines the major strategies to promote renewable energy in the country.

A New Energy Policy was also highlighted under the Tenth Malaysia Plan which focuses mostly on

energy efficiency that targets to boost energy security and reliability of supply through efficient technology and demand side initiatives.

A more recent government initiative comes in the form of the Eleventh Malaysia Plan (11MP) which encourages sustainable energy use to support the developmental growth of the nation. One of its main missions is to strengthen stakeholder coordination and collaboration in the energy sector by fostering a more structured institutional inter-agency partnership on energy planning as well as engaging consumers on energy efficient consumption. Apart from that, 11MP also aims to ensure the security of gas supply through the construction of pipelines from the Malaysia-Thailand Joint Development Area to Kerteh, Terengganu, and construction of Re-gasification Terminal (RGT) 2 in Pengerang, Johor. Petronas has also commissioned one floating offshore LNG unit in Sarawak with a capacity of 1.2 metric tonne per annum (mtpa), with the aim of improving the reliability of gas supply in that region.

The plan also aims to manage supply diversity for the security of electricity subsectors by better management of resources. This includes optimising fuel mix and exploring alternative fuels in the effort to gradually reduce the country's dependency on fossil fuels. Rural electrification





“Developing feasible solutions for future energy use could not only prevent Malaysia from becoming a net fuel importer in the next 30 years but also reduce our carbon emissions and improve quality of rural life.”

– **Dato' Sri S.K. Devamany S. Krishnasamy,**

Acting Deputy Minister of Energy, Green Technology and Water Malaysia (KeTTHA) at the Opening Ceremony of the Electric, Power and Renewable Energy (EPRE) Malaysia 2017

programmes will also be enhanced to increase the national coverage to 99% by the year 2020. Moreover, the plan aims to enhance alternative energy sources by pursuing renewable energy options with large potentials such as biomass, biogas, solar PV and mini hydro plants. The implementation of net energy metering (NEM) will also provide savings on electricity bills for consumers encouraging the overall use of renewable energy generation.

### **Towards a Secured Future**

To further enhance supply security, several strategic options may also be implemented. The main segment that would curtail the nation's over-dependence on fossil fuel would be to diversify the nation's energy generation mix. This may be done by intensifying local gas and hydro resources development, securing more gas from foreign sources, and strengthening supply infrastructure to facilitate regional interconnection.

Another strategic option would be to reduce carbon emission from power generation. A study on low carbon electricity such as the application of carbon capture and storage system at coal-based power plants will also be beneficial for the energy sector. Apart from that, the use of alternate fuels and a cleaner source of energy for the transport sector such as shifting towards the use of electric vehicles is also a viable option.

Going back to the root of an issue is always advantageous in solving a problem. This may be done by enhancing energy efficiency in the residential, commercial and industrial sectors. Moreover, reducing demand for personalised modes of transport by increasing the use of public transport through a planned public transport scheme may also be done. Another effort in attaining sustainable energy development

is by facilitating low-carbon industries especially in the manufacturing of high energy efficiency products such as LED lights, inverters, and green technology.

Other strategic initiatives in enhancing supply security for the nation include the gradual employment of the most efficient plant that will reduce the amount of fuel used to generate electricity. A review of the existing generation planning criteria is also currently underway with the objective of enhancing quality and reliability of supply through the introduction of more renewables in the system. “Apart from that, we will also be looking at more renewable capacity in the system and the possibility of more interconnection with neighbouring countries, all subject to the system's ability to accommodate the injection of new capacities. Demand side management initiatives are also implemented to encourage efficient use of electricity through the introduction of guidelines, energy audits, prescribed Minimum Energy Performance Standards, pilot projects at specific, targeted segments and promotional activities,” added Mohd Rizal.

Energy drives a nation forward. It is a fundamental element that ensures the quality and comfort of our lives, one that is, however, taken for granted way too often. Individuals and all sectors of modern economies are wholly dependent on an abundant, uninterrupted as well as reliable supply of energy to live and work. Energy security, therefore, becomes crucial in ensuring not only the nation but the world's continuous sustainable development. It is of paramount importance to keep in mind that energy security goes beyond that of a nation; energy security is a global issue. To make a difference, however, one must start at their home-ground. **EM**

# BUILDING TOWARDS ENERGY EFFICIENCY

A Game Changer for the Construction Sector





Green buildings have given way to some of the most cutting-edge and innovative technological construction works throughout the globe. Additionally, sustainable buildings are going through a phase of rapid evolution, even penetrating into the conventional construction industry in many countries. With commercial and industrial buildings consuming enormous amounts of energy daily, it becomes imperative that low energy design is implemented as a necessary effective measure to save energy consumption. Getting on board the green and energy efficiency train, Malaysia is on the fast track to becoming a green construction hub within the Southeast Asian region. With several sustainable buildings already making a wave in the industry, government support will only catapult the nation's reputation as a centre for low energy and green buildings.

**Fundamentals of a Green Building**

In defining a green or sustainable building, the US Environmental Protection Agency have characterised it as a structure that is built using an environmentally responsible and resource-efficient process that is carried through the building's entire life cycle in terms of design, construction, operation, maintenance, up to its renovation and demolition. In order to achieve this, decisions taken in the initial stages can have a large impact on the success of attaining energy efficiency in a finished building. Choices on the form of the building, its depth and height, and the size of the windows can immensely influence the eventual energy consumption of a building.

Thus, to determine whether a building meets all the criteria of a green building, a rating system is applied. The most relevant for the Malaysian construction sector is the Green Building Index (GBI), a rating system based on energy and water efficiency, sustainable site planning and management, materials and resources, innovations and indoor environmental quality. The ratings are categorised to include different tiers such as certified, silver, gold and platinum which is rewarded based on the building's overall score during its triennial assessments. Apart from that, GBI-certified developers are also eligible for tax exemption for the costs of obtaining the certification while buyers of GBI-awarded buildings are exempted from stamp duties.

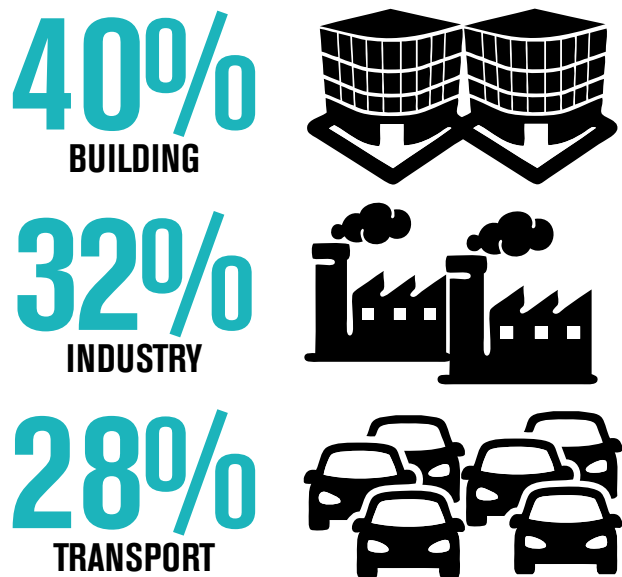
**LEO & GEO Structures**

Currently, Malaysia boasts an impressive portfolio of buildings that are both sustainable and energy efficient with new building definitions and concepts. A fine example is the Low Energy Office (LEO) concept, introduced in 2002, which combines a structure's architecture and physics with the highest quality working environment that minimises the consumption of primary energy. Energy efficient system and design being its priority, LEO's designer targets to achieve a 50% energy saving in comparison to traditionally built office buildings, while simultaneously minimising

construction costs by 10%. Results have shown that LEO is well on its way to realising its tentative payback period in less than 10 years, for the extra investment spent for its creation.

Taking inspiration from the environmental innovation of LEO's architects, Green Energy Office (GEO) is an ambitious hybrid of that very same concept combining green technology with energy efficient design. The concept was introduced in 2007 and was awarded GBI certification two years after. GEO's design strives to minimise energy demand and utilise renewable energy to the fullest while still taking into mind to maintain a comfortable workplace environment for its users. Using renewable energy power generation system to generate its own energy, almost 50% of the building's electricity comes from its solar panels.

**Energy Consumption by Sector**



*The building industry in Malaysia uses the most amount of energy in comparison to the two other sectors.*

Source: semanticscholar.org

GEO focuses on the incorporation of simplistic yet ingenious green design such as the usage of high double-glazed windows that do not only filter the outdoor heat but also serve to provide an abundance of natural light into the office space. Apart from that, the concept also calls for innovative green technology such as *cold daylight* which provides the offices with free lighting. A GEO is also cooled with a combination of radiant cooling and air convection system, and also uses rainwater for all its air-conditioners, plant watering, and overall cleaning works.

At the frontline of Malaysia’s green buildings are two projects making a splash – the Ministry of Energy, Green Technology and Water (KeTTHA) LEO building in Putrajaya and the Malaysian Green










Technology Corporation (GreenTech Malaysia) GEO building in Bangi.

**Domestic Energy Initiatives**

As sustainability becomes a major element in achieving green development, it becomes imperative for Malaysia to put forward the right policies and regulatory frameworks to facilitate these sustainable projects. While numerous countries are seen establishing their own forms of energy sustainability, Malaysia has also switched to the energy efficiency lane through the introduction of its 2030 Sustainability Goal to reduce 25% of gross consumption of electricity from the building sector, while pledging to reduce up to 40% of CO<sub>2</sub> emissions per GDP by 2020.



**Total Percentage of Energy Consumption in Buildings**

Residential Energy Use:		Commercial Energy Use:	
45%	Space Heating	27%	
18%	Water Heating	7%	
9%	Space Cooling	10%	
6%	Lighting	14%	
4%	Refrigeration	5%	
5%	Electronics	3%	
2%	Computer	2%	
3%	Wet Cleaning	6%	
4%	Cooking	2%	
4%	Adjust to SEDS	11%	<b>SEDS</b>
3%	Others	14%	...

Source: semanticscholar.org





**Left:** At the forefront of the nation's steady line of sustainable buildings are the Malaysian Green Technology Corporation (GreenTech Malaysia) GEO building in Bangi.

**Right:** With its full glass design, the glimmering green façade of the Malaysian Energy Commission headquarters also known as Diamond Building obtain 50% of its daylight needs from sunlight, thus it naturally saves energy.

Under the Construction Industry Development Board's (CIDB's) Sustainable Construction Programme, is the Malaysian Carbon Reduction and Environmental Sustainable Tool (MyCrest). MyCrest's sustainability rating tool aims to quantify and lower the carbon footprint of construction projects, by guiding design, construction, and operation of buildings in a low-carbon and sustainable manner.

MyCrest was initially introduced by the Ministry of Works through the Public Works Department (JKR) and CIDB, mandating that all public projects worth RM50 million and above to comply with this sustainability rating tool. "MyCREST takes into account 11 criteria, ranging from the pre-design phase, up to the stage of sustainable facility management, with points awarded based on carbon emission reduction efforts," explained Tan Sri Dr. Ahmad Tajuddin Ali, the Chairman of CIDB.

There is also the Building Sector Energy Efficiency Project (BSEEP) implemented under JKR, in collaboration with United Nations Development Programme and funded by the Global Environment Facility. Ir. Gopal Narian Kutty, Director of Environment and Energy Efficiency of JKR explained that, "The project essentially aims to help Malaysia in gradually reducing the rate of growth in energy consumption for this sector through an integrated programme that enhances the share of new buildings being designed and constructed as energy efficient buildings. The programme also aims to promote and encourage existing building owners to achieve similar energy efficiency standards during their renovation and retro-fitting initiatives."

Tracing back to the initial stages of the government's green initiative for the country was the National Green Technology Policy back in 2009. The policy underlined the application of renewable energy and energy efficiency in buildings through the magnification of green technology research and innovations.

Green building designs dare designers and architects to venture out beyond the codes, defying it all in the pursuit of creating a building that is not only performance driven but also minimises long-term energy consumption, environmental impact and costs. By venturing into the design phase with a holistic mindset, taking into consideration all different elements of the building, energy efficient buildings will continue to revolutionise the Malaysian construction industry. In the words of a United Nations Environment Programme expert, Dr. Arab Hoballah "...almost no country in the world can hope to achieve carbon dioxide reduction targets without including the building sector into their plan of action." Energy efficiency in buildings is, therefore, the key to reducing carbon dioxide emissions and instantaneously cutting down energy consumption in the most cost-effective and sensible way possible. **EM**

# Plugging Into the Future

## Electric Vehicles





The mention of electric vehicles brings forth the thought of non-existent tailpipe emissions, reduced air pollution and the vision of a greener tomorrow. In doing so, Malaysia has reviewed the National Automotive Policy (NAP) in 2014, with the objective of developing Malaysia as the regional automotive hub in Energy Efficient Vehicles (EEV).

This idea perfectly tallies with Malaysia's aim to become a green technology hub by 2030, with its focus on technologies such as electric vehicles, solar rooftops, sustainable buildings, and solutions to convert waste into energy.

### Future Goals

According to the National Electric Mobility Blueprint, the targets currently set to be achieved by 2030 as follows: 100,000 electric cars, 100,000 electric motorcycles, 2,000 electric buses and 125,000 charging stations by the year 2020.

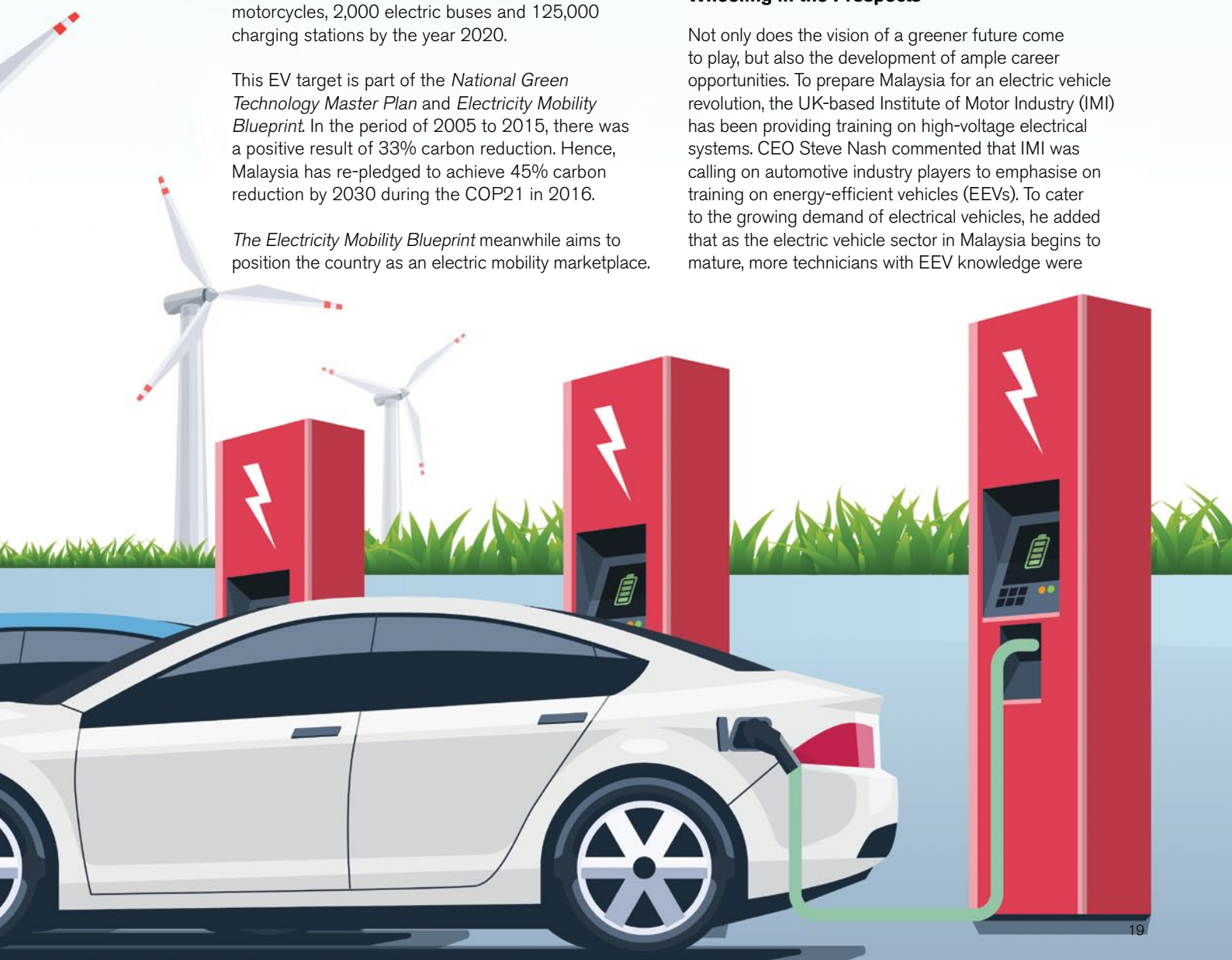
This EV target is part of the *National Green Technology Master Plan and Electricity Mobility Blueprint*. In the period of 2005 to 2015, there was a positive result of 33% carbon reduction. Hence, Malaysia has re-pledged to achieve 45% carbon reduction by 2030 during the COP21 in 2016.

*The Electricity Mobility Blueprint* meanwhile aims to position the country as an electric mobility marketplace.

These plans were developed to address the long-standing issue regarding greenhouse emissions which in turn, focuses on developing the EV industry.

### Wheeling in the Prospects

Not only does the vision of a greener future come to play, but also the development of ample career opportunities. To prepare Malaysia for an electric vehicle revolution, the UK-based Institute of Motor Industry (IMI) has been providing training on high-voltage electrical systems. CEO Steve Nash commented that IMI was calling on automotive industry players to emphasise on training on energy-efficient vehicles (EEVs). To cater to the growing demand of electrical vehicles, he added that as the electric vehicle sector in Malaysia begins to mature, more technicians with EEV knowledge were



needed as it entailed working on the high-voltage electrical systems of such cars. This would work to the advantage of graduates seeking employment in the sector. IMI South-East Asia senior manager Matthew Stuart added on that Malaysia is ahead of others in this region in the area of electric vehicle adoption. Hence with its policies and a growing awareness of electric vehicles, Malaysia has a strong potential to become the main regional training hub for electric vehicles. These reasons make it perfect for IMI to partner up with the Malaysian government and the local institutions.

**EV's Place in Malaysia**

Car ownership in Malaysia is the third highest in the world at 93% with 54% of households having more than one car. These numbers do not bode well alongside the government's initiative to reduce reliance on fossil fuels.

Malaysian Green Technology Corporation (MGTC) former CEO Ir. Ahmad Hadri Haris says that carbon dioxide emissions from road transportation in 2013 were 61.6 million tonnes. "We would need to plant over 1.5 billion trees just to absorb this amount of carbon dioxide," he says.

According to MGTC's figures, switching to EV could save you 69% in fuel and 64% in maintenance costs. The added advantage of being a proud owner of an electric vehicle would be a smoother, purring motor due to the stronger acceleration of the electric motors.

Unfortunately, there is a downside to purchasing an electric vehicle. Next to its hefty fee, the other main concern is running out of power before reaching a charging station. Current electric cars can only cover a maximum distance of 200km in one charge. Not to



fret, PLUS Malaysia and MGTC have joined forces to work towards a solution of installing rapid chargers in the R&R areas in Seremban and Ayer Keroh.

**The Transportation of Tomorrow**

To position Malaysia as a regional automotive hub, several steps have been taken. Malaysian company, Amber Dual has partnered up with automotive giant, Beijing Automotive Industrial Corporation (BAIC) in developing a pure electric vehicle to cater to the Malaysian market. The electric car, the EV200 is currently undergoing homologation testing in Malaysia. It will have a top speed of 125 kph, with a range of 200km. Equipped with a 30kWh battery (with full capacity of 53kWh), the car can be charged within six hours at home or two hours with a fast charger.

**Expected Benefits  
To the Rakyat and the Nation**

	Petrol Car	Electric Car	Difference	Savings
<b>Fuel/Electricity Cost</b>	RM30,742	RM9,572	RM21,170	69%
<b>Maintenance Cost</b>	RM23,338	RM8,486	RM14,852	64%
<b>Stationary Traffic Fuel Cost</b>	RM4,030	RM0	RM4,030	100%
<b>Battery Second Life Value</b>	n/a	RM7,824	RM7,824	n/a
<b>External Cost Savings</b>	n/a	RM2,044	RM2,044	n/a
<b>CO<sub>2</sub> Tailpipe Emission</b>	32,248kg-CO <sub>2</sub>	0kg-CO <sub>2</sub>	32,248kg-CO <sub>2</sub>	100%
<b>TOTAL POTENTIAL SAVINGS</b>				RM49,920

Source: Malaysian Green Technology Corporation





The electric car EV200 is currently undergoing homologation testing in Malaysia. There are 155 EV charging points and this number will be increased to 300 by year end.

## Proposed Tax Exemption - 2020 Targets

	2015	2016	2017	2018	2019	2020
<b>Proposed Percentage of Import and Excise Duties Exemption</b>	100%	90%	80%	60%	40%	20%
<b>No. of EVs (Estimated)</b>	126	350	1,550	13,000	25,000	59,900
<b>Cumulative No. of EVs</b>	200	550	2,100	15,100	40,100	100,000
<b>Estimated Loss of Tax Revenue (RM)</b>	1,701,000	4,252,000	16,740,000	105,300,000	135,000,000	161,730,000
<b>Value Created for EV Users (RM)</b>	613,998	1,705,550	7,553,150	63,349,000	121,825,000	291,892,700

Source: Malaysian Green Technology Corporation

*Do electric vehicles have a place in Malaysia? Based on recent and predicted future trends, the dream to have 100,000 electric cars on the road might actually be a possibility. This is if the proposed tax exemptions and other infrastructure such as charging stations takes place as scheduled. However it is good to see that Malaysia is at least taking measures to ensure the future of electric vehicles will be a promising one.*

The ride hailing company Grab, has also partnered up with the Malaysian Green Technology Corporation (GreenTech Malaysia). Earlier this year, GreenTech's former CEO Ahmad Hadri Haris told that the Malaysian government's partnership with Tesla was also part of the automotive company's plans to establish itself in the country.

GreenTech Malaysia signed a number of memoranda of understanding at the International GreenTech and Eco Products Exhibition and Conference Malaysia (IGEM) 2016, notably with Petronas Dagangan, a unit of state-backed oil firm Petroliaam Nasional (Petronas), and with German automaker BMW, to establish an EV charging ecosystem in the country.

Minister of Energy, Green Technology and Water (KeTTHA), Datuk Seri Panglima Dr. Maximus Johnity Ongkili mentioned that the 2017 Budget will encourage the use of electric vehicles. He said the ministry had plans to increase the number of charging stations to encourage the use of electric vehicles. **EM**

# CHARITY BEGINS AT HOME

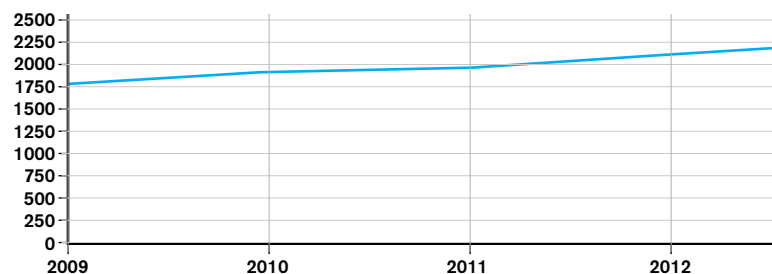
## Energy Efficiency in the Residential Sector

**W**orld consumption of energy has grown exponentially, and with it, a need to remain clean, green and efficient. Energy conservation has become a huge talking point among governments and businesses but there is one more crucial stakeholder. The residential sector is among one of many groups renewing their efficiency efforts. **Energy Malaysia** goes on the ground and analyses the current trend of energy conservation among households, as homeowners themselves share how they learnt to reduce their electricity intake.

The increase in the number of residential area development projects has greatly impacted the economy in Malaysia. However, it has also increased the energy demand by quite a stretch. Most consumers are not even aware of how much energy is being wasted on a daily basis.

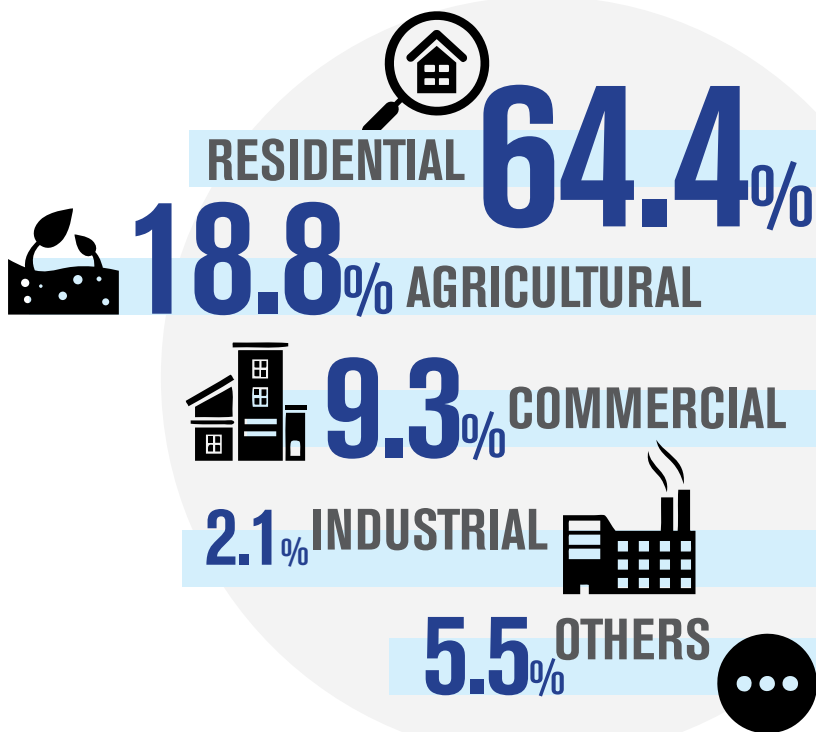
Since households are run by individuals, they are not obliged to take particular action through regulatory means as compared to other sectors such as industrial or commercial sectors, it is difficult to control household

**Residential Electricity Consumption in Malaysia (ktoe)**





## The Number of Residential Area Development Projects



Source: National Property Information Centre, 2016

energy use. Hence, the industry has to find novel ways to not only conserve energy but raise awareness of the significance of energy in the residential sector.

### A Booming Population

The population in the country has increased substantially year by year. In addition, there were around 29.3 million people living in Malaysia in 2013 as compared to 23.3 million in 2000 which incidentally contributed to the increasing trend of electricity use. Moreover, as reported by the Department of Statistics, the growth in the number of housing units completed in the country showed an increase for each year.

According to recent environmental impact assessments, the number of households has increased by 32%, and the total residential square footage has increased by 41% from 2011 to 2015. Therefore, without energy conservation improvements, energy demand for uses such as heating, cooling, and lighting would increase at similar rates.

### Electrical-Heavy Appliances

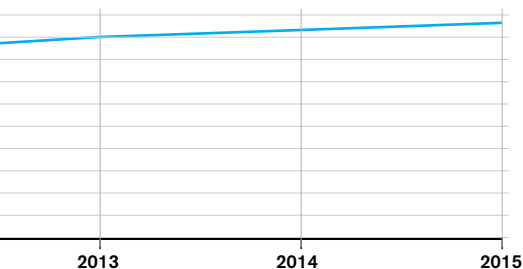
In terms of electricity consumption, as reported by Malaysia Energy Information Hub (MEIH) (2015), the use of electricity in Malaysia has increased year by year. This increment in electricity usage is attributed

mainly from the increasing use of electrical appliances such as washing machines, televisions, refrigerators, air-conditioners and other common electrical appliances.

### Governmental Strategies

In order to promote energy efficiency in households, the government developed the National Energy Efficiency Master Plan (NEEMP) within the 10th Malaysia Plan (2011-2015). NEEMP is anticipated to be a holistic implementation roadmap to drive efficiency measures across all sectors with a goal to accomplish cumulative energy savings of 4,000 kilo tonnes of oil equivalent (ktoe) by 2015.

With regards to the residential sector, the initiatives to drive energy efficiency efforts are to phase out incandescent light bulbs by 2014, reducing carbon dioxide emissions by an estimated 732,000 tonnes, and



The graph shows a gradual increase in residential electricity consumption in Malaysia from the year 2009 to 2015.

Source: Malaysian Energy Information Hub

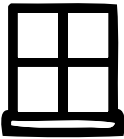
## Effective Strategy for Efficient Energy

However, the government can only play a minor role in the progress of conserving energy in the housing sector. Homeowners have to take on the responsibility of energy conservation, to avoid wasting energy unnecessarily. **Energy Malaysia** interviews Puan Hasiah Aziz, a resident of Putrajaya, on how she maintains an energy efficient home.



### INSULATING WALLS & ATTIC

Effective insulation slows the rate of heat that flows out of the house, so less energy is required to heat or cool the house. If the house has no wall insulation, blown-in insulation can greatly improve your comfort and save enough energy to be very cost-effective.



### UPGRADING/REPLACING WINDOWS

If the windows in the household are old and leaky, it may be time to replace them with newer, energy-efficient models. Replacing windows can result in cost savings, but the larger savings would be associated with replacing single-glazed windows.

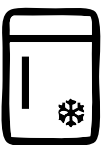


### PLANTING MORE TREES & SHRUBS

If your house is older, with relatively poor insulation and windows, good landscaping will usually do the trick with efficiency. During long periods of hot and humid weather, the foliage blocks infrared radiation that would warm the house. Of course, if your house has very good insulation and better windows, the effect is much smaller because the building shell itself is already blocking almost all the heat gain.

### REPLACE INCANDESCENT LIGHT BULBS WITH COMPACT FLUORESCENT LAMPS (CFLS)

CFLs can save three-quarters of the electricity used by incandescent bulbs. Most people don't think about the fact that the electricity to run a light bulb costs much more than the bulb itself. One of the new CFLs costs about six or twelve ringgit, but it lasts 10,000 hours and uses only about 27 watts to generate as much light as a 100-watt incandescent bulb. The best targets for replacement are 60- to 100-watt bulbs used several hours a day, because usage affects how long it takes to recover the investment.



### ENSURE REFRIGERATOR IS FUNCTIONAL

Ensure that the fridge is fully functional and place it at an area where it is not too hot as it will affect the energy usage of the fridge. If the fridge is not a frost-free model, check for frost in the freezer compartment and make sure it does not exceed 6mm.



### REPORTING ENERGY WASTAGE

Streetlights would usually begin operation from 7pm to 7am. Make an effort to lodge a report to Tenaga Nasional Berhad if any problem ever occurs.



energy usage by 1,074 gigawatts a year, increasing energy performance labelling for common household appliances and allowing consumers to make informed decisions as they purchase energy efficient products.

In addition, there are several energy efficiency programmes that are implemented such as tiered electricity tariff structures, electricity bills rebates, the sustainability achieved via energy efficiency (SAVE) rebate programme, Suria 1000 programme and the





*With over 31 million people in Malaysia and an exponential growth in the number of housing units each year, energy demand is on the rise, making energy conservation efforts more salient within the residential sector.*

## Number of Housing Units Completed in Malaysia

	2007	2008	2009	2010	2011
<b>No. of Detached Housing</b>	3,457	2,262	2,831	1,846	2,028
<b>No. of Semi-Detached Housing</b>	12,759	10,718	12,086	9,374	8,437
<b>No. of Terrace Housing</b>	79,042	54,455	51,753	36,133	33,343
<b>No. of Town Housing</b>	1,144	1,371	948	3,571	885
<b>No. of Cluster Housing</b>	2,126	1,094	1,782	910	775
<b>No. of Low Cost Housing</b>	8,229	7,341	4,550	4,220	4,839

*Source: Department of Statistics, 2012*

introduction of goods and service tax (GST). In the 2014 budget, the government announced that GST of 6% will be chargeable to the 201st unit of electricity and above

consumed by the residential sector, effective since 1 April 2015. These programmes and strategies aim to give a greater push for households to save energy use.

An energy efficient household should be supported and a residential sector that strives to innovate and make major transformations with their energy usage, should be celebrated. While there remains a strong need for more advanced technology and increased sustainability policies from our authorities, the buck does not stop with our leaders. As energy consumers and residents of planet Earth, all homeowners must continue carrying on the responsibility of conservation, in what little ways we can. **EM**

## Solar Power in Malaysia

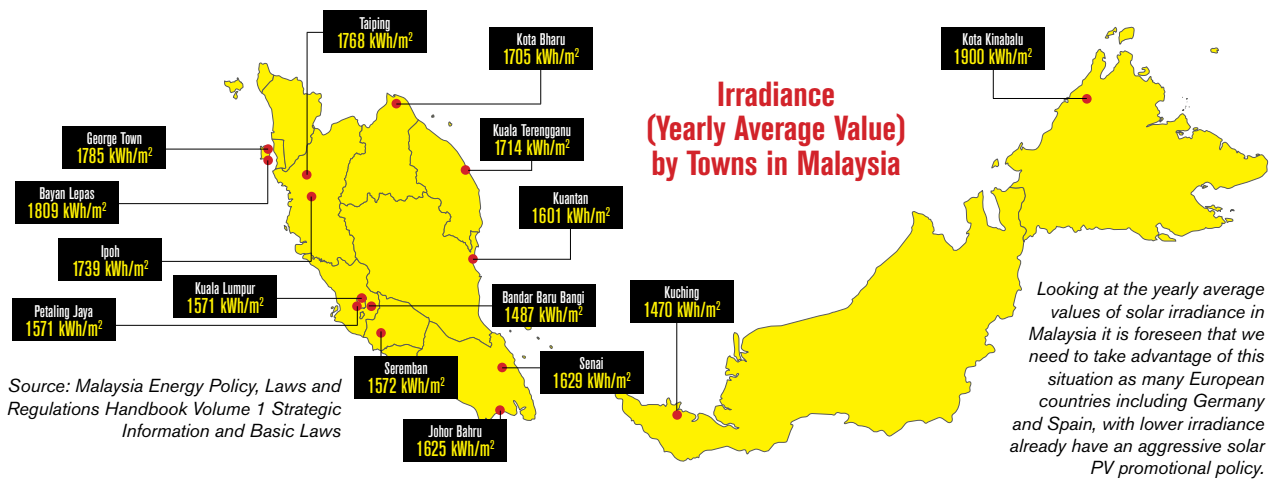
# One Nation Under the Sun

Malaysia is on course to becoming a major player in the solar power industry, particularly in the manufacture of solar photovoltaic (PV) cells and modules. Presently, the country is the third largest producer in the world of such equipment, and the Malaysian Solar PV Roadmap, which is expected to be launched by end 2017, aims to establish Malaysia as the preferred hub for solar cell manufacturing by 2030. More than just being a centre for production though, there is also a concerted effort to increase the adoption of solar power in the country.

This is in accordance with several national energy initiatives. For instance, under the *National Renewable Energy Policy and Action Plan (NREPAP)*, which was introduced in 2009, electricity generated from renewable sources – which encompasses solar PV, biomass, biogas, mini hydro, and solid wastes – is expected to reach 11,227GWh by the year 2020.

Of this, solar PV will make up just 194GWh or less than 1.7% of the total. However, over the years, the importance of solar PV in the energy mix is expected to increase. Estimates are that by 2050, it will account for 13,540GWh of the





Source: Malaysia Energy Policy, Laws and Regulations Handbook Volume 1 Strategic Information and Basic Laws

29,358GWh or 46% of the power produced from renewable energy (RE).

This spike can be attributed to a number of reasons. Firstly, there is Malaysia's strategic geographical location near the Equator, which gives it abundant sunlight and high irradiance levels.

Another reason why solar power is forecast to show high take-up is because it's power generation has zero greenhouse emission, making it another clean energy source that is viable in Malaysia. As such, adopting solar power will go a long way in helping Malaysia achieve its goal of reducing carbon intensity by 35% by the year 2030.

**From FiT to NEM**

In order to encourage the take-up of solar power, the government has introduced a number of policies aimed at individuals (including corporations) and power producers. One of the earliest being the *Renewable Energy Act 2011*, which paved the way for the Feed-in Tariff (FiT) system.

Under FiT, consumers can apply for a licence to generate electricity from renewable sources and sell it to the utility. Although this includes biogas, biomass, and small hydro, the practical choice for both individuals and organisations is solar PV as it is the easiest for people to adopt. As at time of writing, the total installed capacity of solar PV projects under FiT was recorded at 310.45MW.

Then, in November 2016, the Energy Commission launched the Net Energy Metering (NEM) scheme

and appointed Sustainable Energy Development Authority (SEDA) as the implementing agency. Just like FiT, NEM allows private individuals and organisations to generate electricity using solar PV. This time however, instead of selling the electricity to the utility, NEM licensees can consume the power produced, and then sell any excess to the grid.

NEM has an annual capacity of 100MW – of which 90MW is for Peninsular Malaysia – while the remainder is for Sabah and Labuan. This has been set for five years, from 2016 to 2020, which means that if take-up is maximised each year, a total of 450MW of electricity will be generated from solar PV in Peninsular Malaysia by the year 2020.

**Going Large on Solar**

Perhaps the biggest indication that Malaysia is focused on making solar power one of the key sources of energy is the implementation

of large-scale solar (LSS) projects, which are solar PV plants that generate between 1MW to 50MW worth of electricity.

LSS projects have been capped at 1,000MW over four years from 2017 to 2020, which works out to 200MW per year in Peninsular Malaysia and 50MW in Sabah. In March 2016, the Energy Commission announced that it was inviting Requests For Qualification (RFQ) to develop LSS projects with a total capacity of 250MW.

Later that year, in December, sixteen power companies were given the green light by the Energy Commission to construct the solar projects. Among the sixteen companies are Tenaga Nasional Berhad (TNB) is tasked with completing a 50MW solar power plant at Sepang in Selangor; Mudajaya is responsible for a 49MW solar plant at Kuala Kangsar in Perak, and Integrated Logistics is constructing a 10MW solar plant at Bandar Bukit Kayu Hitam in Kedah.

In order to ensure that the country's development needs are met, while also preserving energy security and supply, it is vital to tap into non-fossil, renewable sources of energy. Solar power is a green and inexhaustible supply and not only does Malaysia have the advantage of geography, it is also one of the biggest solar manufacturing hubs in the world. With the Malaysian Solar PV Roadmap aiming to boost expertise in solar PV production, one possible result would be more efficient panels that can generate more energy from sunlight. Ultimately, solar power may become the most cost-effective and efficient way of producing power, as it will be 100% home grown. The end result – one nation under and powered by the sun. **EM**



# KeTTHA: The Nation's Green Heartbeat

In line with the Ministry of Energy, Green Technology and Water (KeTTHA's) visions in championing sustainable energy and water for all, towards a greener Malaysia, **Energy Malaysia** met with Dato' Sri S.K. Devamany, the acting Deputy Minister of KeTTHA as he highlights the Ministry's responsibilities in formulating energy efficiency (EE) initiatives within the nation. A man with an undeniably charismatic disposition, Dato' Sri S.K. Devamany takes on the task of energetically sharing with us his roles in KeTTHA, areas that the Ministry could stand to improve on, its top three priorities in enhancing EE as well as the nation's role in captaining EE initiatives across the ASEAN region.



**Q:** What are your responsibilities as the acting Deputy Minister of KeTTHA and are there any specific areas in our current energy industry that you will be focusing on improving?

**A:** Let me start by expressing that I am very much impressed with the Prime Minister Datuk Seri Najib Tun Razak, basically as I have been following his green agenda for a long period of time. The peak of his demonstration towards the green initiative was at the United Nations Climate Change Conference 2009 in Copenhagen, where the Prime Minister declared the nation's target in reducing its carbon emission intensity of its gross domestic products (GDP) to 40% by the year 2020. This was aptly reinstated at the 21st session Conference of the Parties to the UN Framework Convention on Climate Change (COP 21) held in Paris back in 2015, where he decided to increase the commitment, to further reduce carbon intensity or CO<sub>2</sub> emissions up to 45% by the year 2030.

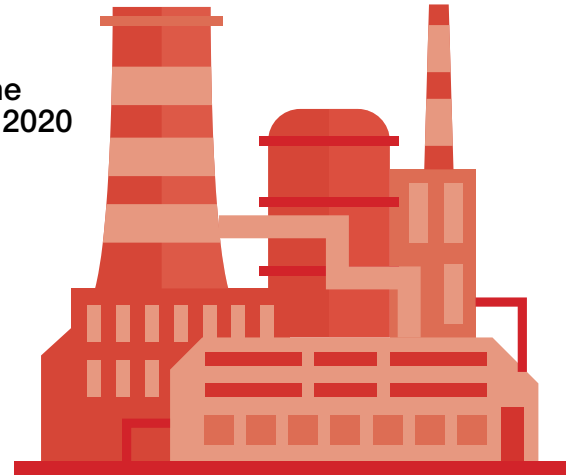
Globally, Barack Obama was also very invested in the concept of sustainability and due to this, you could suddenly see the energy landscape shift worldwide. Global warming is, essentially, the culprit, whereby our temperate climate will soon transform into a tropical climate and vice versa. The massive environmental fluctuations and calamities are evident everywhere, be it in the sudden devastating floods, dangerous earthquakes, or melting polar icecaps, all which are unprecedented occurrences. If this keeps on, no matter how much we take care of our boundaries, we may no longer be able to control the devastation of this world. This issue has manifested globally over the last two decades and I think that our Prime Minister captured it very well. He is, in fact, the first proponent of the ASEAN region who spoke about the environmental issue very vehemently, and has even gotten himself engaged with the international fraternity advocating the green, climate change, and global warming agenda.

Humanity once respected water, earth, the sun and the air around us. Nature was spiritual. Due to industrialisation, money-making mechanisms and machinery, we forgot our humanistic responsibilities

## Malaysian Carbon Emission Reduction Targets

**40%** by the year 2020

**45%** by the year 2030



along the way. In our pursuit of earning income and managing balance sheets, we overlooked the fact that nothing has been spent for the preservation of these elements of nature. We have become very much profit-driven. If it keeps on, we will not be producing citizens who are responsible. We are, instead, producing individualistic, materialistic and destructive citizens.

Therefore, the implementation of the green agenda in Malaysia is no longer through our legislatures because our Prime Minister has already done that both internationally and nationally. He is now on a mission to push the nation's green initiatives at the human level. We need to make every citizen realise that the very air we breathe must be fresh and it is our collective responsibility to achieve that.

KeTTHA is also, at present, looking at that angle, shifting smoothly from policy-making towards creating citizens that realise the significance of preserving green entities. At the same time, we are also very entrenched in developing the human resources and technology behind the ecological industry by understanding and developing modern tools that can be applied towards that process.

**Q. What would you say are the top three priorities for the Ministry in terms of enhancing energy efficiency, and what is being done to achieve them?**

**A.** An accentuation on EE has been greatly intensified to tackle the nation's energy challenge in accordance with its sustainable development agenda. The Government, through the Ministry, has taken many approaches in encouraging and enhancing EE efforts in Malaysia in order to ultimately reduce energy consumption and energy-linked concerns within the nation.

One of the top priorities for the Ministry, at the moment, is in positioning the government to lead by way of example through the implementation of dynamic policies. For example, we didn't used to have a solid blueprint on green technologies. In early 2011, we established the *Sustainable Energy Development Authority (SEDA) Act 2011*. SEDA was essentially formed as an all-inclusive green energy initiative for the nation.

We have also been standing on the green stratagem for nearly one decade now. An example comes in the form of the National Energy Efficiency Action Plan (2016-2025), which aspires for a reduction of up to 8% for electrical energy consumption in the year 2025 against business, with the implementation budget of RM543 million in all sectors (government, industry, commercial and residential).

There is also the Energy Performance Contracting (EPC) in the government sector which we are implementing now. KeTTHA has installed solar panels and has shifted to using LED lights and even my office has sensor lighting, while the air-conditioning of this building is monitored to be at its most energy efficient temperature. These are instances of EE initiatives taken by the government, evidently leading by way of example. Putrajaya, as one of the best administrative centres, has become energy efficient. Even India and Africa are coming in to duplicate the state of Putrajaya and study how it was constructed.

Other approaches to promote EE in Malaysia includes the monitoring of electrical energy consumption in all governmental ministries with a 5% reduction target and the implementation of energy saving measures (ESMs) in governmental buildings and hospitals, both with no costs and low-cost measures.

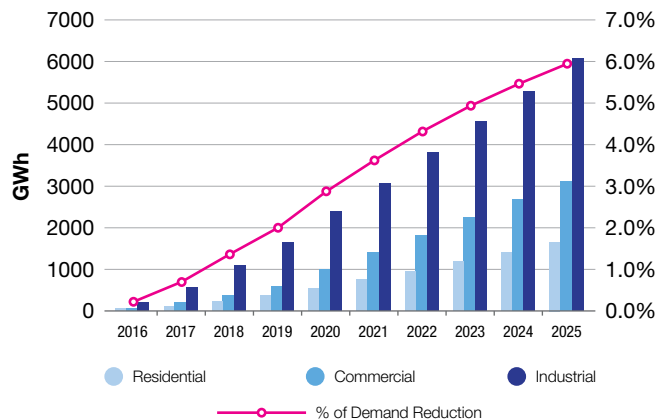
Once the laws and legislature frameworks are reformed nationally, we have to go back to people who are the implementers. Who are the people who implement these green frameworks? They are the local and state governments as well as private

institutions. So we come up with regulations and laws for them to follow. Section 23 of the *Electricity Supply Act 1990*, in particular, empowers the Minister with regards to the efficient use of electricity.

We not only push them to follow the laws and regulations, we also incentivise them. Government incentivisation motivates them to use these legislative frameworks. A fine example of this would be the GTFS 2.0 which was launched by the Prime Minister on 1 March 2017. It is essentially a fund, to be provided through the banks and granted to people who display green initiatives in their respective industries and multinational corporations, where they can enjoy a reduction of up to 2% of the interest rate. An allocation of RM200 million is committed into the GTFS 2.0, which will run over a period of 5 years.\*

Apart from that, the fact that there is a ministry dedicated towards green technology is proof of the prominence we put on the environmental agenda in Malaysia. We were definitely the first in the ASEAN region to initiate the green initiative, even coming up with very clear laws. The nationalisation of the green agenda allows us to steadily veer away from fossil fuels to other renewable energy resources. We are now migrating ourselves, rather aggressively, towards solar. In the last three years, the growth of solar in Malaysia is moving vigorously. We are also one of the top solar photovoltaic (PV) producers of the world, besides China. Malaysia is the solar king of the ASEAN region, producing PV components right here in our home ground making us the leaders of solar components manufacturing in Southeast Asia. We are not only leading because of our technology but also due to our power of financing.

**Electricity Savings and Electricity Demand Reduction by the Malaysia Energy Efficiency Action Plan (2016-2025)**





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**“The Government has been leading the green agenda by example! Putrajaya, itself, is at the frontline of turning the nation green. We are ourselves, are a green heartbeat vibrating everybody else. We are vibrating the industry and corporations as well as pulsating the green blood into the people.”**

**– Dato’ Sri S.K. Devamany S. Krishnasamy,**

Acting Deputy Minister of the Ministry of Energy, Green Technology and Water (KeTTHA)

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Several promotional and dissemination programmes and activities consisting of seminars, workshops, and roadshows have also been carried out. A fine example is the EE campaign, initiated by KeTTHA, and aptly named the “Green is a Lifestyle Campaign” where various programmes are conducted throughout Malaysia especially in universities, schools, and the public to increase the awareness on EE.

**Q: How do you see Malaysia playing a leading role in heading energy efficiency initiatives across the ASEAN region?**

**A:** Presently, EE and Conservation (EE&C) is considered one of the main catalysts for economic growth in the ASEAN region. This is aptly captured in the ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2020 goals towards enhancing Connectivity and Market Integration in ASEAN to attain energy security, accessibility, affordability and sustainability for all. Malaysia is also actively involved in regional and multilateral schemes for EE improvements across the region.

Malaysia can play a leading role in heading EE initiatives across the ASEAN through active participation in ASEAN-related programmes specifically catered towards EE&C. Apart from that, through sharing success stories and experience with fellow counterparts within the ASEAN Member States (AMSs) in the EE&C sector, the nation is utilising this opportunity to harmonise and promote the nation’s EE standards and labelling of energy-related products and services.

Dato’ Sri S.K. Devamany is indeed a man with an agenda: a green agenda. He describes KeTTHA as the ultimate “component and proponent of a beautiful sustainable development”. In which every development process is designed to encapsulate the green agenda, as an important part of the nation’s overall growth. **EM**



*Through various legislative frameworks and national initiatives put in place, Malaysia is indeed one of the leading countries on board the green agenda in the ASEAN region.*

*\*For more information on the Green Technology Financing Scheme please visit <https://www.gtfs.my/>.*

# Safety First!

## Standards on Electrical Safety Management Plan and Programme

**A**n all-day training session at the Everly Hotel, Putrajaya brought together senior officers, heads of units, regional directors and executives from the head and regional offices of the Energy Commission. The topic on hand was that of safety, where the Guideline on Electrical Safety Management Plan and Programme published by the Energy Commission was dissected from front to back, leaving participants with a better understanding of its contents, objectives and its requirements. Essentially, the electrical safety management system is a framework of processes and procedures established and implemented that will ensure an organisation fulfils all responsibilities in achieving a continuous improvement in electrical safety performance. This is in line with the Energy Commission's safety policy which also aims to integrate safety into its daily activity as the key factor towards the overall success of the energy industry.

Conducted by Datuk Ir. Ahmad Fauzi Hasan, Chief Executive Officer of the Energy Commission, the training programme started off with an explanation on the main objectives of the *Electricity Supply (Amendment) Act 2015*. Gazetted on 5 November 2015 and put into effect on 1 January 2016, the Act's objective includes enhancing the safety of consumers and industry personnel with the implementation of a safety management system. The overall aim of its implementation is to regulate electrical risks at electricity supply infrastructures and consumer installations.







Participants from the head and regional Energy Commission offices gathered together for an insightful training which highlighted the Guidelines on Electrical Safety Management Plan and Programme by Datuk Ir. Ahmad Fauzi.

The guideline, thus, was formulated to serve as a guide for licensees, owners, tenants, management, operators and contractors in the preparation of this newly required safety management plan and programme. Among its most important objectives are:

- To ensure the safety management plan or programme prepared by the relevant parties is in order according to the prescribed guideline.
- To ensure the plan and programme are suitably and systematically developed and structured to control electrical risks of electricity supply

infrastructure or non-domestic electrical installations.

- To assist in assessing the performance and compliance level of the relevant persons to the plan and programme in accordance with the Act.

The training programme is concluded with an in-depth look at the electrical safety management system audit checklist that is suggested to be used as a guide or standard by the relevant parties under the Act. The checklist is also recommended to assess and gauge the level of effectiveness, compliance and improvement measures that are

required to prepare and implement the electrical safety management plan and programme for each supply infrastructure and non-domestic electrical installation. The checklist comprises of all the required elements of the safety management plan and programme including:

1. Policy, Plan, and Programme
2. Organising in terms of responsibility, competence, and communication
3. Planning and Implementation
4. Risk Control Measures which deals with the identification, evaluation, and control of risks; the permit-to-work system and emergency preparedness
5. Performance Evaluation which contains investigation of electrical-related accidents and incidents as well as performance monitoring review
6. Action for Improvement which contains preventive and corrective action as well as continual improvement measures

The checklist ends with an overview of the licensee's or installation's status of compliance and overall evaluation review.

*“The principle of the Electricity Supply (Amendment) Act 2015 is not just aimed at safety and technical compliance but also towards the overall safety management for the industry.”*

**– Datuk Ir. Ahmad Fauzi bin Hasan,**  
Chief Executive Officer of the Energy Commission

The training programme informs and familiarises participants with the new electrical safety management plan and programme requirements as prescribed under the Act. In addition to this, the industry knowledge and know-how is greatly enhanced. **EM**

# GLOBAL ENERGY OUTLOOK FROM THE LAND OF THE RISING SUN

Japan is a country that has long been a world leader in energy research and development. A supportive government is the key towards the country's energy security and reduction of carbon dioxide emissions, with the establishment of the Institute of Energy Economics, Japan (IEEJ) as a fine example of such backing. The institute conducts specialised research activities in the areas of environment and energy from the perspective of the national economy. It analyzes energy-related problems and prepares basic data, information, and reports that are essential to policy formulation. IEEJ aspires to contribute to the progress of the Japanese energy industries, for both the suppliers and consumers, in a bid to improve the lives of its people. Based on facts and figures from the IEEJ Energy Journal, **Energy Malaysia** summarises the economic and energy outlook of the international oil and coal as well as the gas and renewable energy markets through the fiscal year of 2017 (FY2017).

## Balanced Oil Market

Globally, crude oil prices throughout February and June 2016 have seen its share of fluctuation plunging below US\$30 per oil barrel (bbl) to US\$50/bbl in the latter month. The global oil demand is expected to see a slight increase towards 2017, as demand in major consuming countries rises. Production in oil producing nations, with the exclusion of the OPEC countries, however, will decelerate.

In terms of demand, the trend shows an overall growth especially in the US, China, and India, mainly in response to the deflation in oil prices since the second half of 2014. Oil demand in the US, for example, has grown healthily following the recent price drop. According to the US Energy Information Administration, demand has increased by 470,000 barrels per day which is equivalent to 0.8% year on year to 19.45 million barrels per day (mb/d) in the first quarter of 2016. China also recorded an increase of 690,000 barrels per day which is equivalent to a 7% rise in demand, according to the International Energy Agency (IEA). This increase was mainly driven by a hike in the gasoline and liquefied petroleum gas demand within the countries. The





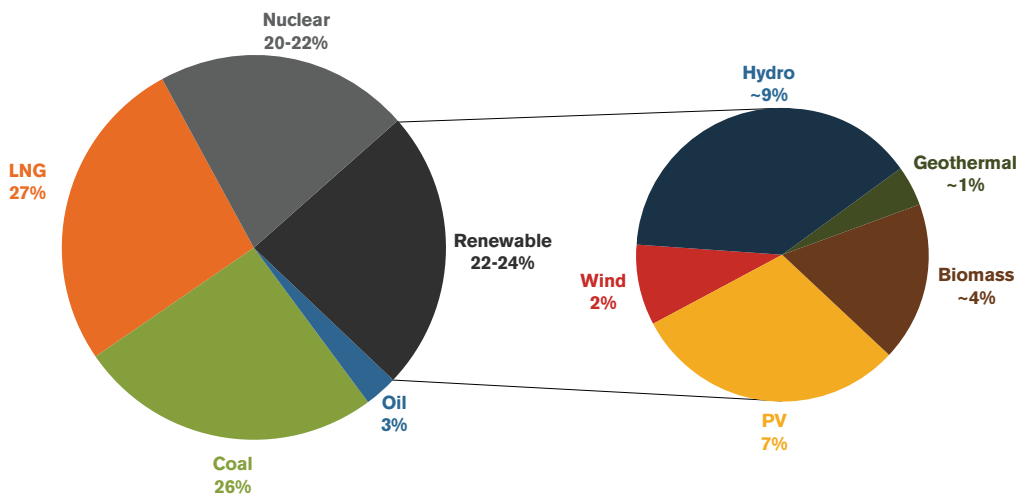
Reputable for its ability to conduct independent research and development (R&D) for a variety of sectors, Japan is fast on its way to increase its energy-related R&D.

global oil demand growth, however, will be seeing a sluggish downturn to about 1.1 mb/d, largely owing to the uncertainty of the global economic state and the pertinent appreciation of the dollar.

With regards to supply, the bulk of production came from the OPEC nations which remained high in the first quarter of 2016, amounting to 32.3 mb/d, which records a good 1.2 mb/d or 1.5% rise from the previous year. Production will remain high in the Middle East especially in Iran and Iraq in 2017. Saudi Arabia's production will also remain robust, generating well above 10 mb/d, giving continuous primacy to its market share. Non-OPEC countries, on the other hand, are seeing a slowdown in production mostly due to low oil prices. The IEA recorded a 57.2 mb/d oil output for the non-OPEC in the first quarter of 2016, a drop of 1.1 mb/d which is equivalent to a 1.9% decline from the earlier year.

Thus, the overall outlook for the international crude oil market is a well-balanced supply and demand environment, with prices rising gradually towards 2017.

### Japan's Energy Generation Mix by 2030



Source: [renewableenergyworld.com](http://renewableenergyworld.com)

Japan's electricity generation mix plans by 2030 comprises of nuclear power, oil, coal, LNG with renewables taking the lead at 22-24% of the mix.





**Bleak Year for Coal**

Amid the persistent global coal prices plunge, major coal exporting countries are resorting to cost-saving efforts. However, declining earnings have inevitably led to coal companies closing down coal mines, suspending production or having to make production adjustments.

In terms of demand, the trend seems to vary in each country. In the Asian region, for example, demand continues to grow, driven mainly by demand from its Indian and Southeast Asian counterparts. Steam coal demand for power generation, in particular, is increasing steadily. Southeast Asian nations are also expanding steam coal exports for new coal power generation capacity under the construction sector.

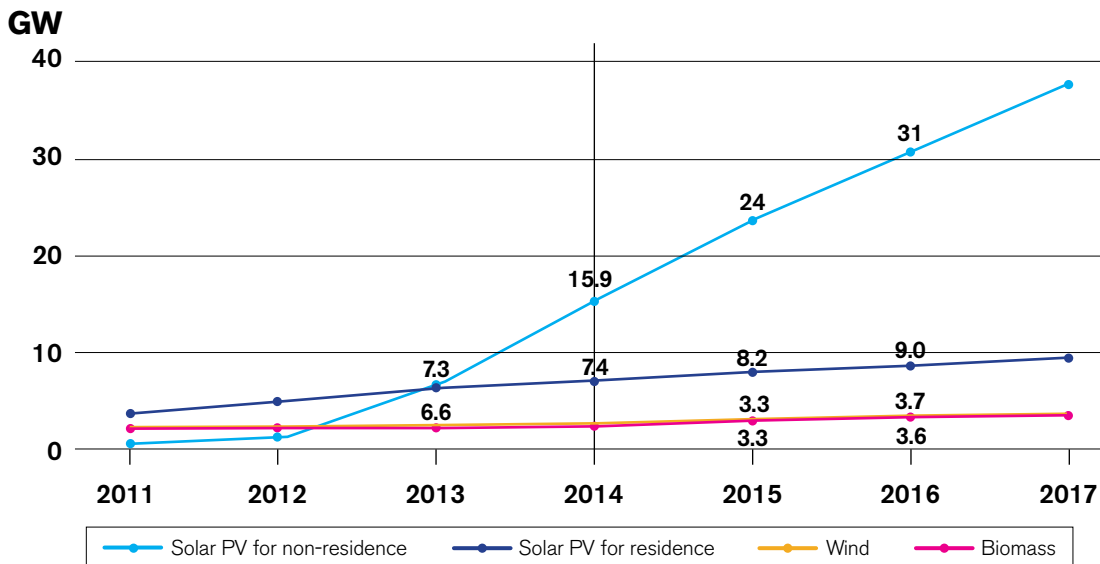
India is implementing a policy-based enhancement of domestic coal production with companies like Coal India

Limited playing their part setting an ambitious production target of up to 610 million tonnes. On the other hand, China, the US, and countries within the European region are experiencing a decline in coal demand, mainly due to factors such as economic growth deceleration, increasing renewable energy power generation, competition from gas, climate change measures and air pollution regulations, all strapping down its growth. Thus, in response to a drop coal demand, the necessary production adjustments must be made.

**Gas Demand Surges**

Demand in the international liquefied natural gas (LNG) market will see an increase from the 268 million tonnes in 2016 to 282 million tonnes in 2017. Long-term LNG contract prices indexed to oil prices are expected to increase due to the rise in crude oil prices in 2017. Consequently, Japan's LNG imports prices will also follow

**Japan's Renewable Power Generation Capacity**



Solar PV for non-residences showcased the highest renewable power generation in Japan reaching up to 31GW in 2016 followed by solar PV for residence and biomass.

Source: IEEJ Energy Journal



**Above:** The year 2017 will showcase a well-balanced supply and demand market for international crude oil, with prices surging gradually towards the year end.

**Below:** While coal demand continues to grow, its persistent price drop has resulted in a bleak year for the overall global coal market.

suit increasing gradually with the average price for LNG coming into Japan rising from US\$6.6 per million British thermal units (mbtu) to US\$7.40/mbtu.

The overall facts and figures in the international gas market also show a slackening in the global LNG growth, especially in developing countries. Contributing factors behind this include heavy competition from coal which offers better price competitiveness as well as from renewable energy which has been receiving ample policy support as of late in the power generation sector. However, future LNG demand forecasts remain optimistic particularly in emerging countries such as China and India. The IEA's "Midterm Gas Market Report" of June 2016 forecasted that the gas demand growth in both these countries would amount to 47% of the global LNG growth between the years 2015 to 2021. The European LNG demand will also show a gradual increase depending on whether surplus LNG continues to be absorbed into Europe.

In an effort to ensure the expansion and development of the LNG market, a Strategy for LNG Market Development was published in May 2016 by the Japanese Ministry of Economy, Trade, and Industry, which seeks to obtain cheaper and more available LNG. The market development will also ensure that LNG is readily available in times of supply disruptions or emergencies, contributing to the overall supply security of the country.

### Rapid Global Growth of RE

In 2015 alone, the global renewable energy (RE) power generation capacity surpassed 1,800 gigawatts (GW) which accounted for 24% of the overall power generation (the generation percentage distributed to 17% for hydro, 4% for wind and 1% for solar energy). With such an impressive numbers in their output, the growth of RE, previously predominant only in the European region, is presently veering towards Asia (particularly China) and North America. Developing countries are also revelling at the rapid expansion of RE mainly owing to its vast government policy support and significant cost depreciation in solar PV and other RE generation as well as the elimination of fossil fuel subsidies. Amid all this progress, comes a line of challenges that needs to be addressed by these nations such as grid stabilisation, the rising burden on consumers under the FIT system and an industrial shakeout under excessive competition.

However, in the Western region, recent institutional reforms have decelerated the expansion of renewable energy particularly in Germany and the United Kingdom (the UK). Germany is facing obstacles due to the compulsory implementation of the market premium system, the establishment of annual expansion targets, a shift to a bidding system, and surcharges on power generation for private consumption, which will only create a grim deceleration of renewable generation capacity growth within the nation.

In Japan, there is also a robust expansion in renewable energy policies, with the operating capacity approved under the FIT system increasing from 19GW on March 2015 to 28GW by March 2016. Figures show that the approved FIT capacity may well reach 65GW at the end of FY2017.



The overall demand in the energy markets seems to show an optimistic growth, driven mainly by the healthy economic climate of developing nations. According to the 2017 edition of BP's Energy Outlook, global energy demand will display a robust growth of up to 30% by the year 2035, an average 1.3% annual growth. There is also a new energy mix shift globally, owed mainly to new innovation of technologies that are better catered for the environment. Thus, with the ever-changing global energy landscape, industry players must also work to adapt fluidly to meet those needs. **EM**





# HAWAII

## Revitalising its Energy Scene

**T**he tropical state of Hawaii is made up of tropic islands stretched across more than 1,500 miles of central Pacific Ocean, with the Big Island in the south-eastern region and the Kure Atoll in its furthest northwest region. Consisting of eight main islands and hundreds of uninhabited reefs, cays, and atolls, Hawaii is known as the most remote group of islands on earth, due to its vast distance from any other major mainland. Most of its residents are clustered in the coastal areas, with many of the state's population living on the Oahu Island. Its natural geographical isolation by the ocean that surrounds it has made Hawaii's energy infrastructure among one of the most unique in the United States of America. **Energy Malaysia** delves head first into the tropical island's energy landscape transformation, initiatives in achieving its green goals, its implications to the state's sustainable development and how Malaysia can duplicate some of the state's sustainable development initiatives in its own renewable energy sector.



*"As the most oil dependent state in the nation, Hawaii spends roughly \$5 billion a year on foreign oil to meet its energy needs. Making the transition to renewable, indigenous resources for power generation will allow us to keep more of that money at home, thereby improving our economy, environment and energy security."*

**– David Ige,**  
Governor of Hawaii



*Located high on the blue shores of Ma'alaea, Maui, the Kaheawa Wind I has been operating since 2006. The wind facility is capable of generating up to 30 megawatt, which amounts to enough energy to power approximately 11,000 homes annually or equivalent to 9% of Maui's overall yearly electrical demand.*

## Road to Resources

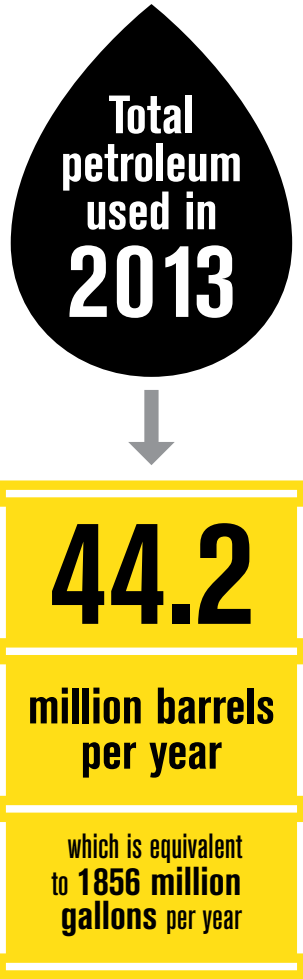
In recent years, the state has had to resort to spending more than one-tenth of its gross domestic product (GDP) on energy resources, which consisted mostly of imported crude oil and petroleum products, showcasing a state that is in dire need of an independent and sustainable energy resource. According to the United States Energy Information Administration (US EIA), more than four-fifths of Hawaii's energy comes from petroleum, making it the most petroleum-dependent state in the United States (the US). Hawaii also has the most expensive energy in the US, ranking the highest gasoline and electricity prices, with its residents paying up to double or triple the national average for electricity. The state's

over-dependence on petroleum and its isolated island grids location are the culprits for its higher than average electricity prices.

In a bid to reduce its dependence on petroleum as well as to optimise the use of sustainable and local resources, the state of Hawaii have entered into a partnership with the US Department of Energy in 2008 which was aptly named the Hawaii Clean Energy Initiative (HCEI). In 2015, Hawaii has also set an admirable legal target, making it the first state to ever set a deadline for producing all of its electricity wholly from renewable sources. Hawaii's Governor David Ige signed four law bills which aimed

to advance the state's position as a leader in renewable energy.

One of the measures signed into law by Governor Ige was the House Bill 623 which focuses on what is deemed the island's most aggressive clean energy goal yet; that is to obtain 100% of its electricity from sustainable renewable sources by 2045. The law sets to further expand the state's preceding ordinance which previously called for only 70% self-sustenance through clean energy by the year 2030. The legislature also extended the renewable portfolio standard (RPS), which required 40% of electricity to come from renewable sources by 2030. Furthermore, Hawaii has set a



*A sobering reality, Hawaii remains predominantly dependent on imported fossil fuels, primarily oil. According to the US Energy Information Administration (EIA), almost 90% of the energy used in Hawaii is from imported petroleum.*

separate energy efficiency portfolio standards aimed at lowering the anticipated consumption by 30% by the year 2030.

Legislators explained that the main objective for passing the law was to assist in eliminating Hawaii's high-priced and detrimental reliance on oil which recorded up to 40 million barrels imported annually into the state for energy production alone. Ecological energy advocates are optimistic that the new legislations will support Hawaii's gradual transition from the most oil-dependent state in the country towards being one of its greenest.

In addition to the 100% renewable energy generation measures, Governor Ige also signed legislations that will provide for renewable energy farms and

fixed net-zero energy targets for the University of Hawaii System.

Currently, Hawaii's renewable energy resources and technologies recognised under the RPS boasts an impressive list varying from the sun (solar thermal and PV), wind, hydropower plants, bioenergy (which includes biomass, biofuel, and biogas), geothermal, ocean energy (wave, tidal and thermal), seawater-chilled air conditioning and the hydrogen created from renewable energy sources. In 2015 alone, up to 23.4% of the state's electricity was generated from its primary renewable energy resources; solar PV, wind, and biomass.

**Best-suited for Solar**

Located 1,800 miles north of the equator, Hawaii's tropical climate, with a steady stream of sunlight all year long, makes it the perfect place for solar generation. Its superior solar resources and advanced energy policies have resulted in a hiked annual solar capacity for the years 2007 to 2013. By the year 2015, solar power became Hawaii's biggest renewable energy source supplying approximately 35% of renewable generation, due mostly to the state's growth of distributed solar generation.

Hawaii now boasts more than 60,000 residential and commercial properties hosting PV capabilities, with nearly 50 megawatts installed at some of its state's commercial and military facilities. With so much request for solar connection, state regulators are now balancing those requests with its grid stability requirements to ensure smooth operation of electricity throughout the region.

**Wind to Energy**

Its second most utilised renewable energy resources, wind energy, accounted for approximately 28% of the island's renewable energy portfolio in 2015. Wind energy also logged up to 6.5% of the total energy sold and distributed by the state's utilities.

The potential for utility-scale wind power generation can be found both

onshore and offshore of Hawaii, with six massive wind farms within the islands of Oahu, Maui and the Big Island. Currently, small wind projects are powering the water treatment plant and irrigation system on the Big Island while several offshore wind projects in the federal waters around Oahu are being projected in the near future.

**Wonderful Waves and Water**

Encircled by the Pacific Ocean, Hawaii has an abundance of renewable ocean resources. Ocean energy consists of both hydrokinetic (wave energy) and thermal resources. The state possesses a huge potential for hydrokinetic resources which taps into the movement in the ocean from its waves, currents, and tides to generate electricity. Ocean Thermal Energy Conversion (OTEC), on the other hand, is an energy generation method that utilises the temperature differences and heat in between the different levels of water which ranges from the warm surface waters to the cold deep ocean waters.

Presently, Hawaii has a lofty potential for both wave energy and OTEC, hosting various ocean energy research, development and exposition projects both at its own home ground and around the globe. Studies have indicated that wave energy could provide up to one-third of Hawaiians' electricity, with the right technological developments. The state has since welcomed the first ever ocean-wave generated electricity to be transmitted to the grid in the US, generated by an Ocean Power Technologies (OPT) PowerBuoy at Kaneohe Bay in 2010. It later collaborated with the US Navy to deploy three more OPT buoys from 2004 to 2011.

The US Navy have also partnered up with the Hawaii National Marine Renewable Energy Centre (HINMREC) at the University of Hawaii-Manoa, one of the three nationally-funded centres for marine energy research and development in the nation, in a bid to establish a multiple-berth wave energy test site (WETS) at Kaneohe Bay, Oahu. The first wave buoy under WETS



was the Azura prototype, which was deployed at the WETS 30-meter-deep berth and has since been removed after the completion of its trial demonstration period in 2016. The US Marine Corps have also announced in March 2016 of its projected second wave WETS-connected buoy deployment, the Fred Olson Lifesaver energy converter.

### Energy from Mother Earth

The Hawaiian Electric Company 2016 report shows that biomass, especially from agricultural waste has long been utilised to generate heat and electricity in the state's rural areas. Honolulu's H-POWER waste-to-energy plant in

Campbell Industrial Park Generating Station provides up to 10% of Oahu's electricity from municipal solid waste. The 110-megawatt station was unveiled and began service in 2010 and is currently the world's biggest commercial electricity generator that is primarily fuelled with sustainable biofuel. Presently, various biomass electricity generators are already operational or in its construction process in the islands of Oahu, Kauai, and Maui.

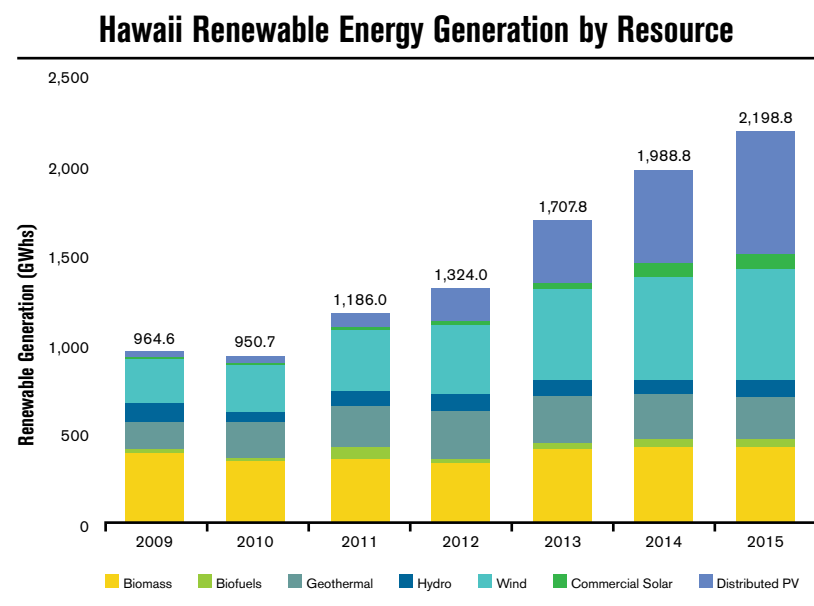
The HCEI also provides a roadmap to the usage of biomass and biofuels in the state with the hopes of a gradual shift from petroleum fuels and the boost of the state's agricultural sector.

### Malaysian Emulation

While Malaysia has made commendable progress in its renewable energy sector, with ample government initiatives moving it forward, it may stand to learn from Hawaii's energy transformation. Hawaii currently has the highest penetration of rooftop solar in the nation, with an estimated 12% of rooftops boasting PV installations, which represents 5.7% of the electricity generated in 2014 in its major service territory. It has since transitioned away from net metering to ensure that all customers benefit from the continued growth in distributed energy and not just those who have the ability to install solar PV. Two new programmes have been designed in its place for customers seeking distributed energy resources: customer grid-supply (CGS) and customer self-supply (CSS).

Malaysia, on the other hand, is still at the initial stages of solar installations. Thus, the implementation of net energy metering is still relevant to encourage the use of solar installations, allowing for self-consumption of the electricity generated by solar installations.

Hawaii is undoubtedly at the forefront of the renewable energy scene, in terms of its utilization, technology, and policies. Its groundbreaking '100% renewable' goal is definitely an impressive stand, one that has pushed the country, rather forcefully, into becoming energy sufficient. This shows that setting a legal deadline to achieving a goal may be a good idea, and one that Malaysia could stand to duplicate.



*Boasting ample renewable energy resources, Hawaii has achieved up to 25% clean energy in 2016, according to the state's Energy resources Coordinator's Annual Report.*

*Source: Hawaii State Energy Office*

Being the first state in the United States to set such ambitious self-sustaining goals, it will indeed require considerable effort to achieve. However, despite the challenges that the state of Hawaii will need to bulldoze through, the goal would be attainable with ample co-operation as well as through the formation of partnerships between all key industry players, including Hawaii's very own energy utility supporting its new legislation. As authorities are eagerly set for the clean transition towards renewable and sustainable projects, the populace is also increasingly enthusiastic to join in on the green bandwagon. With most of its neighbourhoods now fully decked with solar panels and wind turbines sprouting everywhere, Hawaii's energy landscape is indeed on its way onwards and upwards. **EM**



# DENMARK'S Green Transformation

How Denmark managed to make green transformation an effective driver for economic growth

By Nicolai Ruge, Ambassador of Denmark to Malaysia



**M**ark Twain wisely said: “Plan for the future because that’s where you are going to spend the rest of your life.” In the same vein, Denmark took a hard look at its energy policies and what the future should look like – and decided it should be green and fossil fuel-independent by 2050.

## Denmark's Green Record

In keeping the country on track to becoming completely independent of fossil fuels by 2050, Denmark has established for itself a long track record of green policies. Green taxes, tough environmental regulations and targeted subsidies have gone hand in hand. During the last 30 years the Danish economy has doubled, while our use of energy has remained constant and our emissions of CO<sub>2</sub> have been reduced.

The average Dane consumes about half the energy of an average American. Contributing to this is the fact that virtually all combustible waste is either recycled or used to produce power and heat. Only 1% ends up in landfills.

Likewise, water abstraction has been significantly reduced and more than 90% of our waste water is subject to advanced treatment.

Some of the key words behind this low carbon footprint is district heating, where the power from a single source is used to heat and power entire cities. The transport sector is still a big challenge, but Copenhagen has shown a way forward: 45% of all Copenhagensers use their bicycle to go to work every day. Before I moved to Malaysia, I was one of those Copenhagensers, cycling 7 kilometres to work every day – and back again.

With public entities and private consumers increasing the demand for more energy and cost-efficient products, private companies are pushed to innovate. This is a win-win for society, government and business. Clean technology is Denmark's fastest growing export, currently accounting for 15% of total Danish exports and Danish energy technology exports have grown on average 7% annually for the past 20 years.

We want to reduce our emission of greenhouse gasses by

40%

in 2020

(compared to 1990)

We want to reduce our energy consumption by

7%

in 2020

(compared to 2010)

### Transforming the Building Sector

Buildings are responsible for as much as 40% of Denmark's total energy consumption. Requirements to meet specific thresholds for energy consumption have been incorporated in Danish building regulations since the early 1960s. The requirement on energy performance of new buildings is regulated in the Danish Building Code that covers energy for heating, cooling, ventilation, domestic hot water and lighting.

To ensure high levels of energy efficiency in new buildings, the energy requirements were significantly tightened in 1977 and at the same time, government subsidies for energy improvements made to the existing building stock was introduced. A whole new industry of energy retrofitting started developing and Danish companies were quick to see that it held an export potential in its own right. An example of this in Malaysia is Danish Energy Efficiency Partners Sdn. Bhd. that is working with the State of Melaka, among others, on energy retrofitting a wide range of public buildings, from bus stations to hospitals.

By 2020 the energy performance of new buildings in Denmark will be extremely strict: New buildings must be "nearly zero" energy buildings and their energy needs covered primarily by renewable energy sources or district heating. A good example of how Denmark's green journey is continuing by relentlessly setting new and higher goal for a better tomorrow.

It makes me proud that also future Danish generations will be living in a country with minimal pollution, a low carbon footprint and be able to toast in the purest drinking water directly from the tap – generally enjoying a high quality of life.

### Malaysia and Denmark – A History

Denmark and Malaysia have had an impactful relationship when it comes to the creation more sustainable, lower-carbon growth. A good example of this would be the Environment Cooperation Programme between Malaysia and Denmark that was anchored in the Economic Planning Unit of the Prime Minister's Office

and lasted from 1994 to 2010. The collaboration was very successful in helping Malaysia to develop and test policies in areas such as energy efficiency and waste management.

Denmark was also instrumental in launching the annual Global Green Growth Forum, which brought together top government and business leaders from all over the world to converge in Copenhagen for discussions on how to best cooperate and complement each other in the pursuit of green growth. This would in turn be transformed into concrete actions through public-private partnership agreements. I had the pleasure in 2016 of accompanying the Honorable Minister of Energy, Green Technology and Water (KETHA), Datuk Seri Panglima Dr. Maximus Johnity Ongkili, who attended the Global Green Growth Forum in Copenhagen along with a delegation that included, among others, the Energy Commission, Tenaga and SEDA. The possibility of elevating the Global Green Growth Forum to a higher international status is currently being explored with the United Nations.

What we need is a green industrial revolution that cuts across energy production and consumption, and which links energy efficient and zero-carbon transport and buildings to each other through smart grids and the internet. To get the green transition going we need to become better at working and thinking across sectors, industries, technologies to accelerate and create viable solutions. And governments need to do this in partnership with the private sector. **EM**

# Energy Market REFORM

## Past Lessons for the Future

**O**n 26 May, Professor Ken Koyama gave a comprehensive talk on “Industry and Market Responses to Electricity Market Reforms”. Split into two sessions, attendees from different professional bodies, organisations and higher learning institutions were delivered with information and statistics that drew comparison between energy markets in Europe, United States, Japan and Malaysia.



*Professor Ken Koyama is the Chairholder in Energy Economics of Energy Commission at Universiti Tenaga Nasional (UNITEN) and also the Managing Director and Chief Economist at the Institute of Energy Economics, Japan (IEEJ).*



In the talk, Professor Koyama stressed the importance of learning the history of the global energy market to understand more in-depth about the advantages of market reform by using examples from Japan as well as other countries. He emphasised the Fukushima disaster in 2011 which left the power supply and cooling systems for three Fukushima nuclear reactors disabled, motivating the market reform.

There are many advantages to this shift that Professor Koyama elaborated on, mainly the fact that there will be a more secure and stable supply of electricity. This is ensured through different facilitating power houses in different regions of Japan where the balancing capability is maintained with the help of new entrants. A vast amount of potential and innovation would be brought in by fresh players who look at the market from a different angle.

Professor Koyama then explained the importance of this process where it helps hold down increasing tariffs which will benefit both businesses and consumers. This is due to the emergence of new entrants where a healthy competitive market will increase efficiency and productivity in the energy market. Consequently, consumers will be able to see lower and more stable electricity bills.

Not only that, there would be a lot more choices for consumers as business opportunities widen. The variety of new technologies has drastically changed the way utilities provide for consumers. With this, there



*The quality of the talk was elevated by Professor Koyama's years of industry experience.*

is an increased amount of options that cater to specific consumer needs, minimising energy wastage.

The talk included a Q&A session where participants discussed further about future prospects of the energy market in Malaysia based on current situations and past actions. Professor Koyama gave a definite answer, placing close attention to history. He defined history of market reform as a "continued process to fix or modify the reform", suggesting the importance of gathering knowledge

in the ever-changing landscape of the energy market.

Concluding the talk, Professor Koyama noted down important lessons learnt based on research done in Japan and abroad. He mentioned that market reform is a natural development in terms of streamlining the electric power and gas industry. The process would prompt more opportunities for the economy to grow which would therefore result in more choices for consumers.

Electricity market reform is not a simple ordeal. There are measures to be taken, a variety of possible threats to overcome and most importantly, knowledge to be absorbed. Professor Koyama believes that it is an important learning curve that can also be seen as a "large social experiment" as the energy market is constantly undergoing changes. As such, priority should be placed in understanding the potential of the energy market and ways to take advantage of it. **EM**

# Redefining GREEN CONSTRUCTION

**A** total of 160 exhibitors participated in Ecobuild Southeast Asia 2017 (Ecobuild SEA 2017) this year to showcase sustainable designs, latest products, technologies, and innovations in construction. The exhibition also marked its fourth year in collaboration with the International Construction Week 2017 (ICW 2017), the leading annual event that brings big construction players across Malaysia and Southeast Asia together under one roof to display their latest innovations, share their accomplishments and build new partnerships. The three-day exhibition went on from 12 to 14 April 2017.



*Among the notable booths gracing the floor of Ecobuild SEA 2017 was the Energy Commissioner booth under the Ministry of Energy, Green Technology and Water (KeTTHA) pavilion which put forward various green initiatives taken by the government sector within the construction sector.*

## In Making a Difference

Themed "Towards Enhancing Safety and Quality in Construction", ICW 2017 was officiated by Dato' Sri Haji Fadillah Yusof, the Minister of Works Malaysia. Among the dignitaries that graced the opening ceremony were Tan Sri Dato' Dr. Ahmad Mustafa Babjee, the Chairman of UBM Malaysia and Tan Sri Dr. Ir. Ahmad Tajuddin Ali, the Chairman of CIDM Malaysia who each took the stage for their own welcoming remarks. The event ultimately aims to offer a world of opportunities and interactions between industry giants to seek new business as well as keep informed on the latest trends and technologies to hit the industry. It also sets an excellent platform for them to network and expand their horizons in finding solutions to field-related problems.

The affair also comprised of the international solar energy exhibition under the name Solar ASEAN 2017 with both local and international solar energy players showcasing the best they can offer in the field, which includes big names such as BSL Eco Energy and Amtech Power. The launch of the nation's first ever solar string inverter range assembled locally was also officiated by Dato' Abdul Razak bin Abdul Majid, the Chairman of the Energy Commission, under the solar energy exhibition. The locally assembled certification was awarded by the Sustainable Energy Development Authority Malaysia (SEDA) enabling solar system owners to enjoy an extra RM0.05 per kilowatt of energy generated from their installation.

Booths were also not limited to private construction companies but included an array of government agencies keen on highlighting their initiatives and contributions in the sector. Notable mentions were the booths of the Ministry of Energy, Green Technology and Water (KeTTHA), the Energy Commissioner and the event host's own CIDB booth. CIDB pressed on its green and sustainability programmes such as MyCrest and Mampan, programmes engineered especially for the construction sector.

## Seminars of Experts

The event also set up numerous platforms in and around the exhibition floor for free-to-attend, concurrent seminars covering up to 46 topics as well as technology symposiums, proving a good variety of activities for visitors to engage in. Reiterating Tan Sri Dato' Dr. Ahmad Mustafa Babjee in his opening speech, "These seminars will act as an effective educational platform for industry players to keep abreast with the latest industry trends, which I hope all participants will tremendously benefit from."

It is indeed an exciting time for the construction industry with field giants giving their full commitment into transforming the industry to higher levels of quality, safety, and service. Events such as this are an opportunity for locals to excel while working alongside foreign players. The continued collaborations between the industry players and the government, will only spur the sector to greater heights.

# The World Comes to **Kazakhstan**

**E**XPO International Exhibition held in Astana, Kazakhstan this year is a global event aimed at education, sharing innovative solutions, progress promotion and development of cooperation activities. Since the first exhibition in 1851 in London, EXPO has been opening new horizons in maintaining sustainable development and advanced solutions to international problems. For EXPO 2017, Kazakhstan has chosen the theme “Future Energy” to promote and discover sustainable energy solutions that will create a monumental global impact. From 10 June until 10 September, the best and the brightest will gather in Astana to tackle humankind’s biggest challenge, how do we ensure safe and sustainable energy for all?

The global gathering showcased developments from around the world in the field of green and renewable energy. The main building of EXPO is the National Pavilion of Kazakhstan, created in the form of a sphere. Known as the Sphere, the impressive building is carefully constructed with photovoltaic cells which will convert solar energy into electricity. This stunning monument which is the largest spherical building in the world, showcases innovations in space, solar, biomass, wind, water and kinetic energy.

Malaysia joined 149 other countries to showcase our leadership and expertise in green technology as well as Malaysia’s unique culture. The Malaysia Pavilion, which carries the theme “Powering Green Growth”, is one of the largest pavilions at EXPO 2017 with 727sqm. The 727sqm pavilion would not be possible without support from corporations and the private sector. Focusing on green energy and technology, Malaysia’s pavilion is spearheaded by the Ministry of Energy, Green Technology and Water (KeTTHA). Sponsors include Tenaga Nasional Berhad, Gas Malaysia, Itramas



*The Malaysia Pavilion showcases the theme “Powering Green Growth”, symbolising the country’s vision of a greener future through five main sectors; Powering the Nation, National Transformation, Empowering the Vision, Energy of Harmony and Malaysia Business Centre.*

Technology, Helios Photovoltaic, Mudajaya Group Berhad, Gading Kencana, Julie’s and Puro Board Sdn Bhd.

Malaysia is also hoping to stir a social buzz through a social media campaign based on that small actions can collectively lead to significant

impact, based on the butterfly effect phenomenon. The 1 Post = 1 Watt pledge, which runs throughout the duration of EXPO 2017 is part of the #MyButterflyEffect campaign. For every post during EXPO 2017 with the hashtag #MyButterflyEffect, Malaysia will add one Watt of solar generation.

There’s no way better than to sum up Malaysia’s participation in EXPO 2017 than by Datuk Seri Panglima Dr. Maximus Johnity Ongkili, the minister of KeTTHA. “As an Emerging Market leader, Malaysia is in a position to inspire the world. We believe that a relatively small nation like Malaysia can inspire big changes in green growth on a global scale because, after all, green growth is in our nature. With the #MyButterflyEffect campaign and asking the simple question #Wattif, we have set in motion a butterfly effect that will hopefully result in a world powered by future Energy.” **EM**



# RUN for Energy Efficiency

The completion of the biennial Energy Efficiency Run (EE Run) programme marks the successful continuation of the Energy Commission's push for energy efficiency management. The run is a platform in reaching out to the masses to inculcate the macro objective of sustainability in energy and healthy living through transfer of information among various stakeholders in the efficient management of energy consumption.



Datuk Ir. Ahmad Fauzi Bin Hasan, the Chief Executive Officer of the Energy Commission presenting the jubilant winners of EE Run their much-deserved prizes and trophies.

It is also an extension of the "Be Energy Smart" campaign to encourage the public on not only efficient but effective energy management and consumption thereof.

The 2017 EE Run held on 15 April garnered 1,500 participants competing in 12 different categories. They comprised of key players from the energy industry as well as the general public inclusive of a wide range of age groups.

Datuk Abdul Razak Abdul Majid, Chairman of the Energy Commission mentioned in his speech on the significance of the run as being a long term initiative to improve the knowledge and understanding of efficient energy management, which starts from the individual and how such management is inextricably linked to healthy living.

He also added that the run would serve a social dimension where key

## LIST OF WINNERS



### 10 km

Net Time (mm:ss)

**Category A (Men Open)**

Rosnizam Rosli ————— 35:41

**Category B (Women Open)**

Tan Mei Wai ————— 50:10

**Category C (Men – Veteran)**

Vadiveelu Arumugam ————— 38:05

**Category D (Women – Veteran)**

Susan Khoo ————— 47:57

### 5 km

Net Time (mm:ss)

**Category E (School Boys)**

Muhammad Syahmi Suhardi ————— 35:41

**Category F (School Girls)**

Ainul Mardiah Azahar ————— 50:10

**Category G (Men Open ST)**

Ahmad Imran Mohamad Hilmi ————— 38:05

**Category H (Women Open ST)**

Nur Hanis Ismail ————— 47:57

**Category J (Men Veteran ST)**

Khairul Nizam Anuar ————— 35:41

**Category K (Women Veteran ST)**

Nurul Haiza Mohd Roslan ————— 50:10

**Category M (Junior Boys ST)**

Azrul Akim Mohamad Hilmi ————— 38:05

**Category N (Junior Girls ST)**

Nur Azrin Sharina Mohd Hilmi ————— 47:57

industry players and the general public, young and old, are able to form strong camaraderie to share methods of energy conservation. That interaction is key to achieving the run's objective on a micro scale.

All participants received a finisher medal whilst the first 10 winners from every category won cash prizes. The top three winners, in addition, received trophies of acknowledgment. **EM**

# Safe And Efficient Usage Of Electricity

Test the automatic circuit breaker switch in your home today!

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

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

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

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

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



**VALUE OUR LIVES. AVOID ACCIDENTS AND WASTAGE!**

## **PRACTISE EFFICIENT WAYS OF USING ELECTRICITY**

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

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

Use electrical appliances at moderate speed, temperature and load.

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

Monitor the electricity consumption level at your premises.



# ORDERLY SUPPLY and USE OF ENERGY

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

## The Energy Commission...

### Advises

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

### Regulates

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

### Promotes

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

### Plans and develops

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

### Licenses and certifies

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

### Monitors and audits

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

### Investigates

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