Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga
Energy Commission

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Developing Efficient Energy

The Energy Sector's Enhanced Efficiency Initiatives

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Towards A World-Class Energy Sector
Energy Malaysia
Suruhanjaya Tenaga Energy Commission

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Moving the National Energy Efficiency Agenda

Energy efficiency (EE) has emerged as one of the strategic initiatives for the Government in recent years as rising energy demand coupled with supply security is likely to have a strong impact on the country. In this regard, it is important to set bold yet attainable energy efficiency targets.

Under the 11th Malaysia Plan, the Government has rolled out energy efficiency programmes and identified several key priorities and projected targets. For example, the National Energy Efficiency Master Plan (NEEMP) 2011-2020 is a roadmap to jumpstart an energy efficient culture in the country. The target is to reduce electricity consumption by 10% by 2020, which is to be carried through 18 specific energy efficiency programmes implemented over a 10-year period.

Transforming buildings and making them more energy efficient is one way to achieve these energy and environmental goals. Government buildings have taken the lead to drive energy efficiency by surpassing conservation goals over the past few years. This has made them truly exemplary showcase models that the private sector can emulate.

Over a three-year period, these government buildings have successfully turned around and achieved a staggering 10.9% reduction in energy consumption, which translates to about 28.9 million kWh of usage. We hope to see more state-of-the-art energy efficient buildings being built, and even more retrofitted into green buildings.

Another initiative is the Energy Performance Contracting (EPC), which is able to facilitate capital allocation required to retrofit buildings into energy efficient buildings. EPC projects are expedient to bringing major energy savings, and therefore support emission reduction. The good news is that a network of Energy Service Companies (ESCO) is already very much in place.

We have also recently implemented the Net Energy Metering (NEM) scheme to encourage private individuals and organisations to self-generate electricity, mainly through solar PV installations, thus helping to reduce the carbon footprint. , Expected to be a disruptive force within the energy sector, the NEM

scheme, which started in November, forms a natural hedge against any future gyrations in the electricity tariff and it is estimated to contribute to the RE National Target of 11% by 2020.

All these programmes are envisaged to provide significant opportunities to reduce non-renewable energy utilisation and help inject more energy efficient behaviours into the Malaysian culture. A yearly programme named the Energy Efficiency Challenge in schools has been effective in creating awareness and demonstrating good energy consumption habits among participating schools, which invariably may extend to the home environment and hopefully to the entire community.

Meeting the growing energy demand could be a great challenge for the Malaysian government in the future with the continually evolving global situation. Finally, the Energy Commission firmly believes that all efforts into accelerating energy efficiency should be encouraged in order to progress towards better management of the entire energy supply chain. EM

Dato' Abdul Razak Abdul Majid
Energy Commission, Malaysia

Suruhanjaya Tenaga
Energy Commission

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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.

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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.

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

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Turbines operating on tidal power have the capacity to generate huge amounts of electricity.

Betting On Tidal Power

With narrow straits straddling the Indian and Pacific oceans, Indonesia has significant tidal power potential, and PT Arus Indonesia Raya (AIR) and OpenHydro plan to build the country's first tidal power project. "The project is important for Indonesia and the world so we can stop burning coal," said AIR President and Director Panji Adhikumoro Soeharto.

Indonesia has the potential for up to 60GW of tidal power, more than Indonesia's total electricity capacity of just over 50GW last year.

The turbines, which will sit on the seabed, are expected to cost up to US$7 million, and plans are in the pipeline to develop up to twenty 2MW turbines in an area which has tidal power potential in the Bali Strait, which will supply power directly to state energy company Pertamina.

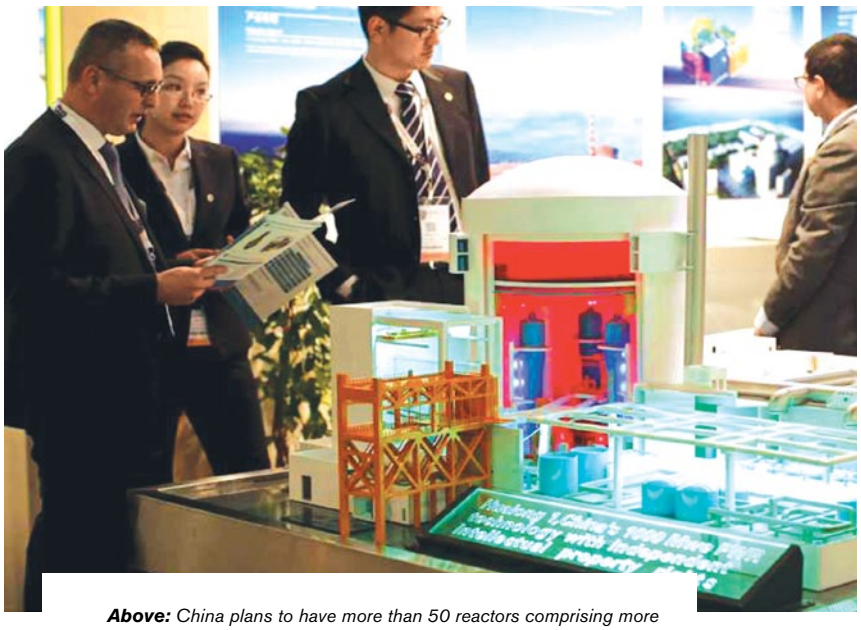
Indonesia plans to have renewable energy comprising about a quarter of its total energy generation by 2025, an increase from the 5% of energy generation that it currently makes up. EM

China to Have Largest Nuclear Capacity

China is set to overtake the United States to have the world's largest nuclear generating capacity over the next 10 to 15 years as it races to build new reactors to combat pollution. According to the World Nuclear Association (WNA), it will overtake France to have the second-highest number of nuclear reactors by 2020.

"For China, the air pollution is a major driver," said Agneta Rising, WNA's Director-General.

In Asia, 134 operable reactors generating 47.4GW are currently under construction, which comprise nearly two-thirds of global reactor construction. China makes up the bulk with 20 reactors under construction. EM



Above: *China plans to have more than 50 reactors comprising more than 50,000MW in nine new countries in the region, with most planning to have their first nuclear reactors enter operation before 2030.*

Below: *The Sanmen Nuclear Power Plant in China during construction.*

Solar Energy Dominates by 2020

Solar energy will be the top source of electricity by 2050, aided by plummeting costs of the equipment to generate it.

According to the International Energy Agency (IEA), solar photovoltaic (PV) systems could generate up to 16% of the world's electricity by 2050, while solar thermal electricity (STE) – from 'concentrating' solar power plants could provide a further 11%.

"The rapid cost decrease of PV modules and systems in the last few years has opened new perspectives for using solar energy as a major source of electricity in the coming years and decades," said IEA Executive Director Maria Van Der Hoeven.

Solar PV panels constitute the fastest growing renewable energy technology in the world since 2000, although solar is still less than 1% of energy capacity worldwide. EM

IEA Executive Director Maria Van Der Hoeven expects plummeting costs of equipment to push solar energy to the top spot by 2050.

IEA's Open Door Policy Welcomed

IEA Executive Director Dr Fatih Birol and several ministers from ASEAN having a discussion on the need to build secure and sustainable energy supplies and markets at the closed-door meeting held in Myanmar.

The 34th ASEAN Ministers of Energy Meeting (AMEM) was held in Myanmar in September to endorse the ASEAN-IEA Joint Statement of Cooperation for 2017.

Under the Joint Statement, several key areas of cooperation between IEA and ASEAN member states were outlined, including energy development, energy security, emergency response coordination, regional market integration, and energy efficiency standards.

"Given Southeast Asia's rising importance on the global energy map, the IEA attaches high priority to supporting ASEAN countries in addressing energy challenges in a sustainable and innovative way," said Fatih Birol, IEA's Executive Director.

The bilateral cooperation was attended by Ministers from ASEAN, the Heads of ASEAN Power Utilities (HAPUA), and ASEAN Centre for Energy (ACE). EM

Water as a Renewable Fuel Source

Technology has now made it possible to process water to generate electricity. This is done by using the electrolysis process that breaks down the water molecules to release hydrogen. The hydrogen gas is then kept in a high compression cylinder tank or dissolved in a special powder for the safe storage of the highly flammable gas.

The hydrogen fuel cells that change hydrogen into energy help mitigate the worsening greenhouse effect.

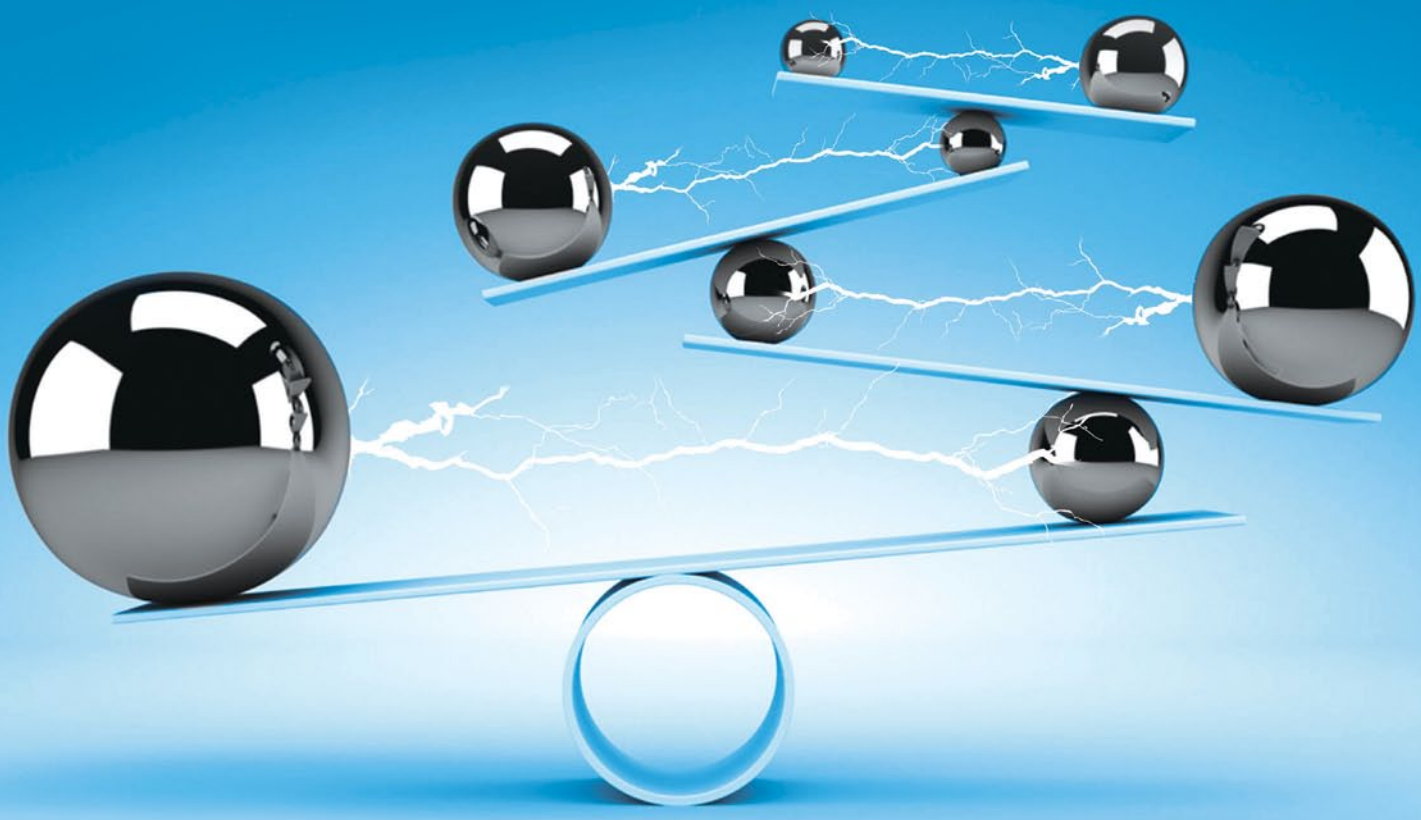
This system, which combines the hydrogen fuel cells with solar energy, is already being used at a base transceiver station in Kuala Rompin, Pahang and has solved many problems previously faced by the telecommunications tower. EM

Transceiver stations can now use hydrogen fuel cells with solar energy.

Mastering Energy

Shifting Energy Efficiency Initiatives Into High Gear

One way to ensure that buildings are designed in a way that does not waste energy is to equip them with the latest building technology and maintain an efficient operation of all technical systems. Outdated installations and relic equipment lead to high energy consumption and harmful climate emissions.



"We've been talking about the EPC technical issues since day 1. We are now trying to create the financing for the ESCOS by engaging local financial institutions. A few of the local banks have shown interest but they have yet to revert."

– **Zulkiflee Umar**,
Head of Demand Side Management Unit,
Energy Commission

Large-scale modernisation will increase a building's energy performance, but how many buildings in the country are actually fitted with innovative technology that is both cost-efficient and promotes energy efficiency?

Over the years, the Malaysian government has introduced several initiatives to promote efficiency in the country. These include fiscal incentives for energy efficiency in 2001, energy audits of government buildings that commenced in 2002, and the National Energy Efficiency Action Plan (NEEAP).

While the Efficient Management of Electricity Energy Regulations 2008 (EMEER 2008) focused more on large consumers, NEEAP encompasses all energy consumers. Furthermore, the Eleventh Malaysia Plan (RMK-11) made provisions for energy efficiency programmes in three categories: commercial buildings, industry and government facilities.

Building Foundations

The forecasted outcomes of the Eleventh Malaysia Plan for energy efficient (RMK-11: EE) projects include the reduction of electricity consumption in government buildings by 199GWh and savings of RM74.5 million in electricity cost for the duration of RMK-11 (from 2016 to 2020).

Other benefits include costs savings of RM130 million in generation and transmission of electricity, as well as a greenhouse gas (GHG) emissions reduction of 147.52ktCO2e (kilotonnes of carbon dioxide equivalent) by 2020.

The Eleventh Malaysia Plan for energy efficient projects is also expected to drive the Malaysian Energy Service Companies (ESCO) market through the Energy Performance Contracting (EPC) mechanism—a system that allows the capital investment of ESCOs to be paid from the guaranteed energy savings generated from their energy efficiency improvement on a project.

One crucial factor that lacked was a thriving energy efficiency culture among industry stakeholders and the public, and the plan was to cultivate the culture across all sectors in the country to drive energy efficiency adoption.

Energy Performance Contract (EPC)

The EPC is an effective way for building owners and operators to achieve energy savings without upfront capital and zero operating risks, and is a performance-driven contract with the shared savings concept being the remuneration for ESCOs.

It is also an effective way to finance efficiency projects as it includes the operating costs of the project during the span of the contract. Among the challenges that have been identified are the absence of policy direction, subsidised electricity tariff rates and cost pass-through to users.

According to industry players, it is important to set realistic targets—such as savings of 30% from electricity utility bills for commercial and industrial buildings—by applying a methodical approach that will involve lower costs, existing skills and shorter turnaround time. A radical approach, on the other hand, would entail a higher percentage of savings (60% and above) but these targets would have lifetime costs and require managing new risks.

Malaysia could emulate how EPC financing is implemented in the European Union (EU) and use those examples to drive the implementation in Malaysia. For example, a strong regulatory framework with effective enforcement is an essential demand

The Putrajaya International Convention Centre was awarded the Energy Efficiency and Conservation Best Practices Award *by ASEAN in 2007.*

Malaysia in Context

The real estate industry is one of the major sources of carbon emissions, with the buildings sector in Malaysia encompassing commercial, government, and residential buildings (high-rise, as well as terraced and single dwellings). Supported by the United Nations Development Programme (UNDP) and funded by Global Environment Facility (GEF), the Building Sector Energy Efficiency Project (BSEEP) aims to reduce the annual increase in greenhouse gas emission from the Malaysian building sector.

driver for investing energy efficiency initiating into buildings.

Moreover, innovative EPC financing could comprise an aggregation of low-cost dispersed opportunities such as shop lots, schools and government clinics, as well as de-risking strategies that include starting with small projects, getting technical expert support from the government and arranging for guarantee covers.

Unique Approach

The EPC is a unique financing programme specifically tailored for the energy efficiency programme. ESCOs are paid through the energy savings that is achieved, as it is difficult to get financing. Under EPC, the building owners avoid forking out capital expenditure.

The applications for the programme have been encouraging, with an initial 40 customers increasing to the current 98 customers due to the success of promoting the concept and guidelines for registering ESCOs since 2013.

The Energy Audit Grant also played a critical part in promoting EPC and ESCOs in the energy efficiency market. Potential EPC customers are encouraged to undergo an energy audit which will be paid for by the Energy Commission, but this is conditional on the basis that these companies can prove that they have good potential savings, meet the no-cost measures and investment-cost measures criteria and are able to generate at least 5% savings over the next three years.

To boost the performance of ESCOs, several measures were undertaken to improve capacity, create awareness and disseminate information. The Energy Commission conducts networking sessions with ESCOs to share knowledge, information and success stories. There are also several associations such as the Malaysian Association of Energy Services and Companies, which develops the ESCO businesses in collaboration with the government and the private sector.

On the current situation of EPCs in Malaysia, it is easier to conduct under the private sector because there were less processes and procedures.

The biggest obstacle is still a lack of awareness and financing options to kick-start EPC, and the Energy Commission is working to resolve these challenges. According to Zukiflee Umar, Head of Demand Side Management Unit, “We’ve been talking about the technical issues since day one. We are now trying to create the financing for the

ESCOs by engaging local financial institutions. A few of the local banks have shown interest but they have yet to revert."

Financing Energy Efficiency

One of the challenges that EPCs encounter is securing bank financing because they are not covered by the Green Technology Financing Scheme, created to promote investments in green technology in the country. However, the Malaysia Debt Ventures (MDV)'s Energy Efficiency Financing Programme will be the first dedicated source of capital for the energy efficiency sector and specifically for EPCs.

The agency has allocated RM200 million for EPC financing, including a RM50 million low-cost programme in partnership with GreenTech Catalyst Sdn. Bhd., a green technology advisory and business services company. While the programme has the capacity to finance up to 65 projects, the potential can only be met if there are sufficient credit-worthy applicants.

ESCO Market

The biggest ESCO market in the world is China and Thailand for the ASEAN region. "Thailand has an energy conservation fund, which is used to finance EE projects. Applicants can present their proposals to a committee. Because of the existence of the fund, several Malaysian banks have also participated in these projects overseas."

He pointed out that countries like Japan and Europe have "Super ESCOS," whereby a joint venture is established between five parties: the financier, the equipment supplier, the e-contractor, the ESCO and the system provider. "Malaysia is a long way from that. We're still taking baby steps."

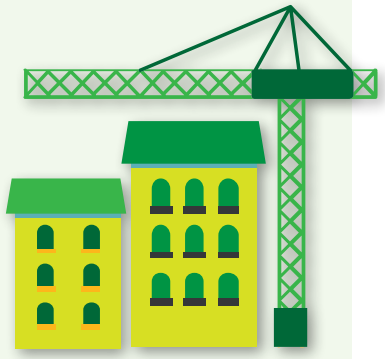
On the latest EPC project, Zulkiflee said that a hospital project in Putrajaya was in the final stages

Tax Incentives for Green Technology

The government provides incentives in the form of investment tax allowance for the purchase of green technology assets and income tax exemption, for the use of green technology services and systems. These incentives cover a range of green technology activities in the area of energy, transportation, building, waste management, and supporting services activities.

Green Technology Projects

Investment Tax Allowance (ITA) of 100% of qualifying capital expenditure incurred on a green technology project from the year of assessment 2013 (date on which the first qualifying capital expenditure incurred should not be earlier than 25 October 2013) until the year of assessment 2020. The allowance can be offset against 70% of statutory income in the year of assessment. Unutilised allowances can be carried forward until they are fully absorbed. Green technology projects related to renewable energy, energy efficiency, green buildings, green data centres, and waste management can qualify for this tax incentive.



Green Technology Services

Income tax exemption of 100% of statutory income from the year of assessment 2013 until the year of assessment 2020. Green technology services related to renewable energy, energy efficiency, electric vehicles (EV), green buildings, green data centres, green certification and verification, and green townships can qualify for this tax incentive.

Purchase of Green Technology Assets

ITA of 100% of qualifying capital expenditure incurred on green technology assets from the year of assessment 2013 (date on which the first qualifying capital expenditure incurred should not be earlier than 25 October 2013) until the year of assessment 2020. The allowance can be offset against 70% of statutory income in the year of assessment. Unutilised allowances can be carried forward until they are fully absorbed.

Definition of the Stipulated Terms Under the Eligibility Criteria

Competent Personnel are those holding a certificate of competency as a service provider in the related field of green technology.

Green Policy is a statement about the commitment to sustainability and environment management by the company.

Green Technology Assets listed in MyHijau Directory refers to green technology products, equipment or systems used to conserve the natural environment and resources, which minimise and reduce the negative impact of human activities and are approved by the Ministry of Finance.

of discussion. "This has come after three years of negotiations."

Green Energy Incentives

The Malaysian government is committed to meeting its target of 40% greenhouse gas emissions by 2020. With a view of strengthening the flow of resources to renewable energy, energy efficiency and energy conservation, here is a summary of incentives that the government has invested in to support these goals.

The main objective of the green technology incentives is to encourage investments into the green technology industries for business purposes or self-consumption and the adoption of green technology by selected services/system providers.

It also aims to encourage companies to buy green technology assets verified by the Malaysian Green Technology Corporation (MGTC) that are listed under the MyHijau Directory.

These incentives would facilitate the transition of expiring existing tax incentives that relate to renewable energy and energy efficiency projects. Further, there will be wider coverage across various priority green technology industries such as energy, transportation, building, waste management and supporting service activities.

Eligibility Criteria

To be eligible for green technology incentives, companies have to be incorporated under the Companies Act 1965, be a resident of Malaysia, and meet the qualifying criteria stipulated.

For example, companies that undertake a green technology project or acquire green technology assets must minimise the degradation of the environment or reduce greenhouse gas emissions, promote health and the improvement of the environment, conserve the use of energy and/or other forms of natural resources, promote the use of renewable energy and recycle waste material resources.

Meanwhile, companies that undertake green technology services activities must have at least one competent or qualified personnel in green technology, have a green policy related to environmental sustainability, and 100% of their income must be derived from green technology services.

Electric Vehicles (EV) that qualify for green incentives includes services related to installation, maintenance and repair of the EV charging equipment, infrastructure and EV charging station. It also includes services related to the operation of the EV charging station and services related to maintenance, repair and overhaul of the EV.

Qualifying Activities for Green Projects and Green Tech Services

- Renewable Energy
- Energy Efficiency
- Electric Vehicle
- Green Building
- Green Data Centre
- Green Certification and Verification
- Green Township

"Through NEM, we are opening the opportunity for people to participate in reducing their carbon footprint. Profit is not the only thing that is important in business. We have to take into account the 3P's – profit, people and the planet."

– Abdul Razib Dawood
Head of Electricity Market Operation Unit,
Energy Commission

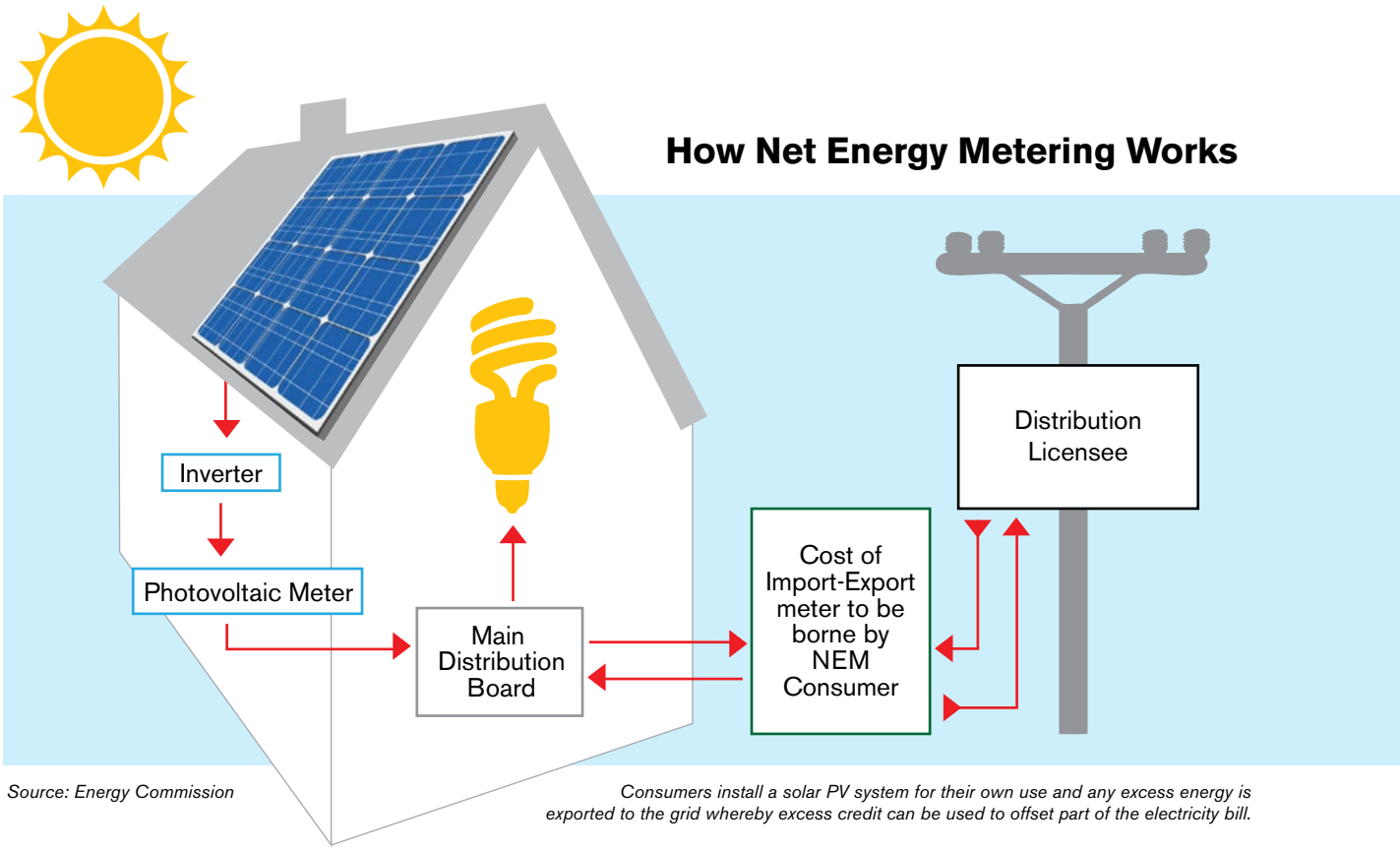
Effective Date of Application

1. Projects/Services: Applications submitted to the Malaysian Investment Development Authority (MIDA) and received by 31 December 2020 are eligible to be considered for this incentive.
2. Asset: Applications submitted to the Malaysian Green Technology Corporation (MGTC) and received by 31 December 2020 are eligible to be considered for this incentive.

Benefiting from NEM

Net Energy Metering (NEM) is a system where solar panels or other renewable energy (RE) generators are connected to a public-utility grid and surplus power is transferred onto the grid, allowing customers to offset the cost of power drawn from the utility.

The scheme, which was rolled out on the 1st of November 2016, with an annual total capacity of 90MW for Peninsular Malaysia, and 10MW for Sabah and Labuan is open to domestic, commercial and industrial consumers.



Source: Energy Commission

Consumers install a solar PV system for their own use and any excess energy is exported to the grid whereby excess credit can be used to offset part of the electricity bill.

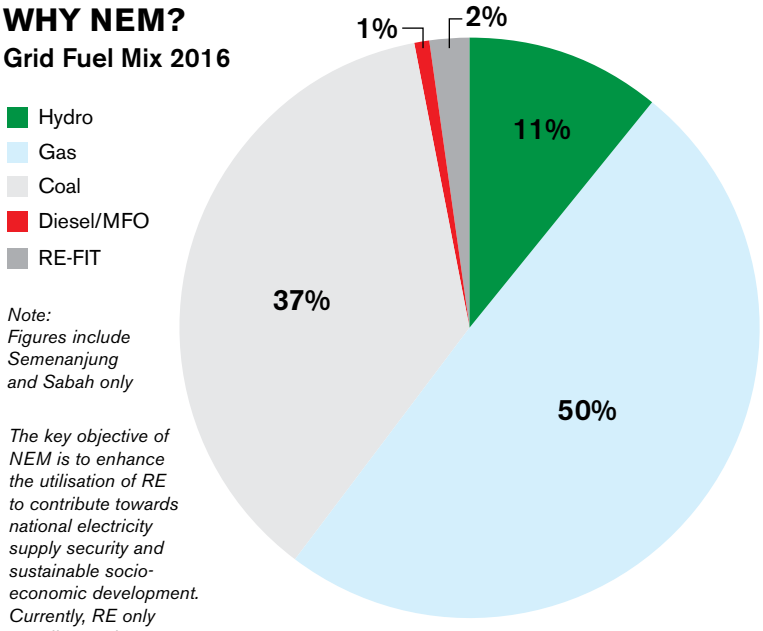
Abdul Razib Dawood, Head of Electricity Market Operation Unit, highlighted the differences between the NEM and the Feed-in Tariff (FiT). "NEM is an indirect connection behind the meter, whereas FiT has a direct connection to the grid. Under NEM, the consumers are self-consumers first with only the excess energy flowing to the grid, unlike in FiT where all the generated energy flows to the grid," he said.

The Energy Commission is responsible for issuing NEM guidelines while the Sustainable Energy Development Authority (SEDA) implements NEM for domestic and commercial customers. For industrial customers, there are Distribution Licensees for customer contracts.

In terms of Roll-over Credit, the balance of credit can only be rolled over within a 24-month period from start of NEM connection. The Roll-over Credit also resets after 24 months to ensure that the terms are fair to both the consumers and the Grid Operator.

WHY NEM?

Grid Fuel Mix 2016



Note: Figures include Semenanjung and Sabah only

The key objective of NEM is to enhance the utilisation of RE to contribute towards national electricity supply security and sustainable socio-economic development. Currently, RE only contributes about 2% to the national grid fuel mix.

Source: Energy Commission

Open Access

All PV installations on the rooftops of buildings and garages, carparks or similar buildings are eligible to be NEM consumers. This includes existing consumers of distribution licensees.

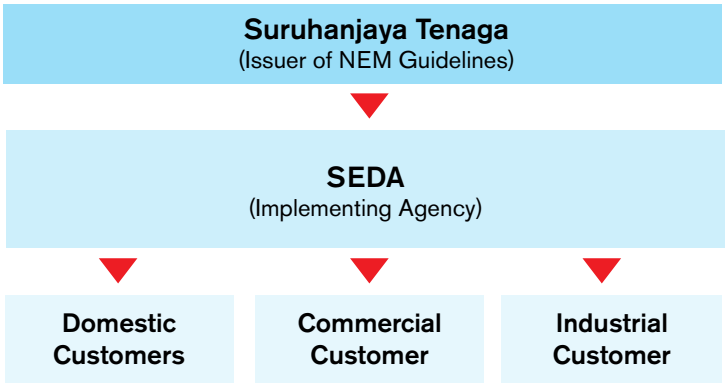
However, applications for the NEM scheme is on a first-come first-serve basis until the allocated quota is full.

There are also a number of terms of NEM interconnection and capacity. For instance, linking to the Distribution Licensee's Network can only be done through indirect connections and the installed meter has to be bi-directional with the ability to import and export electricity.

For domestic or residential consumers, the maximum capacity of the PV systems installed is less than or equal to 12kW for single phase or 72kW for a three-phase system.

For commercial and industrial systems, the maximum capacity of the PV system installed is 1MW or 75% of maximum demand of their existing installation, or 60% of fuse rating of the transformer.

IMPLEMENTATION OF NET ENERGY METERING



The Sustainable Energy Development Authority (SEDA) will manage the NEM programme under the Energy Commission's guidelines.

Source: Energy Commission

Domestic Consumer Usage of 1000kWh/month: Before & After NEM (420kWh/month)

Domestic Demand / month	**Case A** (before NEM) 1000kWh		**Case B1** (30% solar produced is consumed) 1000kWh		**Case B2** (50% solar produced is consumed) 1000kWh		**Case C** (100% solar produced is consumed) 1000kWh	
Energy bought from TNB (Bill before ICPT, GST, RE Levy)	1000kWh	RM152.70	871kWh	RM395.60	790kWh	RM392.87	580kWh	RM292.54
6% GST	700 kWh	RM22.54	574kWh	RM20.38	490kWh	RM15.51	280kWh	RM8.67
1.6 RE Levy		RM7.24		RM6.67		RM5.37		RM3.54
Energy sold to TNB @ DC			147kWh	RM91.14	210kWh	RM65.10		
Bill to pay		RM482.49		RM405.77		RM356.42		RM233.69
CO2 Reduction (kgCO2)			**93.37**	**13%**	**155.61**	**21%**	**311.22**	**42%**

The diagram depicts the impact of NEM on domestic consumers' electricity bills and its contribution to carbon dioxide reduction. For instance, in CASE A, before NEM, when no energy is generated through solar power, consumers incur a higher electricity bill. On the other hand, as in CASE B1, the bill is lower because clean energy is consumed and the excess is sold to TNB. These consumers also contribute to a 13% reduction in carbon emission.

Source: Energy Commission

Disruptive Technology

The NEM is not a complicated scheme compared to the FiT system, which imposed a 1.6% surcharge on electricity users with monthly usage exceeding 300kWh.

The NEM scheme would allow consumers to avoid exorbitant electricity bills and go beyond the limits of the FiT system, which has a limited budget. Under NEM, energy consumers get paid a credit of 31 cents per kWh for any excess energy that is sold to utility companies like Tenaga Nasional Bhd (TNB) and Sabah Electricity Sdn Bhd (SESB).

The big difference is that there is no fund for renewable energy which requires electricity consumers to pay a 1.6% surcharge on electricity bills. However, under NEM guidelines, several criteria had to be fulfilled before consumers are recognised as customers.

"Solar energy is becoming more attractive because it is a disruptive technology and poses a threat to the utility companies, but the technology is not rocket science. It really is like Lego that you can assemble. Further, the good news is that we are on track to reaching grid parity and bridging the gap."

Several countries have implemented NEM, such as Japan, the Philippines, Singapore, South Korea, Thailand, India, Pakistan and Sri Lanka. Although the US was the first to implement a net metering policy in the early 1980s, Europe has also gained a foothold in its net metering numbers.

The NEM is attractive because it paved the way for citizen-owned renewables and for consumers to reap the benefits of a cheaper

Sustainable Power

From the 5th to the 6th of October, industry stakeholders gathered in Kuala Lumpur for the Solar Photovoltaic Conference, which was organised by the Malaysian Photovoltaic Industry Association (MPIA) and the Asian Photovoltaic Industry Association (APVIA).

The two-day conference was held in conjunction with the *7th International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM) 2016*, and officiated by Dato' Seri Ir Dr Zaini Ujang, Secretary-General of the Ministry of Energy, Green Technology and Water (KeTTHA).

Networking Platform

While commending the organisers of the conference, Dato' Seri Ir Dr Zaini noted that the experiences and ideas shared and created during the event will go a long way in opening new verticals of business in Malaysia. It is also expected to cement Malaysia's position as a leading player in the global solar landscape.

In his welcome speech, Ahmad Shadzli Abdul Wahab, President of MPIA, agreed, and noted that the programmes were designed to provide the conference attendees with in-depth insight about the solar industry across Asia. "This, combined with the networking opportunities afforded by the conference, is sure to lead to high-potential connections that could spell big things for further development of solar in ASEAN," he said.

7th International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM)

electricity bill while promoting energy conservation. With the energy savings achieved through NEM, consumers are now contributing towards protecting the environment.

"Through NEM, we are opening the opportunity for people to participate in reducing carbon footprint. Profit is not the only thing that is important in business. We have to take into account the 3P's – profit, people and the planet." NEM is especially attractive for commercial customers who are able to claim tax incentives for green tech projects.

Payback Period

However, despite the many benefits of NEM, the take-up rate was not forthcoming, owing to the long payback period. The payback period for FiT is within 3-4 years, but for NEM it can take as long as 5-6 years to recoup the investment. It is shorter for commercial customers, though, because of the incentives and tax benefits.

The Energy Commission is working with the government to draw up plans to make the scheme more attractive by giving domestic customers the tax benefits that are currently being enjoyed by businesses.

The government is also committed to encouraging sustainable consumption and production of renewable energy under the Eleventh Malaysia Plan. This will be accomplished by exploring new energy sources, enhancing the capacity of personnel dedicated to renewable energy initiatives and implementing NEM, with a target capacity of 500MW by 2020 under an NEM scheme. EM

Pursuing Grand Challenges

To attain the next level of energy efficiency, challenges must be overcome to increase the magnitude of energy savings. Energy efficiency should be adopted across all areas – from schools to companies. ***Energy Malaysia*** takes a look at the Energy Efficiency Challenge, which is run across schools in Malaysia, and the efforts undertaken to impart lessons to students.

This year marked the 3rd iteration of the Energy Efficiency (EE) Challenge, which involved the participation of schools in energy efficient programmes, organised by the Energy Commission.

The response from the 72 schools which participated in the challenge this year was very good.

When the EE Challenge started, there were only four schools that participated in the event, but during the second year, the number of schools which participated had increased to 29. In the Energy Efficiency challenge, everyone in the school gets involved in carrying out energy efficient initiatives. For one school, it was the rugby team which got the ball rolling by conducting energy savings on unused electrical items, and this ultimately resulted in energy savings for the entire school.

The EE Challenge has garnered a strong interest among students and teachers alike, and more schools are anticipated to participate in the coming years. In order to get the EE challenge off the ground across all schools in the country, approval has to be obtained from the Director-General of Education, followed by the processing of applications later on. However, these energy efficient measures are expected to reap rewards in due time.

In order to meet the criteria set for the challenge, a comparison is done from the months of April until October, and compared to the baseline year. For example, the teachers will manage the energy usage of air conditioners and negotiate the best times to turn off the electricity.

The EE Challenge has indicated that there was no clear delineation between energy demand and consumption in rural, semi-urban and urban schools. For the Energy Commission, it is the number of activities conducted at the school and how much energy savings are accomplished that is pivotal. More emphasis was placed on effective monitoring and the consumption of each classroom as per the total consumption of the entire school.

Energy Efficiency Lessons

Creating awareness among students is crucial in implementing energy efficient measures as energy-conscious behaviours can be cultivated so that they can better manage their utilisation of electricity and increase their efficiency in their everyday consumption.

According to Zulkiflee Umar, Head of Demand Side Management Unit, "It is important to get kids to understand how their consumption will affect the level of demand. There should always be a balance between electricity generation and demand management. We should avoid building more power plants. That is why we need to educate students on demand management, because if they do not control demand, we will have to build more power plants."

Energy efficient initiatives are crucial to curb the greenhouse emissions and

"It is important to get kids to understand how their consumption will affect the level of demand. There should always be a balance between electricity generation and demand management."

– **Zulkiflee Umar**,
Head of Demand Side Management Unit,
Energy Commission

Left: *Going to great lengths to be champions, SMK Matang was the grand prize winner which collected RM15,000 for their energy conservation efforts and made their school proud.*

Below: *Bagging prizes at the EE Challenge, the winners take their moment on stage with Energy Commission bigwigs, Chairman Dato' Abdul Razak Abdul Majid (8th from the right) and CEO, Datuk Ir. Ahmad Fauzi Bin Hassan (9th from the right).*

reduce the global warming issue. To this end, important lessons can be imparted by developing a syllabus around an energy efficiency module to be used in school.

"It's not going to be easy to change the mentality of Malaysians to practice energy efficiency. As it is, we already have relatively low electricity tariffs in the country. In countries across the European Union, there are programmes, directives and targets that are set to decrease energy consumption, failing which penalties will be imposed."

Having targets like these would be beneficial in moving the energy efficiency agenda forward.

The ASEAN Energy Awards

In line with pursuing grand challenges within the energy efficiency realm, the ASEAN Energy Awards which started in 2000 is a regional competition which applauds companies in the energy sector that utilise the concepts, systems and technology of energy efficiency and conservation.

Besides promoting regional cooperation, the Awards also serves as a platform for winners to become role models in the ASEAN region, whose energy efficient management programmes other companies can emulate and replicate.

This year, the award-giving ceremony was hosted in Myanmar. Some of the Malaysian winners who bagged awards include CSC Steel Sdn Bhd, Smart Modular Technologies, Kompleks HIjau Solar and Menara Kerja Raya.

The ASEAN Energy Awards recognizes outstanding work for excellence, creativity, practicality and dedication in the field of energy.

The Big Win

On 8 November 2016, the Energy Commission hosted the 3rd Prize Giving Ceremony for the EE Challenge at the Putrajaya Marriott Hotel.

Out of the 73 schools that participated in the competition, only 42 managed to submit their full reports. The competition had been ongoing from the 1st of March until the 30th of September 2016, lasting for seven months.

Dato' Abdul Razak bin Abdul Majid, the Chairman of the Energy Commission, in his speech said that it was important to educate and instil a culture of saving electricity among students and the community.

Meanwhile Ir Abdul Rahim bin Ibrahim, the Director of Energy Management and Service Quality Development Department, said that there are consolation prizes and tokens of appreciations given to those who did not win the first three positions to acknowledge the amount of hard work and dedication they had put in for the challenge.

The ceremony showcased various energy conservation activities and goals accomplished by the various schools. The results spoke for itself as 14 schools were able to accomplish the reduction of 0.5% to 27% in consumption of electricity, which is the equivalent to a total of RM59,000 in only five months.

The grand prize winners of the EE Challenge received RM15,000, while RM12,000 and RM10,000 was awarded to the first and second runner-up respectively.

SMK Matang was crowned the champion for going to incredible lengths to save electricity. The school had carried out a Save Electricity campaign and also incorporated a fine system of RM0.20 for not complying to the rules.

Because of the cooperation of both the students and teachers of SMK Matang, only 54,401kWh was used compared to the previous year which was 74,890kWh, which was a 27% saving of electricity or the equivalent of 20,489kWh.

The bar for the EE Challenge was set quite high and many were impressed with the various unique ways of promoting the cause. Students of various schools engaged in activities which turned out to be a fun and creative way to inculcate the culture of saving electricity in them. EM

THE RURAL CONNECTOR

With the increasing cost of living and more importance being placed on conserving the environment by reducing our carbon footprint and greenhouse gas emissions, the use of energy efficient equipment is becoming much more relevant. Mohd Yusrul Yusof, Regional Director of the Energy Commission's Regional Office, East Coast of Sabah, with his 11-member staff set a record of 50% worth of energy savings. This landmark of energy conservation is an example of what the energy sector can achieve through the implementation of cost-efficient and environmentally friendly technology. This success is bolstering an increase in development of renewable energy sources such as solar power, wind energy, hydropower and biomass fuels, and incentivising the people to switch to these sources. This encouragement will serve to contribute to the electrification of rural Sabah by driving growth into clean energy initiatives.

Stilted homes in Sabah's rural area, modernised and implemented with the electrical grid.

The Energy Commission's East Coast of Sabah office's average electricity bills ranged between RM1,100 – RM1,300 and had fallen dramatically to the range of RM600 – RM700, which was 50% worth of energy savings. These savings were achieved around 7 months after their office renovation works were completed. The initial plan was to reduce at least 30% of monthly electricity bills if the renovation works were to proceed by changing existing air-conditioners to energy-saving ones and changing existing T8 fluorescent lighting to T8 LED lighting. The office's 30% reduction goal was achieved in the first month after renovation was completed.

In an effort to achieve more, additional initiatives were introduced after the renovation by practicing energy efficient habits like setting air-conditioners at 24-25°C and switching off all electrical equipment after office hours or when not in use.

It is also important to note that while energy efficient equipment is normally 20-30% more expensive than normal electrical equipment, it can drastically reduce electricity usage by 30-50% depending on the operations activities the equipment is used for. Based on their recent success on energy savings, it is very probable that the office could get their return of investment (ROI) in a period of 3 – 4 years, based on the cost of changing energy efficient equipment with monthly savings.

While this is a win for the energy industry in terms of maximising efficiency in government buildings, there are still many serious challenges faced when trying to encourage the rest of society to do the same. This is namely changing the people's habits of energy conservation. Much of the region's electricity wastage can come from the energy constantly being used during office hours. Thus, small and medium-sized business owners are encouraged to switch over to installing energy efficient equipment in their firms, additionally optimising their profits by reducing operations costs.

However, homeowners have a fair share of the blame as one of the most severe sources of energy wastage comes from the use of air conditioners and is one of the main reasons electricity bills are so high. Thus, the Regional Office encourages people to be wise with their electricity and to control their dependency on air conditioners.

"There are many problems we handle on a regular basis," says Yusrul. "As most Malaysians know, the electricity supply throughout Sabah can be at times troublesome given the distance to reach the provincial towns and the people who live there." This problem is the driving force behind the energy sector's determination to ensure they reach Sabah's most rural areas and developments, and the people welcome the effort.

Right: *The Regional Office encourages people to switch to energy efficient equipment.*

Below: *A micro-grid system in Sabah to provide household energy services, telecoms and satellite for a community of 200 people.*

The world has become progressively more developed in the energy sector. While developed countries have taken it for granted, those who live in rural areas suffer from a lack of economic growth and opportunity. The future electricity needs of the people mean more challenging efforts by the Regional Office to reach a wider scope of people, notably those living in the interior towns of Sabah, and with shaky economic conditions thrown in the mix, energy savings are becoming increasingly important. This achievement could be a stepping stone to encourage Sabahans to be more economical and environmentally friendly with their energy usage. EM

CAPITALISING ON CAPABILITIES

Electrical Energy Manager

As we embark on a path where energy management is becoming immensely complex and various climate change issues are becoming unambiguous, the role of electrical energy managers has evolved to help organisations navigate the increasingly growing challenges. Electrical energy managers must be able to drive energy cost reduction, be knowledgeable on a range of volatile risks and their effects on operations across multiple sites, and stay up-to-date on current and emerging technologies.

Dato Ir Muhamad Guntor Mansor Tobeng believes his training as an electrical engineer has put him in good stead to perform on a grand scale in the renewable energy and solar power business.

Hands On

According to Dato Ir Muhamad Guntor Mansor Tobeng, a registered professional engineer with the Board of Engineers, nothing beats having hands-on experience in the electrical energy field to catapult working experience into successful ventures.

"I'm the one who climbs the pole and I still do that today when installing solar panels and have to direct young engineers in conducting their work," he said.

The role of an electrical engineer is invaluable when it comes to troubleshooting and expanding calculated, risk-taking ventures. "Being an electrical engineer has been an added advantage because I'm also now equipped to explain things in layman terms, and it takes less time to investigate problems when conducting energy audits," said Dato Ir Muhamad Guntor about his current position as Managing Director of Gading Kencana, a company specialising in energy services in Malaysia.

A career path as an electrical energy manager also holds great promise for young aspiring engineers. "Those who wish to get into this line will have to build a good foundation in product and technical knowledge, learn from programmes that are conducted by regulators, and network with the energy fraternity," he added. They must be able to tie all these in to create programmes that are grounded in facts and data, and engage stakeholders throughout the organisation.

What do Electrical Engineers Do

Electrical energy managers conduct energy audits and analyse the total electrical energy consumption or generation, as well as advise companies in developing and implementing measures for efficient management of electrical energy.

These managers also typically monitor the effective implementation of energy conservation measures and supervise record-keeping on efficient

Dato Ir Muhamad Guntor atop the completed Kompleks Hijau Solar Power plant in Malacca says that his experience as an electrical engineer comes in handy as he still dares to climb power plants to fix the fuses.

management of electrical energy at installation sites.

In order to renew their licences, electrical energy managers registered with the Energy Commission are required to participate in at least eight hours in programmes related to the efficient management of energy, and that are endorsed by the Energy Commission.

Power Players

Conducting energy audits in buildings starts with looking at the electricity bill and drilling down on key areas which are consuming the most energy. "We then identify the energy savings potential in facilities and introduce better practices to reduce leaks and curb energy wastage in these buildings," said Dato Ir Muhamad Guntor.

It is also very important to have an electrical engineer manage energy efficiency projects. "The first thing you would ascertain is if the customer is paying the right tariff. If the number does not jive, that means the customer is paying a lot of penalties, which can be determined from the bill which lists the penalties on power factors."

Recommendations are then made on energy usage by going to the next level and looking at the load voltages and installation capacities. For example, there are low voltage loads such as lights and fans, medium voltage loads such as chillers, air conditioners and compressor. The biggest load factors include welding and robotics. "After that, we consider power quality problems."

Blazing a Trail

Dato Guntor's interest in energy management goes back to the late 1980s when he was involved with energy saving fluorescent lamps at Philips Malaysia. Fast forward to 2017, he now helms Gading Kencana with a progressive vision, analytical mind and calm professionalism.

"I got started in the renewable energy business at a time when everyone wanted to reduce their energy bill. It was a business that no one wanted to do at that time, but I thought that solar energy and renewable energy was something different and that there was potential to develop and capitalise on my previous experience as an electrical engineer."

He brings many years of experience in many critical areas gained from his stints in both Philips and ABL Security, and looks forward to sharing this experience with developing countries.

Overcoming a multitude of challenges is what led to his first large-scale solar farm project, Kompleks Hijau Solar, located in Malacca, to become one of the world's most efficient solar farms. Harnessing technology and constantly innovating also played a huge role in its success. One of the most pertinent problems it faced when it first clinched its large scale projects was to get financing.

"This is when my skills as an electrical energy manager came to the fore and I was able to convince the bankers and answer all the questions they had in laymen's terms. That is where the strength of an electrical manager played a big role."

International Pursuits

Having started off in the solar lights market then progressing to solar and hybrid systems, Gading Kencana is now clinching major deals in the large-scale solar PV systems with outputs by the hundreds of kilowatts.

Keeping the company busy is the roll-out of its Large-Scale Solar Power project in Bidor, which is expected to be completed by June 2018. It was the only SME company which succeeded in getting the project among a host of other bidders such as Malakoff and Mudajaya, Synergy Corporation. "We are the small boys playing in the big boys league." The company also plans to expand its footprint overseas in African countries and Saudi Arabia.

By capitalising on his capabilities and his experience in the electrical engineering field, Dato Ir Muhamad Guntor has blazed a trail in the large-scale solar business. EM

Coming Clean

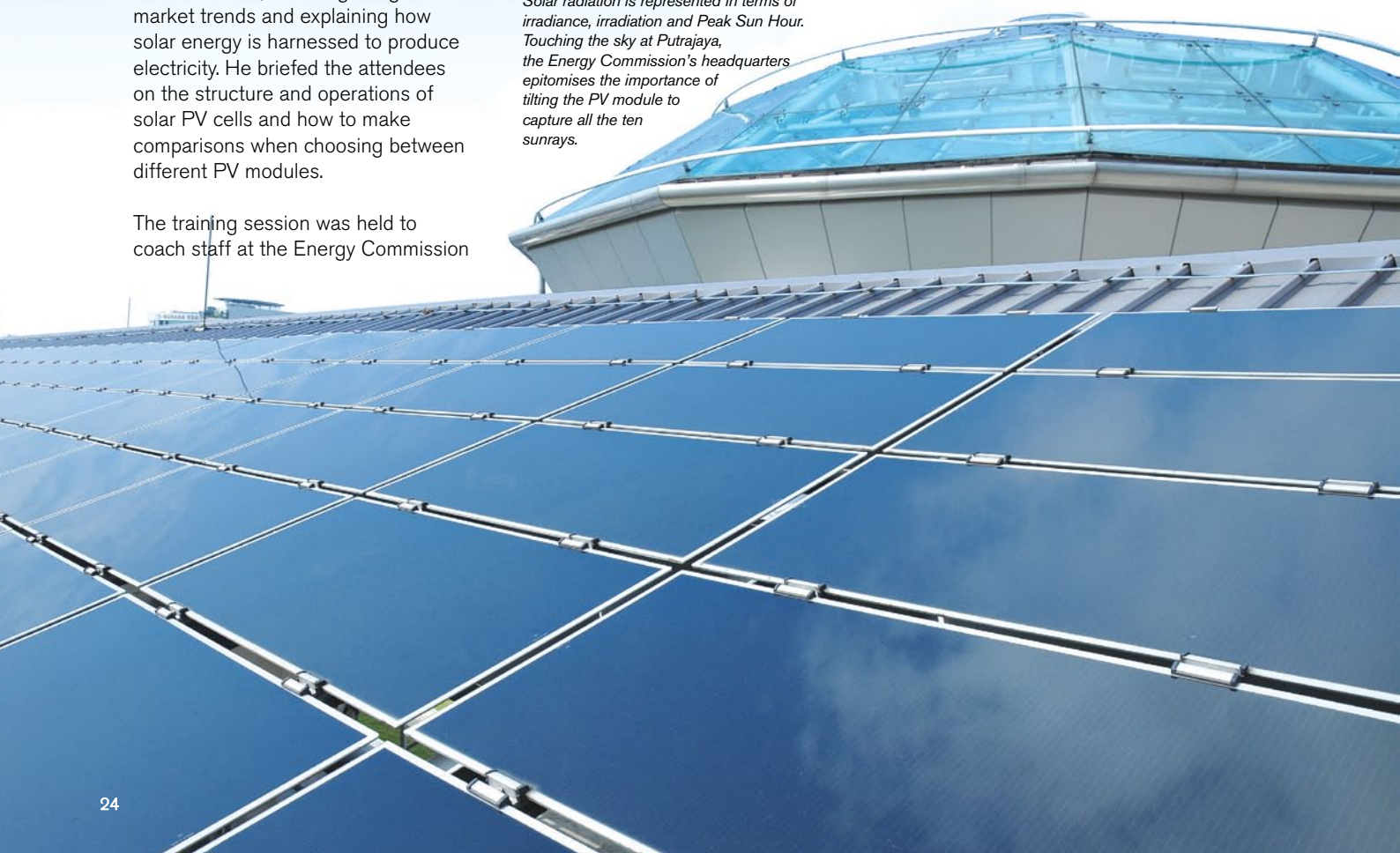
Coaching Staff to Become Competent on Energy Matters

A full-day training session at the Energy Commission brought several renowned lecturers in the field of green energy research together to disseminate a fluent discourse of opinion and positive flow of information. With the rollout of numerous energy efficient initiatives this year, including the Large Scale Solar (LSS) photovoltaic power plant and Net Energy Metering scheme, the Energy Commission plays an increasing role in educating industry players on the various standards, processes and procedures that are prevalent in the marketplace. And it is doing so by building a strong and knowledgeable staff.

Shahril Irwan Sulaiman, Senior Lecturer at Universiti Teknologi Mara (UiTM), kicked off the training session with a comprehensive lecture on solar energy and photovoltaic (PV) technology. He highlighted the current status of solar energy in the region and worldwide, revealing the global market trends and explaining how solar energy is harnessed to produce electricity. He briefed the attendees on the structure and operations of solar PV cells and how to make comparisons when choosing between different PV modules.

The training session was held to coach staff at the Energy Commission and equip them with knowledge and deeper exposure to handle future enquiries about the Large Scale Solar (LSS) PV power plant and Net Energy Metering scheme. The specialised training was the first of its kind and the session drew from the speakers' wealth of experience.

Ahmad Maliki Omar, Head of Green Energy Research Centre from the Engineering faculty at UiTM, continued



Solar radiation is represented in terms of irradiance, irradiation and Peak Sun Hour. Touching the sky at Putrajaya, the Energy Commission's headquarters epitomises the importance of tilting the PV module to capture all the ten sunrays.

"When we design a Grid Connected Photovoltaic system, we optimise photovoltaic space and comply to international standards."

– Ahmad Maliki Omar
Head of Green Energy Research Centre,
Engineering Faculty at UTM

on PV systems' design algorithm and the various components of a Grid Connected PV (GCPV) system. He drilled down on the technicalities of how an overall GCPV system should be designed, the required components and steps to build the system.

In another session, Sulaiman Shaari, Associate Professor from the Faculty of Applied Sciences, UiTM listed a set of Malaysian Standards in relation to the GCPV system. He also said that it is crucial to know the right standards to use and enforce them accordingly.

Besides speaking on the installation, testing and commissioning processes, Sulaiman Shaari also highlighted the importance of operations and maintenance, stating that it should be done annually or every six months, depending on the site of the PV. On the way forward, in terms of green energy, he claimed that Malaysia was leading within the ASEAN region, and had checked most of the boxes in terms of its social, economic, technical, environmental and institutional targets.

For example, Malaysia already had in place coherent policies among different government agencies and it was transparent in the electricity sector. It had also embarked on Feed-in-Tariffs and Net Energy Metering schemes and provided fiscal incentives and public financing for green energy.

List of Malaysian Standard (MS) on Photovoltaic (PV)
• In relation to grid-connected systems

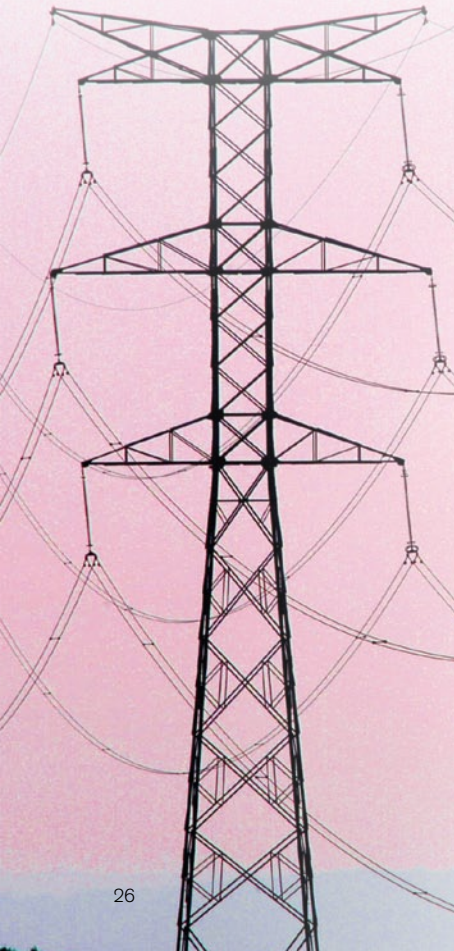
No	Title
1	MS 1837:2010 Installation of Grid-connected Solar Photovoltaic (PV) Systems
2	MS IEC 60364-7-712:2007 Electrical Installations of Buildings A-Part of 7-712: Requirements for Special Installations or Locations - Solar Photovoltaic (PV) Power Supply System (IEC 603647-7-712:2002, IDT)
3	MS 61727:2010 Photovoltaic (PV) Systems – Characteristic of the Utility Interface (IEC 61727:2004, IDT)
4	MS IEC 62109 - 1:2011 Safety of Power Converters for Use in Photovoltaic Power Systems – Part 1: General Requirements (IEC 62109-1:2010, IDT)
5	MS IEC 62093:2012 Balance of System Components for Photovoltaic System – Design Qualification Natural Environments (IEC 62093:2005, IDT)
6	MS IEC 62116:2012 Test Procedure of Islanding Prevention Measures for Utility – Interconnected Photovoltaic Inverters (IEC 62116:2008, IDT)
7	MS IEC 62446:2012 Grid Connected Photovoltaic Systems – Minimum Requirements for System Documentation, Commissioning Tests and Inspection (IEC 62446:2009, IDT)

Finally, there was an open session where attendees asked questions pertaining to current issues affecting the industry, such as the viability of the energy storage technology and its applicability within the Malaysian market, the paradox of using silicon in PV modules because it was non-recyclable, and the economics and costs of using solar PVs.

Attendees emerged from the training session more knowledgeable and capable of applying the tips and techniques about clean energy right away -- accomplishing the main goal of the training session. EM

Shaping Energy Security

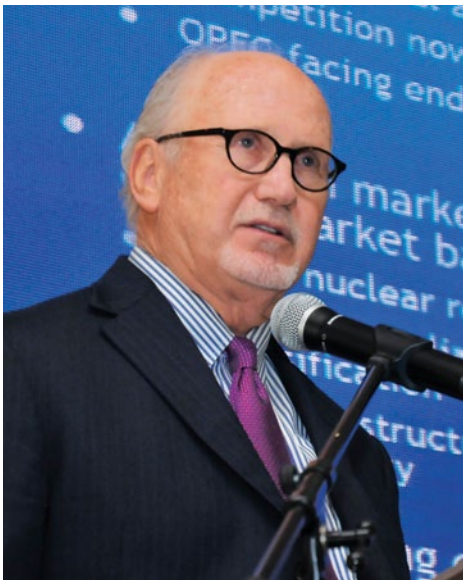
Asia Prepares for Adversity



Perfect solutions may not exist to address significant geopolitical challenges that lie ahead, but as the energy epicentre shifts towards Asia, it could shape a compelling reason for deeper regional energy collaboration.

Mikkal Herberg, Research Director on Asian Security at the National Bureau of Asian Research, who spoke at the *International Forum on Global Energy Landscape: Its Implication to Malaysia* (IFGE 2016) jointly-organised by the Energy Commission and the Institute of Energy Policy and Research (IEPRe), University Tenaga Nasional on the 5th and 6th of December, believes that Asia should take greater responsibility for its own energy security by building larger oil reserves and having regionally controlled product stocks.

"As the US becomes increasingly self-sufficient and less reliant on the Gulf for oil supplies, a slow tectonic shift has begun to occur in the global oil trade from the West to the East. This will have important implications for Asia," he said.



"As the US becomes increasingly self-sufficient and less reliant on the Gulf for oil supplies, a slow tectonic shift has begun to occur in the global oil trade from the West to the East. This will have important implications for Asia."

– Mikkal Herberg,
Research Director on Asian Security at the National Bureau of Asian Research

A uniting vision among ASEAN countries would be instrumental in bolstering security against possible supply disruptions which could emanate from the Middle East. It would ultimately depend on future international cooperation between the US and Asia.

Opportunity Beckons

There is clear opportunity for strengthening energy security efforts in Asia and this can be done by engaging in strategic energy discussions and confidence-building sessions. Regional oil importers could share emergency stocks, which act as a buffer or insurance policy against chronic issues in the Middle East.

Asian countries could diversify its sources of supply and collaborate with the Middle East to deal with potentially disruptive factors.

In this context, the speed of domestic and regional energy market reforms must accelerate with greater emphasis on developing robust and flexible reforms within the market.

Fareed Mohamedi, Chief Economist from the Rapidan Group, concurred, stating that a year ago, Malaysia was not very different from the rest of the world, relying on oil and natural gas to meet its energy needs, but that in 2020, the scenario would change with the proliferation of renewable energy and alternative supply options, and new technologies.

"In terms of energy security, key challenges would be the same as it is for other countries. There's a need to strike an optimal balance between energy security and sustainability when moving forward. There should be better regulation and more integration with the rest of the world," Mohamedi said.

Meanwhile, Dr Tatiana Mitrova spoke on the outlook and challenges for Russian energy exports, saying that it was "a painful story" as she expected Russian oil output to decline post-2020 and oil exports to be largely driven by Asian expansion. The energy sector would not remain the main driver of the Russian economic growth. Oil importing would have to brace for a volatile period as importers face acute vulnerabilities and a long period of low oil prices.

Smart Choices

One way that developing countries such as Malaysia can mitigate the impact of geopolitical challenges and energy dilemmas is through harnessing new technologies and jumping onto the next technological stage.

"Southeast Asia has a choice now. Are you going to be implementing and drawing from technologies that have existed in Europe, or are you going to jump to the next stage? In today's uncertain markets, technology could be the way forward and Malaysia could start by designing smart cities," Dr Mitrova explained.

"I was really glad to hear about smart metering and smart cities being implemented here; it's a sign that technological development exists in Malaysia."

Loo Kok Seng, Senior General Manager of Regulatory Economics and Planning at Tenaga Nasional Bhd (TNB), who spoke on the energy landscape from a Malaysian perspective, said that he expects technology to play a huge role in reducing the price of energy in future. "In the future, owning a solar photovoltaic cell could be so pervasive. I expect that within the next 5 to 10 years, every house would own a solar panel."

Significant challenges lie ahead in the energy sector, and Asia must prepare for its fair share of adversity and prosperity. EM

Leading by Example

Paving the Way Towards Energy Efficiency

Putrajaya government buildings at Dataran Gemilang leading through actions by adopting energy efficient policies.

Malaysian ministries have made great strides in becoming energy efficient as its energy savings initiatives gain momentum. By incorporating energy efficient measures into their facilities, these buildings have achieved significant savings in energy costs, capping a 10.9% milestone in energy savings as reported by the Energy Commission.

The 10.9% increase in energy savings at government buildings – which translated to about 28.900 million kWh – was a huge improvement and exceeded the target far more than was expected. This marked improvement was achieved by managing energy usage, providing energy efficiency information, and adopting behavioural change programmes.

Since 2013, the Energy Commission has been cracking down on the electricity consumption of 25 ministries, which include some 54 blocks of buildings. This also includes monitoring buildings in Kuala Lumpur such as the Ministry of Defence, the Ministry of Works and Ministry of International Trade & Industry (MITI).

Surpassing Targets

The Energy Commission only targeted 5% energy savings when it started monitoring Malaysian ministry buildings in 2013, but these targets have been surpassed three years later.

The government has often adopted policies to improve the environmental and economic performance of their assets, while promoting energy conservation to the public. This can be done by establishing methods to benchmark energy usage or by mandating energy savings targets in buildings.

Adopting behavioural change programmes, such as switching off lights during lunch breaks or turning them on for specific hours of the day, have paid off in spades for ministries in Putrajaya in terms of reducing operation costs and energy consumption of buildings.

Apart from monitoring energy efficiency and establishing energy savings targets within the ministries, the Energy Commission also holds seminars to disseminate ideas and information about energy efficiency initiatives.

Intensifying Measures

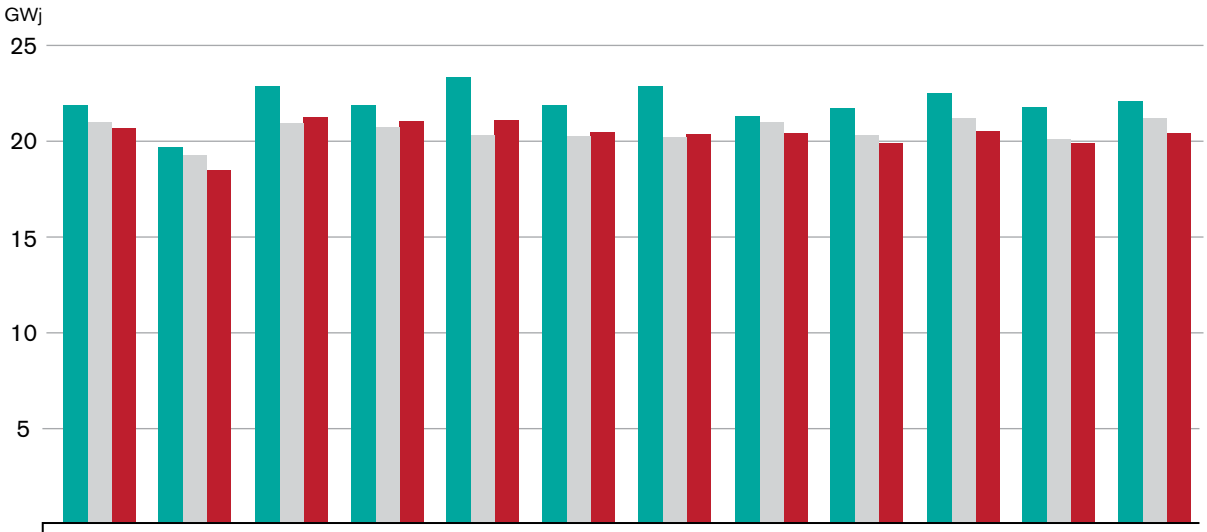
The Energy Commission is constantly engaging with all the ministries in Putrajaya. In a year, the Commission gives several talks to all the ministries in Putrajaya for Environment Day, which falls on a different day for each ministry. Occasionally, the Energy Commission is invited to sit in on management meetings held every month at the ministries, which are chaired by their respective Secretary Generals, and which draw up specific energy efficiency initiatives for that building.

One of the biggest challenges is ensuring that the assessment is fair as some ministries may not agree with the reporting methods and findings. There are some months where there is a spike in energy consumption when the staff stays back late as there is extra work, and that has to be taken into consideration and assessment."

Before any recommendations are made by the Energy Commission, the premises and interior of the government buildings are each carefully assessed as each one is different in terms of capacity and structure.

Energy usage data is collected from buildings where the minister resides and any discrepancies in monthly

Energy Usage (GWh) in 25 Government Buildings, 2013 – 2015



	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2013	22.32	19.76	23.01	22.89	23.09	22.18	22.78	21.26	21.49	22.53	21.30	21.72
2014	21.25	19.58	21.41	21.02	20.86	20.67	20.50	20.98	20.55	21.36	20.37	21.01
2015	21.10	18.32	21.76	21.33	21.68	20.85	20.59	20.59	19.92	20.85	19.97	20.41

Source: Energy Commission

Energy usage in Malaysian government buildings have shown a steady decline since 2013 with the implementation of numerous energy savings initiatives.

energy consumption will be further investigated.

Modernising Buildings

Although no-cost measures are implemented, such as the 24-degree Celsius cooling temperature policy and the target of 5% reduction in electrical energy consumption, have significantly decreased electricity consumption in these ministerial buildings, there will come a time when these measures reach a saturation point.

This is when the Energy Commission promotes Energy Performance Contracting (EPC) to the government buildings, allowing the government to pay Energy Service Companies (ESCOs) with utility savings accrued to them after retrofitting the project.

Ministries which did not perform had to submit a detailed explanation for their high electricity consumption levels. These ministries could fare better by intensifying their efforts and embarking on EPC.

The progress made from a nationwide implementation of energy efficient technologies in Malaysia's government buildings have shown us the extent at which we can cut down on electricity consumption. This instills a clear message that there is indeed huge potential for increasing energy efficiency in the future. EM

Clean and Green By 2050

German Chancellor Angela Merkel has re-emphasised her country's commitment to greenhouse gas (GHG) emissions, but many unsettling hurdles remain to be overcome, notably the future of Germany's relations with the United States where the incoming President has threatened of walk away from international agreements. Yet much optimism remains that Germany will prove itself to be a leader that the world so badly needs in the battle against climate changes.

At the recently concluded United Nations Climate Change Conference (COP22) in Marrakesh, Germany issued a strong statement that it will continue its commitments to its ongoing policy changes towards the development of renewable energy. Despite the many potential hurdles that may come its way, Germany is determined to maintain their mantle of leadership on the issue of climate changes by meeting their established targets by 2050.

Currently, nuclear power provides almost 20% of Germany's needs, and it now wants all of its plants closed within the next 10 years. Fossil fuels play a major role, followed by nuclear power, biomass, wind energy, hydropower and solar power. In an effort to create a huge turnaround in their energy sector, Germany is targeting itself to cut 40% on GHG emissions by 2020, and up to 95% by 2050. This is to be coupled with the goal of renewable sources of energy making up a minimum of 80% of the country's gross power consumption. Germany seeks to implement this change by aiming for a rise in the share of renewables in final energy consumption, from 12.6% in their base year of 2015, to 60% in 2050. These targets were put on paper in 2007 and have been held up by Governments since, and are subject to an annual monitoring process which was published last in November 2015.

The Goal for 2050

Germany's authorities have established a basic framework to set them on the path to achieving their 2050 climate goals. This framework stretched from issues of including target corridors for drastically reducing GHG emissions in individual economic sectors, to highlighting the need to ensure that the country remains economically competitive during this transition. The most fundamental of these initiatives will be controlling GHG emissions to 175-183 million tonnes of carbon dioxide equivalents by the year 2030. Compared to the base year of 1990, this is a whopping reduction of 62%. The goal of this plan is that by 2050, the energy supply must be almost completely decarbonised and renewables are made Germany's main source of power. Renewable energy will be used directly in all sectors, and this electricity will be used for heating, transport

"An intelligent and fair regulation of CO_2 reductions is in everyone's best interests."

– Angela Merkel, German Chancellor

and other industry operations, thus maximising efficiency.

Germany's Climate Action Plan serves to ensure that the international competitiveness of the German industry is always maintained, through modernising the economy's strategy and implementing an active and correct political framework in each region that will encourage structural change. Basically, the German Government is working to make their economic conditions more dependable from the use and development of non-renewables such as coal and fossil fuels. While some emissions from the rise of industrial innovation cannot be avoided, like steel production and chemical processes, the Climate Action Plan seeks to reduce these emissions as much as possible by developing new technologies and processes. These include stricter emission limits for new cars that will be set at a European level, so a reduction of GHG emissions from the transport sector to 95-98 million tonnes of carbon monoxide can be guaranteed.

Germany's Previous Milestones

The Fukushima incident as well as the culmination of nuclear fear that swept up the country due to oil crisis in the 1970s, and the incident of Chernobyl had accelerated the Government to begin searching for alternative energy options. This was what sparked Chancellor Merkel's dramatic move to set ambitious goals to drastically reduce GHG emissions by 2050 and become largely more reliant on renewable energy sources. Yet Germany has always been pivotal in the world's renewable energy sector since *Energiewende* or the Energy Transformation. It is a cornerstone of the German society in dealing with energy matters and has increased the use of renewables from just 6% in 2000 to make up more than a third of the national energy usage today.

The primary goals under *Energiewende* includes eliminating non-renewable energy sources from the country's portfolio, phasing out nuclear plants, reducing dependency on energy imports like coal, and lowering the emissions. Official goals call for GHG reduction to reach 80-95% of 1990 levels by 2050

Germany's success with renewables is largely result of sunny and windy weather that allow wind farms and solar panels to generate massive amounts of clean energy.

and the gradual phase-out of nuclear power by 2022.

In May 2016, Germany produced so much electric power that prices fell. Customers got paid to use the electrical system. This was attributed to sunny or windy weather where wind farms and solar panels were able to produce even more renewable power than it normally does. On a particularly sunny day, almost 87% of the renewables produced in Germany was made from solar power.

Experts from *Scientific Literature*, *Climate Impact Research* and *Wageningen University* have determined that decarbonising the electric power sector is the most important, fastest and cheapest step forward for the energy industry and should be reinforced by rapid reduction in the price of renewable technology such as wind and solar power. They add that the most important thing to know about the feasibility of reducing carbon dioxide emissions from the power sector to zero by 2050 is that there is continuity in the growth rate of wind and solar energy as we've seen in the past few years, the efforts already well on their way to achieving this goal.

That means that efforts must be directed to phase out coal. There is a need to reduce emissions from existing power stations that must follow plans to cancel new global coal capacity. To reach its goal, Germany is setting aside Euro1.5 billion annually to energy research, evidenced by initiatives like the power-to-gas (P2G) pilot plant, the largest of its kind in the world. Success here could push Germany to dominate the race for cleaner energy, and these research initiatives seek to enhance the efficient energy production while encouraging more people to reduce energy consumption

Malaysia's Place in the Field

While Germany has become a game-changer in the field of renewable energy, Malaysia's potential for clean energy generation is substantial and clear to the rest of the world. Its equatorial location makes it ripe for solar power development while the extensive tropical rainforests that Malaysia has in abundance can supply large quantities of biomass. Malaysia's weather with its monsoon seasons has created plenty of water catchment areas that have become sources of hydropower, particularly on the island of Borneo, and mini-hydropower also comes from streams and rivers that serve to advance the electricity supply in rural areas. Even the potential for energy from palm oil, in which Malaysia produced around 18 million tonnes per year and covers 15% of the country, is abundant. It can produce significant amounts of combustible waste, both biomass – with empty fruit bunches, tree fronds, trunks and fibres – and biogas – from the methane capture of palm oil mill effluent.

Ripe with potential, Malaysia could very well be a leader in the field of green energy and is well on its way towards that goal. Their initiatives include the Small and Renewable Energy Programme, (SREP) which allowed any renewable energy plants to sell energy to the grid on a "willing seller and willing buyer" basis, as well as the groundbreaking Sarawak Corridor of Renewable Energy (SCORE). It has been firmly established as one of Malaysia's five economic corridors that has almost 5 million hectares of arable and peat land suitable for agriculture, and is abundant in natural, clean and safe renewable resources like hydropower that offers commercial users clean energy at competitive rates. While Malaysia has an edge over Germany in terms of the quantities of natural resources found in the land, it can take a page out of Germany's book by learning how to implement systems that can harvest these resources with minimum cost and maximum efficiency. Germany's discipline in maintaining their ambitious targets for the future as well as implementation of structural reform is also something Malaysia can duplicate when seeking to evolve age-old mentalities into realising the importance of clean energy conservation.

A hard, long journey towards the development of renewable energy will establish Germany as a powerhouse by 2050. Their determination and dedication to the cause have inspired other nations to do the same, and Southeast Asia is one region that is beginning to embrace the transition for change that will see a clean environment for our grandchildren. Malaysia has realised its potential as a key player in this field and has begun to take steps to becoming a leader in its own right. We are moving rapidly towards a cleaner and greener environment than we have ever seen before, and the world is watching. EM

Powering Through

Maximising Innovation to Spur Biomass

The biomass industry in Malaysia is a growing industry with potential to tap into local and regional biomass resources to bring investments and technologies, and develop talent. Several policies have been developed to facilitate the uptake on biomass. The Malaysian Biomass Industry Action Plan 2020 (MBIAP) aims to position the nation's biomass industry toward high-value creation as well as adopt sustainable practices in Malaysia. In this article, ***Energy Malaysia*** explores how two biomass power plants in Sabah have navigated the challenges within the industry and powered through the difficult times by innovating its products and processes.

"If the tariff does not increase, it will be a difficult business to do. Today Malaysia has the lowest FiT tariff in Southeast Asia."

– Andrew Feng
Managing Director,
Seguntor Bioenergy Sdn Bhd and Kina Biopower Sdn Bhd

Biomass is one of the potential strategic economic drivers for the country as Malaysia is expected to produce between 80 and 100 million tonnes of biomass annually from 2011 to 2020. Investment into the biomass sector is encouraging – in 2014, the Malaysian Investment Development Authority (MIDA) approved a total of 12 biomass projects with investments worth RM82.9 million. In 2011, the government launched the National Biomass Strategy (NBS2020) which focused on oil palm biomass and provides the roadmap on how to maximise the potential of the country's biomass resources.

Waste to Energy

Biomass electricity is drawn from combusting or decomposing organic matter. As one of the world's largest producers of oil palm, Malaysia has a huge feedstock of biomass in the form of palm fibre and palm kernel shells. Another potential source is empty fruit bunches (EFBs), which are highly valued compared to rice husk or wood.

However, unlike fibre and shells which can be used to generate electricity in palm oil mills, EFBs have high moisture content and lack combustibility, making them seemingly unfit for energy generating purposes.

On the other hand, the EFB deterioration process is useful to soil but it also causes water pollution and emits methane which ultimately effects global climate change. Additionally, EFBs have to be processed and shredded before this can be burnt in a specially designed boiler. It is the heat produced from burning EFB converted to superheated steam that is used to drive steam turbines and generate electricity.

Technology Flow

Processing of EFB into fibres involves the process of shredding, compressing the bunches and removing the oil and water from the bunches. During the process, the moisture from the EFB is removed to 50%, then is further dried to 45% moisture content with a bed dryer before it is fed to the boiler for combustion. The plant will also require a waste treatment facility that is capable of treating all wastewater from the process.

The oil recoverable from the processing of EFB is equivalent to 2-2.5% of the extraction rate per tonne of an Empty Fruit Bunch. A typical plant will consist of EFB High-Speed Shredders, EFB Press Machines and Oil Separators.

In the initial stage, EFBs are cut into discrete pieces to improve their burning efficiency in the boilers. The EFB shredder processes the EFB into loose-form fibre strands of 4 to 6 inches. Later, the EFB Single-Barrel Press is used to squeeze the remaining oil and reduce the moisture content in the fiber to 50%. The recovered mixture of oil and moisture is then separated through the Oil Separation System.

Finally, the fiber is dried to 45% moisture content with a bed dryer before being sent to the boiler for combustion.

The EFB treatment machinery is usually a major concern for biomass producers because it involves high costs and entails high-end technology.

Starting Point

Taking the first step is always the hardest, but powering through challenges and forging ahead usually pays off in spades. Seguntor Bioenergy Sdn Bhd and Kina Biopower Sdn Bhd Managing Director Andrew Feng's foray into the biomass power plant business began in 2004 when Malaysia started promoting renewable energy (RE) projects and was conducting feasibility studies to assess the viability of harnessing the potential of oil palm EFBs, with which it is blessed in abundance.

"I was a consulting engineer at that time, assisting investors, and wanted to

develop the green programme. The tariff offered by TNB under the small RE programme (SREP) was low and many were not financially feasible," Andrew Feng said.

His big opportunity showed up when a group of Japanese investors invested in biomass projects in Thailand using the New Energy and Industrial Technology Development Organization (NEDO) grant from Japan, a fund that promotes RE under the Carbon Development Mechanism, which trades in carbon credit. "The tariff in Thailand was also higher than it was in Malaysia, making it a financially feasible project."

Andrew, who was the consulting engineer for the project, faced a myriad of challenges and a slew of surprises when the biomass plants first took off. Although bioenergy was a promising option for Malaysia, not many power plants knew how to convert EFBs into biomass on a large scale.

"The carbon credit programme was hot and everyone wanted to be a part of the project. Also, the Japanese had the responsibility to reduce their carbon footprint and many companies were looking for projects outside the country," he explained.

Japanese investors approached him to start the project in Sabah as there were a large number of palm oil mills in the area and the east coast of Sabah was experiencing a shortage of power. "We pulled in one of the big utility companies from Japan to invest in the project and off-take all the carbon credit. They gave us upfront money to sell our carbon credit right up to 2012, and that is how the project could take off."

Currently, the company operates three biomass power plants – two in Sabah and one in Thailand, which was its maiden project at Surat Thani Green Energy, located in the Surat Thani province. Each power plant has a gross designed capacity of 11.5MW, which is sold to Sabah Electricity (SESB) under the Feed-In Tariff Renewable Energy Power Purchase Agreement (REPPA) under a contract for 16 years. "We're running the plant at full capacity. We use about 1.5MW for the plant and the rest is sold to SESB."

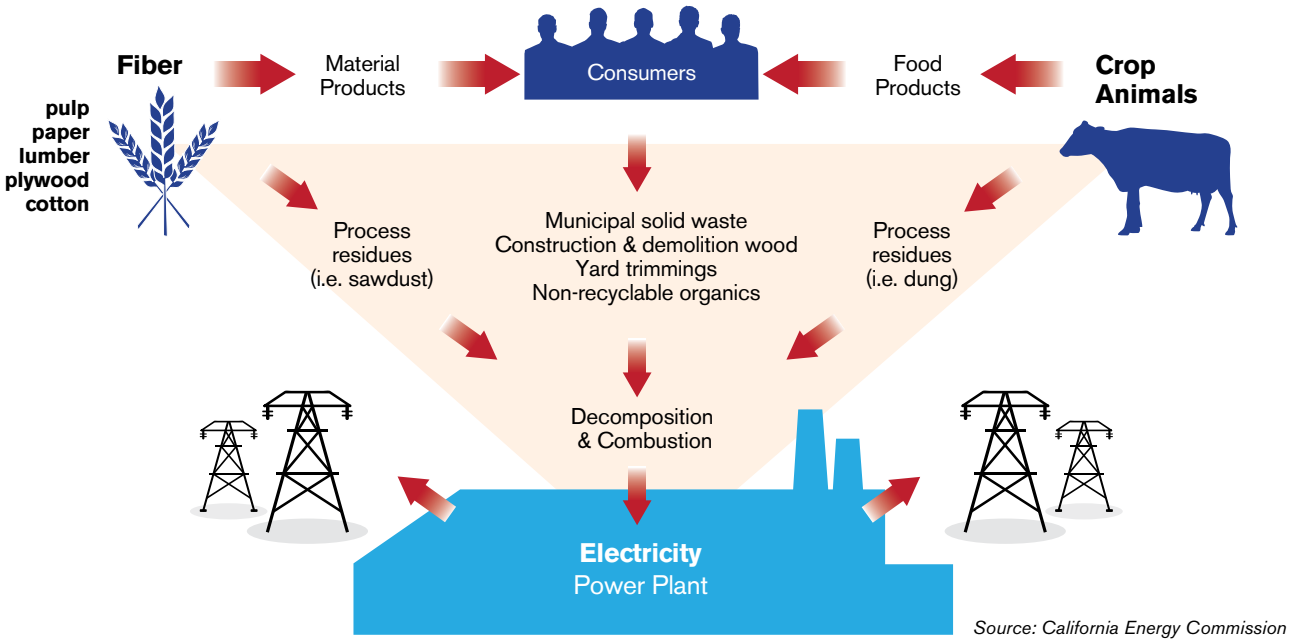
Overcoming Challenges

Operating the biomass plant for the first few years was challenging because the process of reducing moisture content to 45% involved numerous technological processes and high costs. However, this was crucial to successfully running the biomass power plants. "It is a very difficult process where we have to cut, press and dry the bunches. When we started, we assumed all this would be handled in the palm oil mill, but they refused to absorb the costs."

Although the company initially incurred losses, their Japanese investors continued pumping cash into the project to keep it afloat as they had the responsibility of meeting their carbon reduction goals. "There was an initial investment of RM180 million for the two plants and an additional RM25 million from the shareholders. We spent a lot of money to get to where we are."

Biomass to Electricity

How a biomass power plant generates electricity



Source: California Energy Commission

The Seguntor Biomass Power Plant in Sabah has a capacity of 11.5MW. The methane gas is captured from the EFB effluent in an anaerobic digester tank. This biogas is then fed to a gas engine to generate electricity.

The Biomass Market

According to Andrew, there are currently seven biomass power plants operating within Malaysia. Many have ceased operations and have gone bankrupt because it is difficult to sustain without proper remuneration. Although there is no clear data on the potential of the biomass, almost 80% of biomass power plants fail because they underestimate costs and build inadequate systems.

"These power plants cut short certain steps or do not build the system sufficiently. We took about 4 to 5 years to get our wastewater treatment right. Everything was done through trial and error, but this costs money. We had shareholders who were patient and understanding, and that is how we were able to carry on and solve problems – with all their support," Andrew said.

Handling EFBs requires investment into high technologies and equipment, such as boilers and turbines, have to be oversized. "When investors try to compress the costs, they fail to understand that these costs would seep in later."

There are plans to build similar biomass power plants around Sabah, but Andrew will only embark on further ventures after taking into consideration the impact of a low-crop season on its production capacity and the current tariff rates under the FiT system. "If the tariff does not increase, it will be a difficult business to do. Today, Malaysia has the lowest FiT tariff in Southeast Asia. Anyone who wants to invest in power plants have to consider these two factors for it to be a viable business."

As the biomass commercialisation issues grow more complex and diverse, it also opens more opportunities for engagement between different stakeholders, industries and government agencies. EM

The Wonder of RE

Malaysia is on track to achieving its carbon emission targets, having seen a 33% reduction between 2005 and last year. ***Energy Malaysia*** looks at the country's efforts towards carbon reduction and its trajectory towards meeting these carbon budgets.

The Long Haul

Malaysia's energy policies have come a long way since it first set up the Central Electricity Board in the 1940s. Thereafter, there were numerous smart policy decisions to propel the country forward towards a pristine energy future.

The National Energy Policy has evolved over the years starting from the 1980 National Depletion Policy, followed by the Four-Fuel Diversification Policy in 1981.

In 1990, the Electricity Supply Act was introduced and later, the 1993 Gas Supply Act and 1994 Electricity Regulations came to fore. In 1997, the Gas Supply Regulation addressed issues in energy production, distribution and consumption.

Malaysia has also made efforts to develop a "fifth fuel" resource, with an emphasis on the use of biomass under the Malaysian Fuel Diversification Policy.

There is also the Renewable Energy Act 2011, which provides for the establishment and implementation of a special tariff system to catalyse the generation of renewable energy and the SEDA Act 2011, which provides for the establishment of the Sustainable Energy Development Authority Malaysia and its functions and powers.

Finally, there is the National Green Technology Policy to facilitate the growth of the green tech industry and enhance its contribution to the economy.

Renewable Energy Targets

Despite numerous efforts towards developing RE as a fuel for future power generation, its growth has remained insignificant. The rise in electricity generation from renewable sources is noteworthy after 2006, backed by the ninth Malaysia Plan, which noted, "The sources of fuel will be diversified through greater utilisation of renewable energy."

Electricity Generation Mix (GWh)

Year	Hydro	Gas	Coal	Oil	Diesel	Others	Total
1992	4,286	11,398	3,837	9,724	862	-	30,107
1993	4,853	13,905	3,880	9,820	865	-	33,323
1994	6,483	17,491	4,081	8,756	988	-	37,799
1995	6,184	17,726	3,974	9,687	1,249	-	38,820
1996	5,184	29,641	4,177	9,510	1,584	189	50,285
1997	4,134	18,387	2,460	10,784	1,300	-	37,065
1998	4,457	40,223	3,655	10,339	971	-	59,645
1999	7,552	45,988	4,522	4,220	747	-	63,029
2000	6,994	50,314	4,038	2,383	552	-	64,281
2001	6,066	54,066	6,238	2,531	831	-	69,732
2002	5,415	53,979	9,559	4,465	746	-	74,614
2003	5,090	56,478	13,435	1,221	976	-	77,200
2004	5,573	61,363	22,627	1,130	729	-	91,422
2005	6,007	61,396	25,231	1,048	348	-	94,030
2006	6,323	64,768	26,626	1,265	643	50	99,675
2007	5,957	65,568	30,856	1,091	677	63	104,212
2008	7,807	67,779	31,029	1,048	601	66	108,330
2009	6,890	63,370	37,644	1,041	685	132	109,762
2010	6,361	61,342	49,401	933	726	170	118,933
2011	8,056	55,732	52,302	4,295	5,108	1,576	127,069
2012	9,251	60,992	55,615	2,279	4,344	1,596	134,077
2013	11,799	71,174	53,663	1,571	1,741	1,318	141,266
2014	13,540	74,466	53,693	376	756	995	143,827
2015	15,524	66,919	59,335	45	1,516	1,516	144,565

Source: Energy Commission

Supplying energy in a sustainable manner continues to grow in importance from 2006.

From 2006 onwards, Malaysia's share of electricity generation from renewable energy started to rise from 50GWh and eventually increased to a staggering 1,126 GWh in 2015, dipping slightly only in 2013 and 2014.

By 2020, Malaysia aimed to get 11% of its electricity from renewable sources, and to cut its greenhouse emissions by as much as 40% or 7,073,199 tonnes of carbon emission.

With four years left to reach its targets, renewables are still not able to compete with conventional energy, contributing a meagre 2% to the total electricity generation mix.

Meanwhile, ASEAN, which has one of the fastest carbon dioxide emissions rates in the world, has set a target of supplying 23% of its energy needs by renewables by 2025.

Success Indicators

By energy type, solar will maintain its primary position, representing the largest share of annual RE generation.

According to data obtained from the Sustainable Energy Development Authority of Malaysia (SEDA), solar accounts for 54.97%, followed by biomass at 17.62%, biogas at 14.11% and Hydro at 13.31%.

The reason for this spurt of growth is attributable to higher Feed-in Tariff (FiT) rates, easier access to financing and in part because of the government's commitment to renewable initiatives such as the Large Scale Solar (LSS) project and Net Energy Metering(NEM) programme.

These two mechanisms should help Malaysia's aims of installing 1,250MW of solar PV by 2020 from the current 230MW.

The target capacity for LSS Projects is 1000 MWac by 2020 with annual capacity capped at 200MW ac for

Smart Targets

Year Ending	Cum. Total RE Capacity (MW)	Share of RE Capacity	Annual RE Generation (MW)	RE Mix	Annual CO2 Avoidance (tonne)
2011	217	1%	1,228	1%	773,325
2015	975	6%	5,374	5%	3,385,406
2020	2,065	10%	11,227	9%	7,073,199
2025	2,809	12%	14,662	10%	9,237,274
2030	3,484	13%	16,512	10%	10,402,434
2035	4,317	15%	17,479	10%	11,011,455
2040	5,729	19%	19,082	10%	12,021,673
2045	8,034	25%	21,668	11%	13,650,739
2050	11,544	34%	25,579	13%	16,114,871

Source: Energy Commission

The SMART target is a very important aspiration, but there should be adequate room to achieve it. A tolerance of 10% of the target is allowable with a periodic review every 3 years.

As Malaysia makes its final stride towards its 2020 RE goals, it is banking on large-scale solar projects.

RE Targets and RE installed in Power Sectors in ASEAN

Country	Target Year	RE Targets	Most RE Technology Preference	RE Installed in 2014 (MW)	How Far?
Brunei Darussalam	2025	954 GWh	Solar energy (954 GWh)	1.67	0.2%
Cambodia	2020	2,241 MW	Hydropower (2,241 MW)	952	42%
Indonesia	2025	46,307 MW	Hydropower (21,300 MW)	6,680	16%
Lao PDR	2025	951 MW	Small hydro (534 MW)	3,348	5%
Malaysia	2050	21,370 MW	Solar energy (18,700 MW)	6,286	29%
Myanmar	2016	472 MW	Small hydro (472 MW)	3,204	N/A
Singapore	2020	350 MWp	Solar energy (350 MWp)	33.1	9%
The Philippines	2030	15,236 MW	Hydropower (8,937 MW)	5,898	38%
Thailand	2036	19,684 MW 15,236 MW	Solar energy (6,000 MW) Biomass (5,570 MW)	7,901	40%
Vietnam	2030	45,800 MW	Hydropower (27,800 MW)	17,140	37%

Out of the total 21.37GW RE target, Malaysia has set 18,700MW for solar PV by 2050. By 2014, Malaysia reached 29.42% of their total RE target. To reach the remaining target, they will have to install 15.1GW of new RE between 2015 and 2050.

Source: www.aseanenergy.org

Although solar accounts for a sizeable portion of annual RE generation, biomass and biogas is also gaining traction.

Peninsular and 50MWac for Sabah from 2017-2020. Meanwhile, the NEM has a 500MW capacity limit. These are positive steps forward as it enables domestic consumers, commercial and industrial users alike to enjoy reductions in electricity bills and encourage energy efficiency. Further, it is a plus point for Malaysia, which has a limited budget under the current FiT programme.

If Malaysia is to have a chance at meeting its longer-term targets, it will have to find a way to overcome its obstacles. Although it is progressing towards its goals, it is doing so at a measured pace.

Nailing Targets

However, to address climate change it can increase its efforts in carbon reduction by injecting fresh approaches. As the government focuses on its energy policies, various sectors and stakeholders must be accountable to mitigate the growing demand for energy.

For example, property developers could start installing solar panels in new houses or buildings. Financial institutions could provide easier access to capital to finance solar installations and solar farm.

The transport sector could have buses that are solar powered. The education sector could boost the sector with insightful research and educate industry players on understanding and applying energy efficiency practices more effectively.

As Malaysia takes its final stride towards 2020 to meet its longer-term RE targets, it will have to keep looking at the targets that it has set to assess if it is on course to meet them. EM

Going Big

Radically Scaling Up to Harness the Power of the Sun

Employing the technology of photovoltaics – direct conversion of sunlight to electricity – on a large scale – has taken off in many countries. To streamline the development of large scale solar plants, the Energy Commission has created a booklet detailing guidelines for large scale solar photovoltaic plants connecting to electricity networks.

The Targets for Generating Power from LSSP

Year	2016	2017	2018	2019	2020
Capacity					
Peninsular	**150**	**150**	**150**	**150**	**150**
Sabah	**50**	**50**	**50**	**50**	**50**
Total	**200**	**200**	**200**	**200**	**200**

The target capacity for LSSP is 1000MWac by 2020 with an annual capacity capped at 200MWac for Peninsula Malaysia and 50MWac for Sabah in 2017-2020.

Source: TNB Slides

The *Guidelines for Large Scale Solar Photovoltaic Plant for Connection to Electricity Networks* booklet to further boost the development of large scale solar projects (LSSPs).

These guidelines dig deep into the processes and the requirements that are needed to develop large scale solar photovoltaic plants in Peninsular Malaysia and Sabah under the Large Scale Solar programme, of which the government has agreed to allocate about 200MW per year for Peninsular and 50MW per year for Sabah, starting from 2017 to 2020. This would apply to developers that meet the criteria to develop the LSSP.

Economic Viability

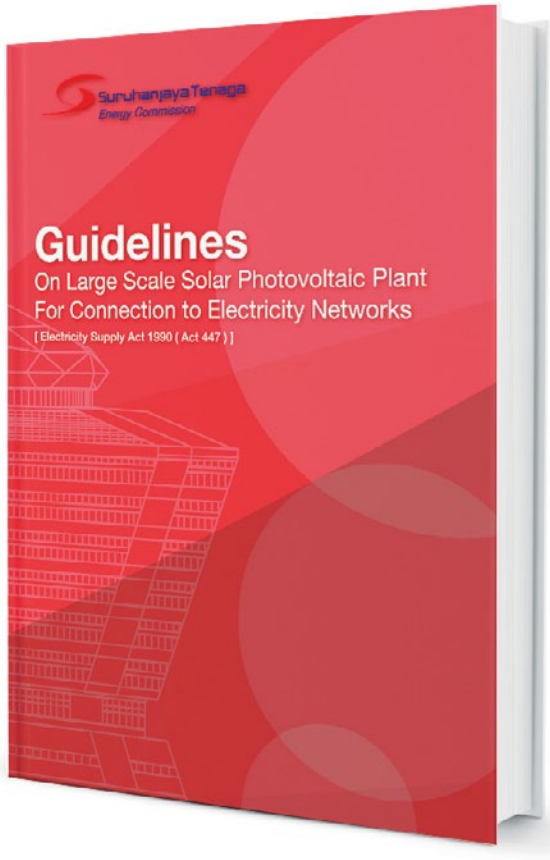
LSSP has gained traction across a slew of countries such as the US, Australia and India, and it is expected to dominate as incentives for rooftop installations grow to become a more expensive option.

The rationale for the push of the LSSP was to stir up competitive market forces in order to increase the penetration of solar power in the overall energy mix.

According to Ir Azhar Omar, Senior Director of Industry Development and Electricity Market Regulation for Large Scale Solar Projects, "There is no supporting feed-in tariff (FiT) or subsidy given to the developers. It is based on the pure economic viability of the project. This is to ensure that whatever cost of producing electricity from the LSSP is not going to burden the consumers unnecessarily."

The potential benefits from LSSP was comparable prices without incentives to rooftop installations and affordable tariffs to electricity consumers. Although many lessons can be drawn from the successful implementation of LSSP around the world, it would still have to be tweaked to suit market conditions.

Malaysia will adopt a controlled approach whereby 1000MW will be offered for a start until 2020. This is important to gauge the acceptability of the system so as not to jeopardise the overall system security, as well as maintaining affordable tariffs to consumers.



Guidelines for Large Scale Solar Photovoltaic Plant for Connection to Electricity Networks booklet.

"We are starting in a controlled approach, where only 1000MW is being offered for a start until 2020. This is important for us to gauge the acceptability of our system so as not to jeopardise the overall system security, as well as maintaining affordable tariff to consumers."

– Ir Azhar Omar
Senior Director of Industry Development and Electricity Market Regulation Department, Energy Commission

Process Scrutiny

The procurement of the solar plants undergoes a competitive bidding process and is implemented according to the Electricity Supply Act 1994, and related regulations, codes and guidelines. There will be a pre-qualification exercise to identify the technical and financial capabilities of potential developers and the suitability of their proposed sites.

Once pre-qualified, the bidders can participate in the next stage by submitting proposals based on the Request for Proposal (RFP) documents issued by the Energy Commission.

All bidders are given about four months to prepare their bids which will be evaluated by the Energy Commission. If all the criteria and requirements are met as stipulated in the RFP, they will be short-listed and selected to enter into negotiations to finalise the project documents, particularly the Solar Power Purchase Agreement.

Once these are finalised, they can proceed with the construction of their facilities.

Prowess to Execute

Potential developers will also have to demonstrate technical and financial prowess to execute and deliver the project within the proposed cost and timeframe stipulated.

The Energy Commission will monitor the performance of LSSP licence holders over a 21-year period and monthly progress reports will have to be submitted during the construction period and tenure of the licence.

Non-performance or non-fulfilment of the Solar PPA will incur financial penalties and non-performance or non-fulfilment of licence conditions, will result in penalties under the Electricity Supply Act 1990.

Building big renewable appetites in generating power from large scale solar plants must start from getting the steps right through the Energy Commission's *Guidelines for Large Scale Solar Photovoltaic Plant for Connection to Electricity Networks*. EM

The engaging and robust panel of discussion at the International Forum on Global Energy Landscape *(From left) Dr. Tatiana Mitrova, Research Scholar, Centre on Global Energy Policy, SIPA, Mikkal Herberg, Research Director on Asian Security at National Bureau of Asian Research (NBR), Abul Quasem Al-Amin, Professor, Institute of Energy Policy and Research (IEPRe) of UNITEN, Loo Kok Seng, Senior General Manager, Regulatory Economics and Planning, Tenaga Nasional Bhd and Fareed Mohamedi, Chief Economist, The Rapidan Group.*

A First of its Kind Energy Forum

On the 5th and 6th of December, the International Forum on Global Energy Landscape: It's Implication to Malaysia (IFGE 2016) was jointly organised by the Energy Commission and the Institute of Energy Policy and Research (IEPRe), Universiti Tenaga Nasional, at the Shangri-La Hotel in Putrajaya. Several international speakers and industry players attended the event and deliberated on current issues impacting the energy sector across the world and its implication for the Malaysian market.

The IFGE started on a positive note, with a range of distinguished international speakers coming together for two days to discuss critical issues that are affecting the world

energy market and the impending tectonic shift towards emerging Asia.

Some of the key issues discussed were the United States' shale revolution, the impact of a Trump administration, and Russia's oil strategies.

On the first day, Tan Sri Datuk Leo Moggie, Chairman of Universiti Tenaga Nasional (UNITEN), gave a welcoming speech, which was followed by the opening address by Datuk Seri Ir Dr Zaini Ujang, Secretary-General of the Ministry of Energy, Green Technology and Water. After that, the keynote speech was delivered by Professor Dr Ken Koyama, Chair in Energy Economics of the Energy Commission at UNITEN.

The primary objective of IFGE was to provide intellectual discourse and an exchange of knowledge and information about the world energy market and its impact on Asian countries. This was pivotal in light of the US shale revolution and Eurasian energy geopolitics impacting the stability of global economies and politics.

The forum also discussed the prospects of the oil and natural gas market under the current low and volatile price environment, highlighting the importance of the Middle East as the oil and natural gas supplier to Asia and the world. Finally, strategies that Malaysia could adopt to deal with future energy challenges were discussed.

Lively conversations were moderated through panel discussions held over the course of both days. The topics covered were Immediate and Long Term Challenges for Global Oil and Gas Market and Challenges in the Asian Energy Market.

Among the key findings of the session was the need to build emergency stocks within the ASEAN region to bolster against supply disruptions, as well as develop a more flexible domestic reform, given an unsteady and challenging energy landscape on the horizon. The participants of the event were engaging and challenged the panel's suggestions, inviting more incisive debate and novel responses.

The forum ended with an in-depth briefing by the Energy Commission's CEO, Datuk Ir Ahmad Fauzi Hasan, who spoke at length about the energy trends and prospects in Malaysia. Spotlighting the gas industry in the country, he noted that the third party access (TPA) framework which allows other players to import gas, slated to be implemented next year, would be a game-changer for the gas industry as it would level the playing field and ultimately contribute to stronger foundations of the country's energy security.

He also spoke about the Energy Commission's priorities and direction for the coming year and outlined its Large Scale Solar (LSS) programme and energy efficiency plans moving forward, noting that it would seek to emulate countries like Japan and Scandinavia in preparing against energy efficiency challenges. EM

Above: *Light banter between Dr. Tatiana Mitrova (left) and Dr. Ken Koyama, Chair in Energy Economics of Energy Commission Malaysia at UNITEN during the lunch break.*

Left: *UNITEN Vice Chancellor Datuk Prof Ir. Dr. Kamal Nasharuddin Mustapha presenting the Energy Commission's CEO Datuk Ir. Ahmad Fauzi Hasan (left) with a token of appreciation after his closing remarks.*

Fostering Energy Ties

Sitting down to answer questions from the crowd at the 6th Malaysia-Korea Energy Workshop held in Kuala Lumpur. L-R: Lee Jae Hoon, President of Korea Polytechnic University & Former Vice Minister of Trade, Industry and Energy, Dato' Seri Ir. Dr. Zaini Ujang, Secretary General MEGTW, Sonn Yang-hoon, Professor of Incheon National University & Former President of Korea Energy Economics Institute and Ir. Azhar Omar Senior Director of Industry Development and Electricity Market Regulation Department, Energy Commission.

In a bid to further boost mutual cooperation, the 6th Malaysia-Korea Energy Workshop was recently held in Kuala Lumpur to actively engage and share industry knowledge between Malaysian and South Korean key energy industry experts. The aim of the workshop was to provide up-to-date knowledge and technologies to further strengthen bilateral relations between South Korea and Malaysia. The workshop was attended by officials from the Korean Embassy, the Energy Commission of Malaysia and the Malaysian Ministry of Energy, Green Technology and Water (KeTTHA).

In his welcoming remarks, H.E. Dr. Yu Hyun-seok, Ambassador of the Republic of Korea, said that the first workshop, which was held in 2011 and jointly organised by the Korean Embassy and KeTTHA, had resulted in remarkable mutual contribution within the energy industry for both countries.

The workshop provides opportunities to exchange views and current information on the energy industry to overcome the global energy challenges that abound. Dr Yu said that Malaysia would stand to gain from Korea's development of its technologies. "Considering Malaysia is exporting renewable energy, Malaysia is seemingly on the same page with Korea. I am greatly positive that Korea will be able to contribute to Malaysia's nuclear and renewable energy programmes."

Dato' Seri Ir. Dr. Zaini Ujang, Secretary-General of KeTTHA, stated in his opening address that green initiatives were becoming a very significant part of Malaysia's agenda. "From 2011-2013, green products and services in the sectors of energy, buildings, manufacturing, transport, and waste and water management had generated about US$33.1 billion of revenue, or 0.8% of GDP," he said.

Sonn Yang-hoon, Professor of Incheon National University & former President of Korea Energy Economics Institute, gave his forecast under the 2017 World Energy Outlook, stating that even if all the nations abided by the Paris Agreement pledges, carbon

Left: *H. E. Dr. Yu Hyun-seok Ambassador of the Republic of Korea starting the session with his welcoming remarks, noting that "Malaysia is seemingly on the same page with Korea."*

Below: *H.E. Dr. Yu Hyun-seok, Ambassador of the Republic of Korean at the luncheon after the workshop. Also at the table is Datin Badriyah Abdul Malek, the Deputy Secretary-General of KeTTHA, and Tan Sri Peter Chin Fah Kui, Chairman of the Malaysian Green Technology Corporation.*

emissions would not be on track to achieve the 2-degrees Celsius goal of the Agreement. He also gave a rundown on the dynamics of the oil market and the changes in US oil policies since President Donald Trump was elected.

Ir. Azhar Omar, Senior Director of Industry Development and Electricity Market Regulation Department at the Energy Commission of Malaysia, spoke on the topic of Revitalising the Energy Landscape in Malaysia. Running through all the key developments of the energy policy framework that has been instituted thus far, he highlighted that he expects these policies to shape Malaysia's future energy mix. "Malaysia should have the right policies in place and they should not be conflicting objectives," he said.

Ir. Roslee Esman, Director of Gas Development and Regulation Department at the Energy Commission of Malaysia, contributed his views on the Third Party Access of the gas market in Malaysia, and was optimistic about the recent approval of the amendments to the Gas Supply Act. This would level the playing field for gas players and close the gap between the supply and demand of gas in the country, he said.

Lee Jae Hoon, President of Korea Polytechnic University & former Korean Vice Minister of Trade, Industry and Energy, touched on Korea's Energy Policy and its third Energy Master Plan, which will run from 2018-2040. He said that, being a mountainous country, Korea faced difficulties in installing renewable energy on its terrain, but that it harnessed the power of technology to overcome this barrier.

The workshop ended with an interaction session between the four speakers as panelists fielding questions from the floor about how both countries are able to further build on mutual cooperation, tap on each other's strengths and benefit from the network between Malaysian and South Korean participants.

Since the establishment of diplomatic ties between South Korea and Malaysia in 1960, both countries have enjoyed mutual cooperation in many areas, including the energy sector. Malaysia is set to benefit from its close relationship with Korea in terms of technological prowess, knowledge-sharing and a superior network. EM

Advancing the Global Energy Agenda

Representing Malaysia at the 7th International Renewable Energy Agency (IRENA) Assembly *in Abu Dhabi, UAE, Datuk Ir Ahmad Fauzi Hasan CEO sitting in at the ministerial roundtable discussions and meetings with his colleagues from the Energy Commission and SEDA.*

Contributing to a global discussion on renewable energy, the 7th session of the *Assembly of International Renewable Energy Agency (IRENA)*, an intergovernmental organisation, provided a compelling narrative for accelerating the deployment of renewables and additional perspectives for the benefit of its members.

The 7th session of the Assembly of IRENA was held in Abu Dhabi, United Arab Emirates on 14-15 January with Italy designated as President and the Dominican Republic, Indonesia, Jordan, and Morocco as Vice-Presidents. At the high-powered meeting this year, several strategic and ministerial roundtable discussions were held which revolved around central themes of the agency's work and mandate.

These discussions were held to promote an exchange of information and best practice among members and experts in support of efforts to increase the uptake of renewable energy, taking advantage of the annual sessions of the Assembly as the global cooperation platform in the field of renewables.

Government officials from over 150 countries, ranging from representatives from the private sector, civil society and international organisations attended the event. Malaysia was represented by officials from the Energy Commission including CEO Datuk Ir Ahmad Fauzi Hasan and Sustainable Energy Development Authority Malaysia (SEDA).

Over the two days, 75 ministers deliberated over ministerial roundtables and held discussions on how to enable the private sector to accelerate renewable energy deployment and drive the decarbonisation of the energy sector through innovation.

Meanwhile, the *Director General's annual report on the implementation of the work programme and budget for 2016-2017* highlighted the progress of IRENA's programmes over its first year of the current biennium.

The 7th session of the Assembly also witnessed the launch of the third edition of *Rethinking Energy*, IRENA's publication. It highlighted that global investment into renewables had steadily grown for more than a decade, rising from less than US$50 billion in 2004 to US$305 billion in 2015. Despite enormous growth, current investment and deployment levels are still making headway to meet international carbon reduction targets.

Adnan Z. Amin, Director-General of IRENA, commented, "Renewables are gaining ground by nearly every measure. Accelerating the pace of the energy transition and expanding its scope beyond the power sector will not only reduce carbon emissions, it will improve lives, create jobs, achieve development goals, and ensure a cleaner and more prosperous future." EM

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Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY and USE OF ENERGY

Established under the *Energy Commission Act 2001*, *Suruhanjaya Tenaga* (ST – The Energy Commission) is a statutory body entrusted with regulating the energy sector, in particular electricity and piped gas in Peninsular Malaysia and Sabah to ensure security, reliability, safety, efficiency and economy.

The Energy Commission...

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

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

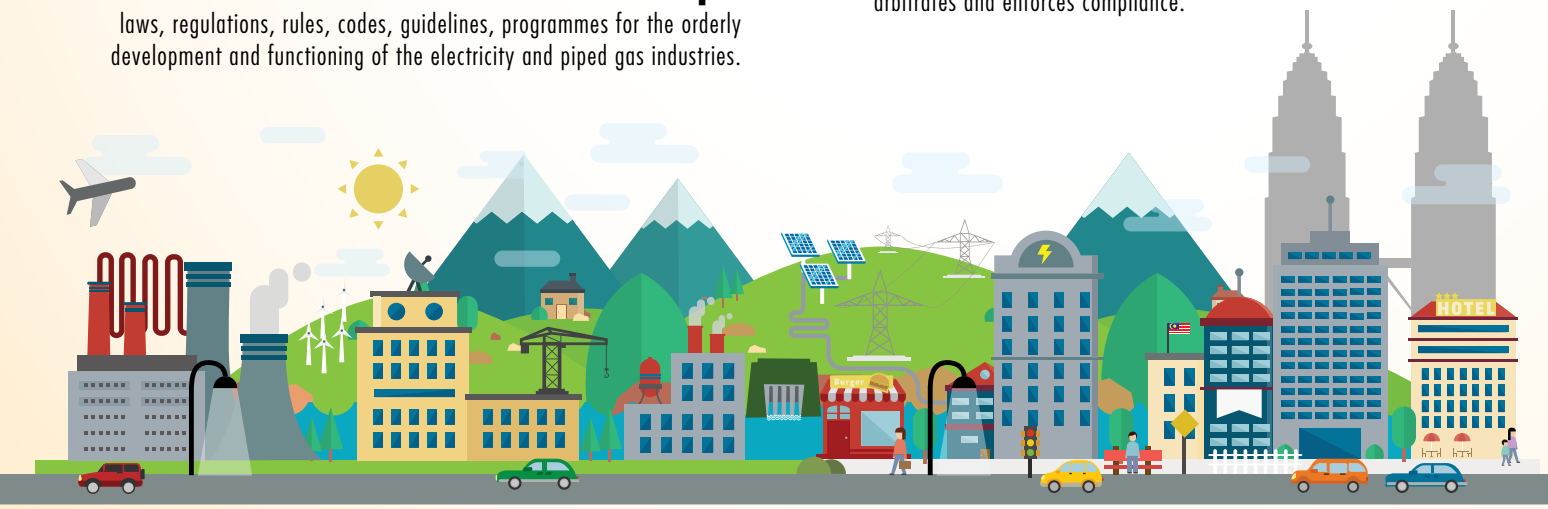
Promotes
good practices, as well as research, development and innovation in the electricity and piped gas industries.

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

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

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

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



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