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Towards a World-Class Energy Sector

ENERGY MALAYSIA

Suruhanjaya Tenaga
Energy Commission

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FOR THE CONSUMERS
Energy Malaysia highlights the need for public engagement and some of the Commission's public engagement initiatives.

ADVANCING THE ENERGY SECTOR THROUGH TECHNOLOGY
Energy Malaysia shines a spotlight on the latest technological advancements and how it will take the energy sector to a whole new level.

Revolutionising the Energy Sector

Industry 4.0 Transforms Malaysia's Energy Industry

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ENERGY MALAYSIA

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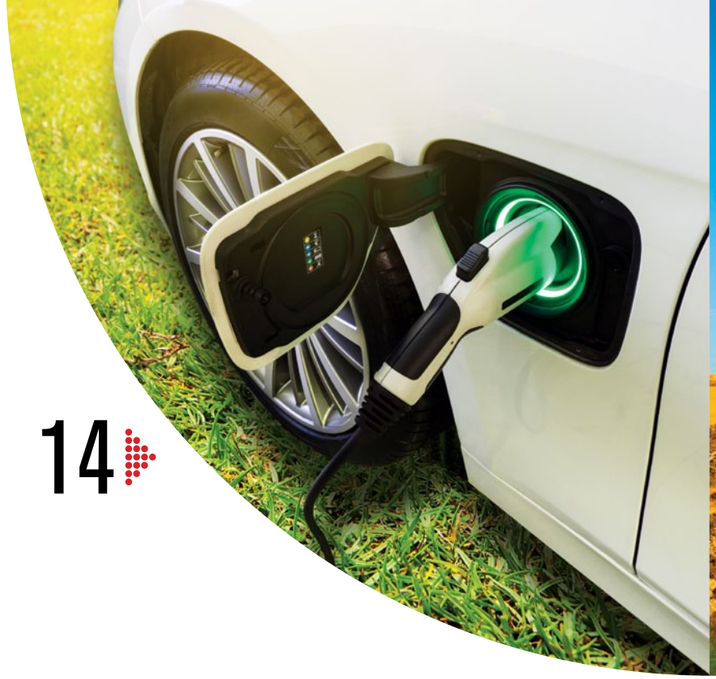

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Embracing Industry 4.0 in the Energy Sector

As demand for energy continues to grow to fuel our growing economy amidst rapid industry changes and rising consumer expectations, we will have to increasingly depend on industry innovations in order to deal with the emerging complex challenges. The emergence of Industry 4.0 has given us a new opportunity for this.

Industry 4.0 or the Fourth Industrial Revolution relates to the emerging technological innovations that are based on cyber-physical production systems. According to some experts, Industry 4.0 could increase productivity by as much as 50% with 50% reduction in the resources required.

In the energy sector, it has been highlighted that Industry 4.0 is being led by artificial intelligence (AI) and the Internet of Things (IoT). These technologies leverage the internet and computing infrastructure to connect smart machines, smart appliances and people that would enable us to much more efficiently and effectively manage the supply and use of energy. It is altering the basis of competition, redrawing industry boundaries and creating a new wave of firms to serve the changing needs in the energy sector.

Ensuring that these changes are well integrated, orderly and delivering the anticipated leap in performance whilst ensuring affordability and sustainability is going to be a major challenge to us all. Undoubtedly, there will be regulatory, financial and capacity challenges that need to be addressed through policy framework development based on international good practices. Industry players need to undertake the requisite cost-benefit analyses so as to achieve optimum benefits from Industry 4.0 initiatives.

The Commission will continue to work with all stakeholders to capitalise on game-changing digital technologies such as being offered by Industry 4.0 in our ongoing efforts to help raise energy sector development and performance to the next level. EM

Datuk Ir Ahmad Fauzi Hasan
Energy Commission, Malaysia

Bamboo as a Sustainable Powerhouse

Organised by multilateral development group – the International Bamboo and Rattan Organisation (INBAR) and China's National Forestry and Grassland Administration (NFGA), the three-day Global Bamboo and Rattan Congress in Beijing was the first international, policy-focused conference on the use of bamboo and rattan to help sustainable development.

Bamboo can be used to make durable products such as furniture, flooring, housing and pipes, replacing emissions-intensive materials including timber, plastics, cement and metals. It can also be used as a substitute for fossil fuel-based energy sources. Research by INBAR has shown that substituting electricity in the Chinese grid with electricity from bamboo gasification would reduce carbon dioxide emissions by almost seven tonnes per year.

Bamboo can also help communities adapt to the effects of climate change, serving as a strong but flexible building material for shelter, as well as helping restore degraded land and combat desertification. INBAR Director-General Dr Hans Friedrich said he hoped that policymakers would realise the potential of bamboo as part of solutions for dealing with climate change. – New Straits Times

Singapore Opens Up Electric Market

From 1 November, Singapore consumers would enjoy the benefits of a liberalised electricity market as the system would be rolled out island-wide following a highly successful soft launch in the Jurong region. The soft launch, which took place in April 2018, saw around 36,000 household and business consumers in Jurong on the west coast of Singapore switch electricity retailers. This, according to Minister for Trade and Industry Chan Chun Sing, is higher take-up rate than in other cities or countries.

The opening of the electricity market has been a long-running programme of Singapore's Energy Market Authority (EMA) since 2001.

With the roll-out of the final phase, around 1.3 million households and 67,000 businesses would have the option of purchasing electricity from 12 different retailers. Prior to this, the only authorised seller of electricity in the island city-state was Singapore Power (SP) Group.

According to reports from Jurong, consumers who switched retailers paid a rate that was 20 percent lower than the average tariff, as competition pushed prices down. The roll-out is taking place in phases, and will run from November to May 2019. – Business Times

Power for Palestine

Whether it is in the West Bank or the Gaza Strip, Palestinians living in the two territories have long had to contend with unstable and unreliable power supply. In the former, the energy demands of 3 million residents are only 75 percent met, while the 2 million residents of the Gaza Strip only receive 33 percent of their electricity needs. Compounding the problem is that these two areas are highly dependent on electricity imports. The West Bank from Israel and Jordan, and the Gaza from Israel and Egypt.

As such, an increasing number of Palestinians are looking at solar power as the solution to their energy woes. In the West Bank, the Palestinian Investment Fund (PIF) is planning three solar plants to generate 22 MW per day, while over in Gaza, many individual households and businesses have installed solar panels on their rooftops.

Progress however is slow and difficult. The West Bank's problems are exacerbated by the fact that most of the land in the area is still under Israeli control as per the Oslo Agreement. Meanwhile in Gaza, sanctions by Israel and Egypt mean that materials to build and operate solar power generators are few and far between.

Massder, a subsidiary of the PIF, reportedly aims to invest US$200 million in renewable energy over the next years, which will generate 200 MW. According to its CEO, Azem Bishara, "We will be in a good position if we reach 5 or 10 percent of the required electricity supply for Palestine in general from solar energy." – The National

"The government is in dire need of individual initiatives and investments to provide power so that it can become independent of the occupation, step by step."

– Shifa' Abu Sa'adi,
Head of Natural Resources, Economy Ministry, Palestinian Authority

MESTECC to form 4 Advisory Councils

The Ministry of Energy, Science, Technolology, Environment and Climate Change (MESTECC) will form at least four advisory councils to provide expert views on every field under its portfolio.

Minister, Yeo Bee Yin, said the councils will be set up, and the Ministry was in the midst of identifying experts, including retirees who wanted to share their expertise.

"My Deputy (Isnaraissah Munirah Majilis) and I are not experts in all of these fields, so we need to have an advisory council for each field – energy, science and technology, climate change and environment. There will be no allocation for these councils, so the council members will have to carry out their national duty (for free), she added. – New Straits Times

MESTECC Minister, Yeo Bee Yin, has set up advisory councils comprising experts in the energy, science and technology, environment, and climate change sectors.

More Jobs for Everyone

The growing renewable energy industry created 500,000 new jobs globally last year, surpassing the 10 million-mark for the first time, according to a new report by the International Renewable Energy Agency (IRENA).

The Abu Dhabi-based agency reported that harnessing clean energy around the world had created a total of 10.3 million jobs by the end of 2017, a 5.3% jump on the previous year.

Adnan Z. Amin, Director-General of IRENA, said the findings showed renewable energy "has become a pillar of low-carbon economic growth for governments all over the world". "Fundamentally, this data supports our analysis that decarbonisation of the global energy system can grow the global economy and create up to 28 million jobs in the sector by 2050," he said. – AFP

No More Diesel for Hamburg

Authorities in Hamburg have banned some diesel vehicles from two major arteries to improve air quality, making the German port city the first to take the long-feared step.

"Driving limits for older diesel vehicles can now come into force as planned" thanks to a decision by a top court, the city-state's government said in a statement. A 1,600-metre (one mile) section of the Stresemannstrasse highway in the Altona district will be closed to older diesel trucks from May 31.

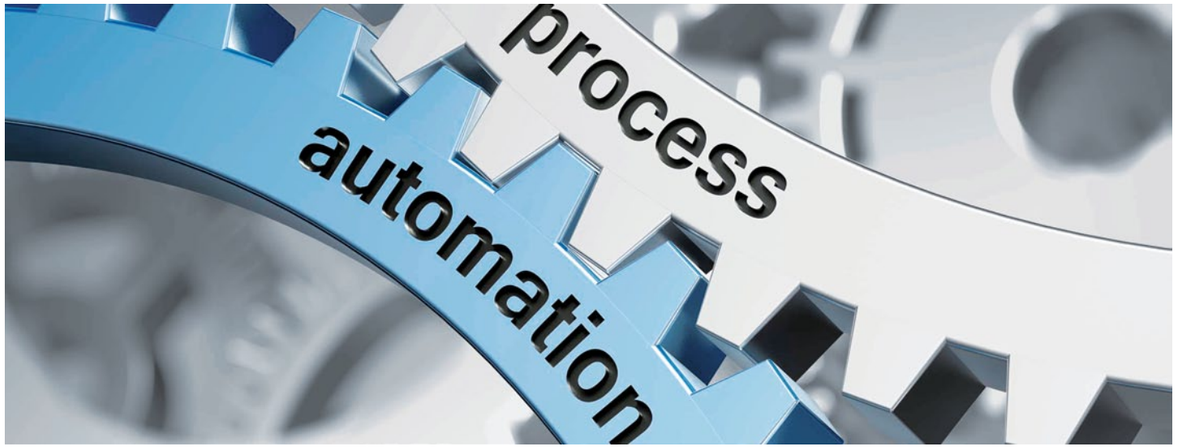
Meanwhile both diesel-powered trucks and cars that do not meet the latest Euro 6 emissions standards will be banned from a 580-metre stretch of another major and heavily polluted road, the Max-Brauer-Allee.

Exemptions will be allowed for local residents and businesses as well as for delivery vehicles, ambulances and rubbish trucks. – AFP

"We have a very concrete set of measures with the clear aim of cleaning up the air without limiting mobility, such as subsidies for electric vehicles and hardware refits to older diesel bus fleets."

– Andreas Scheuer,
Germany's Transport Minister

Robotics, augmented reality, Internet of Things (IoT), rapid prototyping technologies, artificial intelligence, big data analytics, and blockchain. These are the digital technologies that make up the Fourth Industrial Revolution. Digitisation has touched many industries over the past decade. Among them is the energy industry, which still has a long way to go in fully comprehending the inevitable transformation that is slowly being brought on by the current industrial revolution – and what this would mean to the industry. ***Energy Malaysia*** delves into Industry 4.0 and how it's transforming the energy sector as we know it.



Elements of Industry 4.0 such as automation and the Internet of Things allow organisations to better manage costs such as energy consumption.

In the energy sector, the advent of Industry 4.0 is progressing concurrently with the rising demand for sustainable energy. A number of countries are in the process of implementing cutting-edge technologies into their energy sectors. The Fourth Industrial Revolution, or more commonly known as Industry 4.0, was first coined by the German government in its efforts to promote the digitalisation of manufacturing. This coincides with the creation of a 'smart factory'.

It is the merging of the physical and digital world – where physical processes are virtualised and decision-making is decentralised. The factory runs like a well-oiled machine because of its digitalised state where in the event of a manufacturing problem, the issue is located and solved in real time – without the physical intervention of humans.

Generation, Transmission and Distribution

Industry 4.0 technologies are especially useful in the areas of generation, transmission and distribution of electricity. This is applicable to both renewable and non-renewable energy sources as, regardless of which they supply, power plants are highly expected to be competent to fulfil consumer demands. These areas of energy supply are seeing definite improvement in efficiency since Industry 4.0 technologies have been brought into play.

Quite importantly, renewable sources are now taking precedence over fossil fuels. A 2015 report on Southeast Asia stated that renewable sources will take control of close to a quarter of electricity generation by the year 2040. This implies new methods of electricity generation, transmission, and distribution – a situation that current power plants will have to start dealing with if they are to keep up with the eventual transition.

Automation and Control Solutions

Efficiency is the most precise of words that defines Industry 4.0 and that is exactly what it promises. The digitalisation of the energy sector provides an improved control over operational management. This in turn aids the power plant to balance between efficiently generating power while maintaining cost-effective operation.

Among the control and operational solutions needed to run a Smart factory are safety instrumentation systems, programmable logic controllers and supervisory control, as well as automation and control systems (ACS).

New Ways, New Opportunities

Industry 4.0 introduces technologies that are constantly developing and this will exact an important effect on the

energy sector. For a start, it opens the doorway to technologies that are able to support energy transition efforts. This is in regards to the ceaseless challenges faced by the energy sector in its attempts to incorporate renewable resources.

Electricity undergoes the process of generation, delivery, and consumption. As such, its management is important in order to provide good end-user experience. Digitalisation allows the sprucing up of communication technologies in order to enable this efficiency to take place. This spells good news for electricity networks as a large scale incorporation of renewable energies like wind and solar becomes a definite possibility.

A New Energy Landscape

One of the important aspects that is expected in technological innovations is its potential to benefit the environment. This is especially true for the energy sector. However, another aspect that is equally important is 'energy security' – the ability to provide affordable energy without the barrier of interruptions.

When renewable sources were first introduced into the energy industry, solar was believed to be the energy source of the future. Unfortunately, investing in this resource was too costly and, thus, rather unsuitable for widespread use. However, the advent of Industry 4.0 in the energy sector has opened up this possibility again with innovative technologies being introduced into the industry. This would also be applicable to other renewable energy sources.

Smart meters, microgrids, systems for energy management – these and other digital innovations are all paving the path into transforming the energy sector one technological upgrade at a time. This improvement would mean distribution of energy resources in locations that lack proper supply and/or stability.

The digitalisation of the energy industry will lead to the creation of a 'virtual power plant' where the physical presence of humans and their skills will be almost obsolete for energy management.

Industry 4.0 and Sustainability

Finding a balance between development and sustainability is extremely tricky. However, with digitalisation, it becomes easier to find the equilibrium between both. As climate change and safeguarding future generations is a priority, various parties are concerned with achieving the balance between digitalisation and sustainability.

Industry 4.0 supports the United Nations' Sustainable Development Growth (SDGs) where technology can be exploited to enhance sustainability. According to Prof. Dato' Dr Ahmad Ibrahim, Professor at Faculty of Engineering, Technology and Built Environment, UCSI University, industries adopting the Fourth Industrial Revolution are taking advantage of digitalisation to consume resources such as electricity and gas more efficiently.

He added, without limiting the consumption of resources, it would affect the competitiveness of the businesses, thus resulting in a higher cost. Industries also are ensuring that there are minimal losses of energy and this is where Industry 4.0 plays a role in ensuring energy efficiency in the industry. Additionally, consumers

The Malaysian energy sector is being transformed through digitalisation and it is critical to transform the way the sector works to keep up with the global energy market trends.

"Industries adopting Industry 4.0 will not only ensure the efficiency of resources used but also minimise the losses of energy during production stage."

– Prof. Dato' Dr Ahmad Ibrahim,
Professor at Faculty of Engineering, Technology and Built Environment, UCSI University

must also play their role too in safeguarding sustainability seeing that the cost of renewable energy (RE) technologies are much more affordable to the general public.

Changing for a Better Future

In Malaysia, industry players have been reluctant to change due to the costly renewable energy technologies. The lack of manpower and expertise also hinders the nation's development in embracing renewables.

Prof. Dato' Dr Ahmad urged Malaysia to invest in research and development (R&D) and be ready to identify the technologies that can be brought in to ensure sustainability. He said the government should formulate a long term plan by training local manpower to be ready to embrace technology. This in turn will create the emergence of new job opportunities for the sustainable energy sector.

Bringing it Home

The energy sector in Malaysia is no stranger to the transformations brought on by the Fourth Industrial Revolution. At some point, the depletion of non-renewable sources like petroleum will occur.

The question then, is of whether the Malaysian energy sector will make the critical decision of transforming the way the sector works.

A transition is required but this may take decades and the Malaysian energy sector cannot afford a change within that timeframe without serious repercussions.

Therefore, while working towards a gradual change into renewable resources, the industry should also integrate new technologies to help obtain cleaner fossil fuel resources – with the added necessity of also being more efficient.

Considering the rise of population and quality of life in Malaysia, demand may surpass supply – a phenomenon that is quite common in the energy sector and, unfortunately, also the biggest problems.

Dealing with issues such as this in the conventional way of hiking up oil prices is definitely not a long term answer. Innovative technologies, the technologies of Industry 4.0, have to be incorporated, for the non-renewable energy source that is currently being used, and the renewable energy source that will definitely take over the energy sectors around the world in the future.

In the space of a decade, Malaysia and the rest of the world will experience major digital disruptions – a state where conventional operating procedures will become obsolete. Automated equipment, big data, and artificial intelligence (to name a few!) will be the normal thing. The question is, can we keep up with this inevitable transformation? EM

SUPPLYING SUSTAINABLE ENERGY

With the Fourth Industrial Revolution being adopted in the Malaysian energy sector, it is no surprise that state-of-the-art technological advancements play a vital part in furthering the nation's energy sector. ***Energy Malaysia*** looks into how Industry 4.0 is transforming the energy scene and how to find a balance with sustainability in Malaysia.

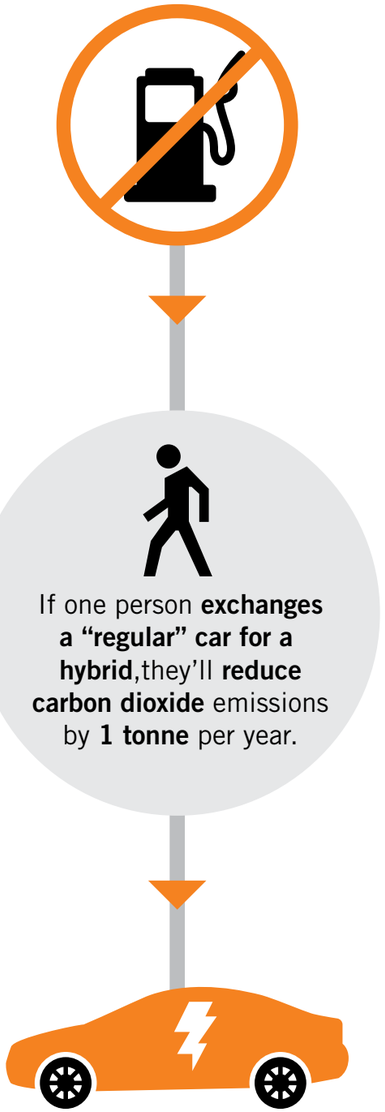
"Every decade, the average temperature has gone up by 0.17°C . In the past year alone, there was a 2°C increase. Global warming is a serious issue and it will impact the future generation for at least the next 20 years to come."

– Dr Mohd Azman Zainul Abidin,
CEO of Malaysian Green Technology Corporation (GreenTech Malaysia)

The Fourth Industrial Revolution has gained momentum and will fundamentally transform human lives for years to come. The energy industry will also be influenced by all Industry 4.0 developments with the birth of Energy 4.0. In the energy industry, Industry 4.0 acts a catalyst spurring energy security and efficiency through smart production and energy use.

Connecting devices, gathering data and personalising the technology is the same basic premise of the Industry 4.0 where potential of information and communication technologies could be harnessed to monitor and efficiently manage the generation, delivery and consumption of electricity to the consumers.

Electric vehicles adds great value to the sustainability balance sheet. They run on electricity and do not have tailpipe emissions in comparison to conventional vehicles. One of the best electric cars in the market, this Tesla Model S Electric Car features a 100kWh battery storage and is capable of achieving 0-200km/h in five seconds.



The flexibility of Industry 4.0 technologies also provides opportunities to support transition to sustainable energy system. The energy sector requires a grand integration of renewable energy resources into innovative sustainable systems and the rise of electric mobility solutions such as electric vehicles (EV).

Balancing the Equilibrium

However, balancing sustainability and Industry 4.0 is no easy feat. Malaysia has 5% Gross Domestic Product (GDP) growth annually and this means the manufacturing and industrial sector in line with Industry 4.0 is working on overdrive to achieve that. Dr Mohd Azman Zainul Abidin, Chief Executive Officer (CEO) of Malaysian Green Technology Corporation (GreenTech Malaysia) shared that manufacturing and industrial growth also gives rise to more energy usage which will result in a higher carbon dioxide contribution.

The trick is to find a way to 'decouple' the carbon dioxide contribution with the growth of the manufacturing and industrial sector. According to Dr. Mohd Azman, there is a need to instil a more environmentally conscious culture within the manufacturing and industrial sector. These sectors would have to find a balance on carrying out their day-to-day operations in a sustainable manner. Only then the 'decoupling element' of growth and carbon dioxide contribution would be successful.

Climate change and environment is the biggest threat to the global economy. Due to extreme weathers and natural disasters like flash floods and landslides, the yield of crop production or even the fisheries sector would be impacted in a negative way. Additionally, local businesses would also be affected as they would not be able to conduct their business activities. Hence, it is important to find a balance between sustainability and Industry 4.0 development as it will bear effects on climate change and the environment, stated Dr Mohd Azman.

Cultivating Green Practices

GreenTech Malaysia has 4 main focus areas to ensure sustainability in energy sector. The first is to facilitate investment towards green practices through Investment Tax Allowances (ITA). The ITA allows exemption for the purchase of green technology assets and income tax exemption for the use of green technology services and system. Dr Mohd Azman shared that there are currently 234 EV charging stations all over the Peninsula and the roll out plan for these stations were facilitated by GreenTech Malaysia.

GreenTech Malaysia also advocates a Smart Sustainable City plan. This initiative is aimed to develop a digitally advanced city in a sustainable manner through the low carbon production framework. It has also initiated the Green Data Centre which will be utilising fluid submersion technology to significantly boost energy optimisation and cut down on data centre maintenance costs. This data centre consolidates data from various agencies and acts as a mediator between the industries and the government.

GreenTech Malaysia also promotes a circular economy, where the value of products and materials is maintained for as long as possible, and waste and resource use are minimised. The resources are kept within the economy and when the product has reached to end of its life, to be used again and again to create further value. In the energy sector, this plays a vital role in creating a sustainable economic system to achieve a low carbon energy system by replacing fossil based fuels with renewable energy.

Industry 4.0 is rapidly transforming the energy sector as we know it and it may take a negative toll on the environment. With safeguarding the interests of the future generation in mind, the government, industry players and stakeholders and the energy sector as a whole must prioritise sustainability in line with the adoption and development of Industry 4.0. EM

THE DIGITAL *REVOLUTION*

The Future of the Energy Industry

The advent of the Fourth Industrial Revolution has brought along a new wave of technology usage in the world of business. Following this path, businesses are walking along the track of asset digitisation, which is a highly useful and thorough virtual resource library that is constantly forming. ***Energy Malaysia*** explores the digitisation of assets in the energy industry.

Asset digitisation is the process of converting physical assets into electronic resources. This process requires a combination of important tools to come into play, such as systems and technology, as well as competent Digital Asset Management. The digitisation of assets is not an altogether novel phenomenon. It is a technological approach that is already being adopted by facilities and institutions, taking advantage of its organisational efficiency. In the energy industry, digitisation of asset is being considered as a new step towards capitalising the technological advent of Industry 4.0.

What Are Your Assets?

Any three-dimensional information is regarded as an asset. This may include any form of books, documents and media content. These assets can be digitised in blockchain, which is a record log that grows on an endless basis. These records are called 'blocks' and are linked and protected with cryptography. These assets are then managed by asset managers, who may be people working in the financial sector, or investors who have practical digital knowledge.

In the energy sector, assets are renewable and non-renewable sources. The digitisation of these assets calls for the incorporation of Industry 4.0 technologies into its operational system, making the intervention of human as unnecessary.

The Deskless Worker

Interestingly, not only 'things' are digitised but people too. Some experts believe that among all important assets, the people working in an enterprise are probably the most important of all. This is where the deskless workers play a part. Making up more than half of the workforce, they are vital components of any organisation, whether big or small. They are the part of a company who do not sit by a computer and phone, but are the field and warehouse workers, the drivers, and even those who work in shifts.

As such, they are a form of asset and have to be supplied with technology, thereby digitising them. Once digitised, they become an aspect that is beneficial for the company, in that a physical location or differing time zones would cease being a barrier – an aspect that is especially suitable for those working in the energy industry.

Why Is It Good?

The more venturesome of them who have embarked on this path of digitisation at an earlier period have some positive news to share. The digitisation of assets has helped in the reduction of operational costs, created a more efficient workforce, higher administrative efficiency, and a higher quality of client experience.

It may also very well be the answer to avoiding pain points within an industry, the most common of which is communicative friction between departments. This means, your digitised assets, the people in the work force that have been provided with (in this case) communicative technology, will be able to collaborate in real time, without the need of a physical presence of those involved. This becomes of benefit to business companies as employees perform better – a profitable plus point for them.

Digitising the Energy Sector

The energy sector is one area which has undergone digitisation, with the most obvious examples being the use of smart grids, smart metering systems, and smart appliances. These utilise the Internet of Things (IoT) where devices are connected to another through the Internet, thereby allowing for the transfer of information between them.

According to Robert Viola, the Director-General of DG Connect at the European Commission, the use of digital technology in the energy sector can result in a number of advantages. These include, "helping the consumer actively participate in the energy market and use energy more efficiently."

This comes a time when demand side energy management is becoming increasingly important, as consumers become more aware of their ability and responsibilities when it comes to the efficient usage of energy. Smart meters are a good example of this concept at work.

As they are able to provide real time information on electricity usage, the building owner or tenant can calculate their consumption of electricity and adjust it accordingly. This is particularly useful in certain jurisdictions where tariffs change according to the time of use, with off-peak use being charged at lower rate.

Renewable energy is also one area which stands to benefit from digitisation. Companies such as ENGIE and Schneider Electric are collaborating to discover and utilise new technological solutions to aid in operational efficiency of these assets.

Didier Holleux, Executive Vice President of ENGIE explained that, "ENGIE's objective is to develop remote supervision and control of its global renewable energy production assets, and possibly other energy assets as well, to optimise their performance. We are working in close collaboration with Schneider Electric with a shared vision of the challenges of an energy world that is decarbonised, digitalised and decentralised."

Digitisation of assets helps in more ways than just its operational aspect. The Executive Vice President of Schneider Electric explained that the company "leverages its software solutions to address and solve customer needs in new and efficient ways." He also added that ENGIE and Schneider Electric's "combined technology and industry expertise can help identify new opportunities on how to better serve the energy market, while providing greater access to affordable, clean energy."

At a local level, Accenture's Managing Director of Resources, Cheah Wai Seng, echoed similarly positive statements on asset digitisation. He stated, "Petroleum and electricity retailers leveraging on usage of smart devices, 'cloud' storage and advanced analytics are able to increase their asset life-cycle and at the same time, innovate customer-centric products."

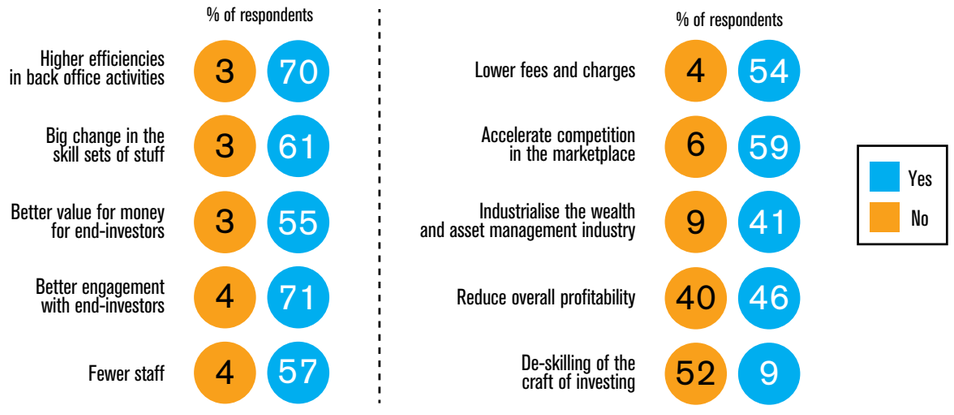
"Petroleum and electricity retailers leveraging on usage of smart devices, 'cloud' storage and advanced analytics are able to increase their asset life-cycle and at the same time, innovate customer-centric products.

– Cheah Wai Seng,
Managing Director of Resources, Accenture

To Digitise Or Not To Digitise, That Is The Question

Following the evolution of Industry 4.0, keeping up with technological development would be a smart move for those in the energy sector. This means daring to leave behind the conventional ways and endeavouring something new to keep up with the gradual and inevitable change brought on by this new path of industrial revolution in the area of energy development. The digitisation of assets – both of 'things', with the help of blockchain, and people – is the instrument of change for the future of industries, and how they work. Industry 4.0 technologies are slowly taking up the place of conventional methods, and an example of that is asset digitisation which promises to be secure, sustainable and efficient – important bywords that attract the interest of any industry, no doubt. In light of this, the Malaysian energy sector may also enjoy the benefit of asset digitisation for both renewable and non-renewable resources if they would consider in the investments of this particular technology.

Overall Impact of Digital Innovations Over Time



Source: CREATE-Research/Dassault Systèmes Survey 2017

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Revolutionising Energy Efficiency

The adoption of the Fourth Industrial Revolution is carried out across various sectors in Malaysia and the energy sector is no exception to that. The Internet of Things (IoT), among others is not only is a vital component in the supply side, but it is also a necessity on the electricity demand side. ***Energy Malaysia*** further examines the ways in which consumers and industries can utilise Industry 4.0 to enhance energy efficiency.

IoT for All

IoT is generally available to every sector of industries including the energy sector. Between rapid technological development and high regulation of the energy market, companies are developing data-driven business models which utility providers in the established market are finding difficult to cope up with. The energy industry as a whole is now pulling its strings and trying to develop innovative technologies to keep up with the era of digitalisation.

In the energy industry, IoT acts as a catalyst spurring energy security and efficiency through smart production and energy use. Connecting devices, gathering data and personalising the technology is the same basic premise of the IoT. The IoT's adaptability results in energy efficiency and security benefits for all.

The Big Boys Going Green

The rapid evolution of the systems, processes and technology that help successful companies develop and deliver energy around the world presents enormous challenges for businesses. Ensuring that all the elements are well integrated, performing and delivering needs great effort.

For industries and manufacturers to maintain competitiveness with the Industrial Revolution 4.0, reduction of production costs is the key. One way to achieve that is to ensure energy efficiency. Globally, companies have adopted an advanced manufacturing, also known as 'Lean Manufacturing'.

The 'Lean Manufacturing' concept utilises minimal resources to bring maximum value to the business. The very same principles are applied to energy consumption and management by bringing the same value with less energy in order to increase efficiency. In Malaysia, industries and businesses have been actively pursuing the Industry 4.0 agenda, particularly in the manufacturing and oil and gas sectors.

A Smart Factory adopts Industry 4.0 and Lean Manufacturing concept to bring maximum value to the business with with less resources.

There are two types of energy saving actions namely those that does not require investment and those that do which will be accompanied by a return of investment (ROI). For example in companies without an energy efficiency policy, a lot of energy is wasted during periods of inactivity such as holidays and weekends. This is referred to as passive consumption. By ensuring that everything is disconnected when not in use, up to 25% of the company's energy costs can be saved.

Through IoT technology, industries and businesses provide the optimisation of energy supply and consumption to reduce CO_2 emission which in turn reduce factory operation costs. Industries adopt an energy consumption visualisation system by predicting and monitoring air conditioning, lighting and power consumption. Additionally, they also install air compressor equipment, heat recovery ventilation system and renewable energy and natural gas energy monitoring system.

Innovative technologies such as Smart Meters and appliances promotes energy efficiency. These technologies will transform the way energy is consumed at home.

Managing Energy Consumption at Home

As for consumers at home, energy efficiency and management has always been a priority. With that in mind, Tenaga Nasional Berhad (TNB) is working hand in hand with the Energy Commission to incorporate digitalisation in Regulatory Period 2. This can be seen with the implementation of Smart Meters, which allow consumers to set a limit on their electricity consumption and monitor their consumption every 30 minutes.

TNB Smart Billing Project Senior Manager Datin Siti Laila Sri Asih Sheikh Garieb stated that the initiative is part of the utility giant's green initiative and power conservation effort. "Consumers will be able to gain awareness on the environmental impact by managing their electricity. This will educate them on our carbon footprint initiative," she added.

Thanks to the Fourth Industrial Revolution, warranting energy efficiency at home is just one click away. For example, the 'Making Electricity Visible' (MAEVI) mobile application features real time energy monitoring highlighting details like the amount of energy utilised and how much is the monthly bill before the bill arrives. The app will also alert a consumer if the electricity consumption has exceeded the planned budget.

The Fourth Industrial Revolution requires new technologies and a robust infrastructure. Now that everything is digitalised, it makes it easier on the consumers, businesses and industries to monitor their energy consumption and become more energy efficient. EM

Digitalising the Energy Industry

"In an Industry 4.0 environment, flexible production capacities and efficient energy consumption would require flexible integrated energy systems, and we have since witnessed the birth of smart metering, smart grids, and smart billing, among others."

– Indranil Lahiri,
President & Chief Executive Officer of Siemens Malaysia.

While energy has been key to all industrial revolution so far, not all parts of the energy industry may have as yet fully realise how much the current digital industrial revolution will be transforming the energy sector. Energy Malaysia interviews Indranil Lahiri, the President & Chief Executive Officer (CEO) of Siemens Malaysia to get his input on how Industry 4.0 is transforming the energy sector one step at a time.

Q: The Fourth Industrial Revolution is being adopted in all the sectors and the energy sector is not excepted. How can Industry 4.0 be adopted in the energy sector and how will it affect the energy sector?

A: The Fourth Industrial Revolution or Industry 4.0 is about the adoption of smart technology and the exchange of intelligent data to help increase productivity and flexibility of industries and their manufacturing processes. Yet, in order to facilitate the connectivity of these integrated networks, there has to be power and energy already in place - for which reliability, quality and sustainability will then drive smart factories and the smart industry development.

What's interesting is that just like the networked systems and machinery in the industrial sector, we are seeing more and more elements within the energy industry being equipped with new, digital functions now. This includes the world's first digital transformer that was developed and launched by Siemens, which optimises the operation of electricity grids, increases grid resilience, and opens up new servicing and maintenance models.

What's evident is that the shifting energy landscape will influence the quality of electricity supply. For industries, changes in equipment and technological processes are increasingly significant – besides the use of newer and more efficient power electronics and energy-storage technologies, the need to safeguard against system failure and to protect people and assets are important aspects of the supply security issue.

As the energy trend moves towards decentralisation, industries can play a role in a distributed energy system by ramping up in-house renewable energy generation with storage options in order to balance load and thereafter reducing grid in-take. In an Industry 4.0 environment, flexible production capacities and efficient energy consumption would require flexible integrated energy systems, and we have since witnessed the birth of smart metering, smart grids, and smart billing, among others.

On the power generation front, there is an increased need by power generators to make "informed decisions" for O&M of power generation assets. This is where power generators embracing Industry 4.0 play a key role.

Q: What are the challenges in adopting Industry 4.0 in the energy sector and what are the strategies in overcoming those challenges?

A: The energy sector is undergoing a transition phase where clean energy and a low-carbon future are the new agenda for the economy and the industry. Renewable resources are heralding the future of energy and starting to revolutionise many sectors, replacing coal and fossil fuels. And the challenge is with companies that lack the knowledge to drive the digital enterprise across supply chains, which fail to see the changes that are taking place, or to come up with agile, innovative models to adapt accordingly.

There is also a certain degree of vagueness on the deliverable or ROI (Return on Investment) for Industry 4.0, hence the reluctance of businesses to place huge investments in one shot. For infrastructure providers and power producers, areas like energy data management and resource optimisation are the new metrics and targets which can be only achieved through accurate and efficient data analysis powered by enablers of Industry 4.0.

It is important for industries to leverage on this changing landscape in order to increase openness and interoperability. It is particularly important to utilise advances such as machine learning, data analytics, cloud computing, artificial intelligence and OT/IT (operational technology / information technology) integration to unlock the potential of predictive / prescriptive maintenance practices.

As a first step, companies can first identify their pain points, evaluate their priority, plan their roadmap and conduct an ROI evaluation over the long-run in order to convince themselves and their management stakeholders of the need to evolve and prepare for the next phase of competitiveness to meet the unprecedented technological innovation that energy is experiencing industry-wide.

Q: What do you see to be some of the most exciting projects involving Industry 4.0 in the Malaysian energy sector? How will these projects benefit the Malaysian energy sector and the nation as a whole?

A: One of the earliest was in 2014, when smart meters were introduced with the pilot implementation of the Advanced Metering Infrastructure (AMI) for Tenaga Nasional Berhad. 350,000 of these meters have been rolled out in Melaka, and this would help TNB reduce operational cost by cutting down on meter readers. At the same time, it also gives end-users greater control over their electricity consumption as they are able to monitor and manage their personal usage via a portal.

The AMI is a stepping stone to realise various other solutions for the energy sector such as time-of-use tariffs, smart pre-payment and demand response. It is worth noting that TNB has announced that it plans to spend RM18.8 bilion over next three years for transmission & distribution grid capacity including RM2.7bil for Grids of the Future technologies (such as 1.2 million smart meters in Klang Valley).

With TNB aiming for a 30 percent reserve margin within the foreseeable future, this additional capacity based on fresh power demand expectations and sources of power will require large power generation projects to be continuously installed at the most efficient and sustainable levels - therefore, technologies and digitalisation will result in maximum availability, flexibility, and plant optimisation to sustain the energy supply and power generation needs of the immediate future. At the same time, cyber secure digital substations would play a crucial role in grid transmission networks while distribution feeder automation would aim to reduce outage durations and to improve prevailing System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) indices. EM

REACHING OUT TO THE MASSES

The Energy Commission is continuously striving to achieve its goals especially in enhancing public engagements. In order to do so, the Commission collaborates with various stakeholders and industry players to ensure that the consumers are well informed of the energy sector. ***Energy Malaysia*** looks into how the Energy Commission alongside other stakeholders ensure that public engagement initiatives are conducted and the impact it has on enhancing knowledge and appreciation of the energy sector.

Mohd Elmi Anas, Director of Electrical Safety Regulations of the Energy Commission during an interview with Bernama and Bernama TV on Electrical Safety Measures During Flood Season to educate the public at large on the subject matter.

Public engagement in the energy sector is complex as it brings both technical and social issues, each with their own language and diverse tools. With that said, the need to engage with the public extends to all the industries as it is crucial to ensure the successful growth and development of the particular industry.

Disseminating Information to the Public

The transition from RP1 to RP2 requires the enhancement of public engagement as digitalisation brought upon by the Industry 4.0 Revolution has made consumers much more aware of the workings and various components of the energy sector.
Siti Suhaila Ahmad, Head of Promotions and Communications shared that making the public and industry players becoming self-regulated has always been the intention of the Commission. Therefore there is a call for a shift of role from that of an educator to the role of an advocator, within the Commission, in order to allow the consumers and industry players to be more knowledgeable and independent.

"We intend to become the point of reference for stakeholders, industry players and consumers. The communication between us and the public emphasises between the development of the country and environmental sustainability. It is our responsibility to educate the public."

– Siti Suhaila Ahmad,
Head of Promotions and Communications

Economic regulation matters such as how the tariff is calculated is everyone's point of interest. The Commission however, is given a bigger responsibility to ensure that not only electricity is sold at a reasonable and affordable price but it remains available for continuous consumption. Apart from the cost of electricity, there is an urgent and critical need to ensure that there is a behavioural change in consumers when it comes to using energy efficiently and safely.

The change can be achieved through various engagement activities such as roadshows, forums, radio and television segments, and seminars. These activities are carried out to various demographic of audiences such as industry players, manufacturers, associations, medical institutions and even students. Engagement activities act as a platform for both the Commission and consumers from all walks of life.

"We intend to become the point of reference for stakeholders, industry players and consumers," said Siti Suhaila, while adding that communication between the Commission and the public emphasises on finding the balance between the development of the country and environmental sustainability, and that it is the Commission's responsibility to educate the public. By doing this, it would result in a transparent industry as the consumers will understand the root cause and will be able to accept and make informed decisions, making them energy-smart.

Engagement through the experts

According to Ir Zul Azri Hamidon, Head of External Relations and Consumer Affairs, the engagement activities are carried out in three categories, namely for the industrial sector, educational sector and for the general public.

"From a conventional energy market, we are transitioning to a more liberalised energy market. It is up to us to educate the stakeholders, students and the general public on the transition that is ongoing in the industry."

– Ir Zul Azri Hamidon,
Head of External Relations and Consumer Affairs

For the industrial sector, the Commission has formed the Energy Consultative Panel which comprises of 30 main stakeholders from different background such as the government, private sector, professional bodies and consumers association. Among the participants include representatives from the ministry, Economic Planning Unit (EPU), Tenaga Nasional Berhad (TNB), Gas Malaysia Berhad (GMB), Federation of Malaysian Manufacturers (FMM) and the Institution of Engineers Malaysia (IEM).

The panel is held annually in the Peninsula and Sabah, and works as a platform for discussion, knowledge sharing and planning to improve the Malaysian energy sector.

In the education sector, the Commission closely collaborates with Universiti Tenaga Nasional (UNITEN) to host studies, seminars and workshops. Renowned international speakers like Prof. Ken Koyama, Managing Director of the Institute of Energy Economics, Japan (IEEJ) are invited to share on the latest trends and developments in the global energy sector. Ir Zul Azri added that these talks and seminars not only educate the industry players but also expose the students to the latest geopolitical and energy market issues.

With the continuous support from the government, the general public are constantly made aware of the ongoing changes within the sector. The consumers are given a platform to make complaints on energy matter issues through the E-Aduan online application. Town hall sessions are also carried out in the Peninsula and Sabah which allows consumers to voice out on their concerns pertaining to the energy sector. Additionally, events like the EE Run and the EE Challenge are carried out by the Commission to educate the public on energy efficiency in a fun and interactive way.

Public engagement plays a vital role in the growth and performance of the Energy Commission. It also helps the consumers have a further understanding of the energy industry thus resulting in a more transparent energy industry. EM

ENERGY AUDITING
MASTERING GREEN TECHNOLOGY

After extensive competency training and experiences, an Energy Auditor plays a crucial role in conserving energy through evaluation and analysis on how energy is being used in a facility, identifies energy conservation and makes recommendations where consumption can be truly optimised. ***Energy Malaysia*** takes a closer look at the tasks and roles of the green guru of energy industry.

The Role of an Energy Auditor

According to Muhd Muhtazam Noor Din, Energy Auditor at Malaysian Green Technology Corporation (GreenTech Malaysia), the job of an Energy Auditor (EA) is to conduct energy audit of buildings and review performance of the building's system either Passive or Active Systems. The main responsibilities of EA are to identify and prioritise energy saving measures to the clients. The tasks include setting-up baseline, collect and analyse field data related to energy usage, calculate potential of energy savings, identify energy wastages and identify opportunities to improve operational efficiencies. The audits could be done for residential, office buildings and also industrial sector.

The Credentials

Muhd Muhtazam mentioned that an EA is important and if possible, would become a minimum standard to guide Registered Electrical Energy Managers (REEM), building owner and/or operator to identify Energy Conservation Measures (ECM). Generally, an energy auditing process has to follow the *Electrical Energy Audit Guidelines for Buildings* published by the Energy Commission and GreenTech Malaysia in compliance with the *Efficient Management of Electrical Energy Regulations (EMEER) 2008* and other safety related acts and regulations.

He emphasised that those who want to become an EA are encouraged to take

"I am very keen on raising awareness on reducing and preserving energy consumption at home and office building, mainly to reduce carbon by reducing electricity bills. I send my message via training and presentations using layman terms so people can easily understand."

– Muhd Muhtazam Noor Din,
Energy Auditor for Malaysian Green Technology Corporation (GreenTech Malaysia)

up competency courses such as Energy Auditor Training Course (EATC) or Certified Energy Auditor (CEA). However, the Certification of Energy Auditor is yet to be mandatory in Malaysia.

An EA is usually part of an Energy Management System (EnMS) and they can be a Ceritified Energy Manager (CEM) and then further to become REEM. There are two training providers recognised by the Energy Commission - the ASEAN Energy Management Scheme (AEMAS) under GreenTech Malaysia, and the Malaysian Association of Energy Service Companies (MAESCO).

Other than professional certifications, an EA needs to have good soft skills mainly in critical thinking, communicative planning and problem solving.

Types of Auditing

Generally, there are three types of energy audits; walk-through/ preliminary energy audit, detailed audit and Investment Grade Audit. The preliminary audit (alternatively called a simple audit, screening audit or walk-through audit) is the simplest and quickest type of audit. It involves minimal interviews with site-operating personnel, a brief review of facility utility bills and other operating data, and a walk-through of the facility to observe the building operation and to identify any glaring areas of energy waste or inefficiency.

Detailed energy audit includes a complete description of the facility, including an equipment inventory, an energy balance, detailed energy savings and costs associated with each low-cost and no-cost measure, financial analysis of each recommended measure, identification and rough estimates of capital project costs and savings. Energy savings and economic feasibility are determined as accurately as possible. The reports contain more detailed descriptions of the measures.

In most corporate settings, upgrades to a facility's energy infrastructure must compete for capital funding with non-energy-related investments. Both energy and non-energy investments are rated on a single set of financial criteria that generally stress the expected return on investment (ROI). The projected operating savings from the implementation of energy projects must be developed in order to create a high level of confidence. In fact, investors often demand guaranteed savings. The investment-grade audit expands on the detailed audit described above and relies on a complete engineering study in order to detail technical and economic issues necessary to justify the investment related to the transformations.

Chronologically, Muhd Muhtazam said an energy audit firstly identifies the amount of energy consumption for a premise/ facility, and subsequently would propose ECMs (The opportunities to improve the operation, maintenance, or energy efficiency of building or process systems). Typical audits start with a walk-through to study the existing system, availability of the monitoring system and metering for information on real-time energy consumption and historical data. He also stated that auditors need to have a proper planning on what is done and has to be done on a daily, weekly, monthly basis and even annually from residential audits to industrial audits.

The Detailed and Investment Grade audit will involve financial and economic calculations and analysis, for example the payback period, internal rate of return which are very significant to prioritise the energy saving measures from no cost measures to high cost measures. All the findings will present in the energy audit report.

The Malaysian government has put significant effort to ensure adequate, reliable, secure and cost effective supply and to utilise energy resources efficiently while minimising the negative impacts on the environment. Muhd Muhtazam is also optimistic about the future of Malaysian energy conservation because of the technological upgrades, operation and maintenance innovation. EM

Drone Technology

Elevating the Energy Industry

For a very long time, unmanned aerial vehicles (UAV) – or drones, were primarily used for military and surveillance. However, in the recent years, the use of drones for civilian tasks such as photography to flying them as a hobby has skyrocketed. Industries, such as real estate, agriculture, retail and entertainment, are also adopting drone technology in order to work faster, safer and in new innovative ways. The energy industry is no exception as ***Energy Malaysia*** finds out with insights from Jimmy Chung, Malaysian Operations Director of Avetics Malaysia, which is managed by Sanudra UAS Sdn. Bhd.

Drones play a vital role in many parts of the global energy sector. In Malaysia, the utilisation of drones in the energy sector is still at an infancy stage. However, in the oil and gas sector, and Large Scale Solar Farms (LSS), the utilisation of drones is taking these sectors to a whole new height.

In the oil and gas sector, Chung explained that the usage of drones acts as the first round of surveillance and inspection. This reduces high risk involvement and increases efficiency by diagnosing the problem areas before deploying workers to fix the problems.

In terms of safety, the drones are also equipped with integrated gas meter, redundancy in propulsion and failsafe algorithm to diagnose serious safety issues.

For LSS, drones can be utilised throughout each stage of the project. They are used to survey the land, and provide a 3D image of its lay, which is vital as the area needs to be flat for the solar farm to be effective. During the construction phrase, drones can be used to monitor the progress of the project and keep track of soil movements. Finally, after completion, they will be used to carry out thermal inspection using forward-looking infrared (FLIR) cameras, to ensure the safety and effectiveness of the panels.

Procedures and Regulations

This complex technology requires knowledgeable, experienced and professionally-qualified personnel to safely customise drones, collect, process and manage data with very stringent requirements. Avetics Malaysia carries out its own in-house research and development (R&D) and also develop their own software. The drones are built locally catering to the industries such as oil and gas, real estate or even agriculture.

The products that the company develops must adhere to the requirements of the Civil Aviation Authority of Malaysia (CAAM) before it can be used for a project. Chung also added that prior to the commencement of the project, the company must apply for a licence from CAAM and Jabatan Ukur dan Pemetaan Malaysia (JUPEM) which would roughly take about one to two weeks. The project can only commence after a licence to fly is awarded.

The regulation of drone operations will tighten the given safety and security concerns. There is a need to maintain a continuous communication with the local regulatory and enforcement bodies such as CAAM and JUPEM to stay up-to-date on current developments.

Piloting a Drone

Behind the scenes, there are usually two pilots controlling the drones. Before one can be a professional drone pilot, he or she has to undergo a pilot competency test and certification process. Chung explained that the in-hourse pilot competency test is stringent as a candidate must have three years of radio control experience and a relevant degree or diploma in Aerospace related field of studies.

After being selected, the candidate would be given on-the job training and mentored by an experienced pilot for 5-10 projects. The candidate will also be trained in UAV knowledge. Since Malaysia has yet to recognise drone pilots, the candidates can take up a local certification programme alternatively.

Avetics Academy offers a four-day certification programme for working professionals or companies looking to explore integrating drone operations into their business processes as well as participants with zero backgrounds. Participants will get hands-on experience on controlling a UAV in a safe environment, all while being guided by an Air Transport Pilot License (ATPL) certified instructors. Participants will also undergo a written and practical examination on the final day to ensure participant's level of understanding meets the standards.

The custom-built Ursa Octoco is a multipurpose multicopter with 8 propellers and is equipped with a 360 gimbal and powerful camera. Primarily used in the energy sector, this magnificent drone can take up to 15m/s wind and maintain stability given its larger foot print and power to weight ratio.

Course Outline

BDO:001 Introduction to Basic DroneFlying (1 Day)

Topic 1: Introduction to Drones
- Basic Knowledge on Unmanned Aerial Systems (UAS)
- Types of UAS and Purposes
- Local Regulations
- Theory of Flight
- Flying Modes
- Pre/Post-flight Procedures
- Failsafe Procedures
- Safety Procedures
- Emergency Scenarios

Topic 2: Basic Flying (Simulator)
- Altitude Control Familiarisation
- Hovering Control Familiarisation
- Translation Hovering Control Familiarisation
- Landing Familiarisation
- Forward Flight Familiarisation

Topic 3: Basic Flying (Outdoor)
- Stationary Hover
- Translation Flying
- Forward Flight
- Figure of 8's

BDO:002 sUAS Pilot Certification Course (3 Days)

Topic 1: Applicable Regulations and Limitations Relating to Small UAS (sUAS)
- Fundamental Principles of Flight
- Governing Bodies
- UAS Categorisation
- Air Laws & Regulations
- Operations and Accredited Operators
- Mandatory Occurrence Reporting

Topic 2: Aviation Safety
- Insurance, Export, Logistical Requirements

Topic 3: Aircraft General Knowledge
- Airworthiness
- Basic Maintenance
- Battery Management
- Aircraft Operating / Navigation Modes
- Air Instruments: GPS, Airspeed, Altitude and Direction
- Command, Control and Effects of Control
- Command Override and "Failsafe"
- Frequencies: Control, Telemetry and Payload

Topic 4: Flight Performance and Operational Planning
- Operating Flight Envelope
- Operation at Higher Altitudes or at Different Temperatures
- Visual Line of Sight: Concept of Operation
- Rural, Urban, Congested, Overflight
- Special Operations and Events

Topic 5: Human (Factors) Performance and Limitations
- Human Factors
- Airmanship
- Situational Awareness
- Medical Fitness and General Health
- Performance Limitation
- Air Crew and Support Crew Management
- Flight Duration and Workload
- Weather and Human Performance

Topic 6: Communications
- Operating without Air Traffic
- Operating with Air Traffic
- Communication Protocols
- Basic R/T Training

Topic 7: Meteorology
- Importance of Good Weather Information
- Obtaining a Weather Forecast
- Interpreting Weather Information
- Wind and Visibility
- Effects of Weather on sUAS

Topic 8: Navigation and Map Interpretation
- Latitude and Longitude Aviation Charts
- Airspace and VLOS Scenarios

Topic 9: Organization and Responsibilities
- Pilot Responsibilities
- Flight Team Composition
- Support Personnel & Organisational Responsibilities
- Technical Specifications
- Types of Operation
- Operating Limitations and Conditions
- Qualification Requirements
- Logs and Records
- Crew Health

Topic 10: Operational Planning and Risk Management
- Determination of the Intended Tasks and Feasibility
- Selection of Operating Area and Alternatives
- Risk Management
- Pre-notification
- Site Permissions – "Landowner"
- Preparation and Serviceability of Equipment

Topic 11: Flight Operations
- On-Site
- Pre-Flight
- Immediate Pre-Flight
- Post Flight
- Emergency and Incident Handling

Topic 12: Advanced Flying (Outdoor - "Atti" mode)
- Pre-flight checks and Power Up
- "Nose In" Hovering
- "Side In" Hovering
- Forward Flight in Box Formation
- Varying Height Forward Flight in Box Formation
- Figure of 8s
- Emergency Procedures
- Landing
- Power down

"We would like to bring UAS safety and solutions to the masses and hope that drone technology will transform the way we do things for the better."

– Jimmy Chung
Malaysia Operations Director
of Avetics Malaysia

Transforming the Energy Sector

According to Chung, Avetics Malaysia are also is in collaboration with the local education institutes such as Curtin University Miri, Sarawak and Universiti Teknologi Malaysia (UTM) to promote drones and responsible flying. The current trend is that industries will greatly benefit immediately from the deployment of drone technology especially in the energy sector and infrastructure.

In the next few years, the drone industry needs to cater to more bespoke needs such as autonomous flight, multi-spectrum, night-vision imaging and swarm drones. There is a constant need to test new technology and areas of application to understand how drones can be adapted in new areas while also making its operation safer, faster and more cost-efficient.

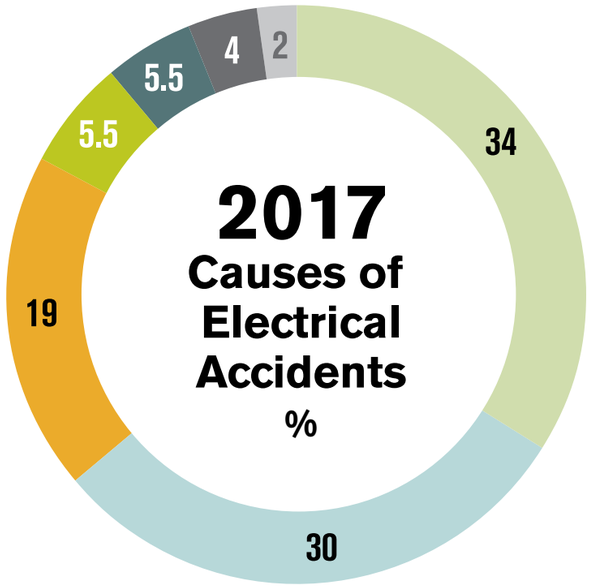
In this age of modernisation and digitisation, robotics is an essential component as we move towards the Fourth Industrial Revolution. The advancement of UAV technology in the recent years has not only opened up many alternatives to photography, agriculture, site survey and traffic monitoring, just to name a few but also especially in the local energy sector. EM

Setting the Standards on Appliances

The Energy Commission places great importance on safety, and since accidents in domestic environments are mostly caused by the use of uncertified electrical appliances, the Energy Commission has made this their focus area. ***Energy Malaysia*** shines the spotlight on how electrical appliances undergo a series of stringent tests and approvals before it hits the market.

"The Commission strives to create public awareness for electrical appliances that have been issued a Product Recall order through collaboration with the Ministry of Domestic Trade and Consumer Affairs."

– Ir Fairus Abd Manaf,
Head of Electrical Equipment Unit



The use of uncertified electrical appliances is one of the contributors of domestic electrical accidents in Malaysia. Therefore, the Commission regulates the certification process of electrical appliances and ensure that the appliances are up to the standards determined by the *Approval of Electrical Equipment Guideline* and *Electricity Regulations 1994*.

Currently, the Commission regulates 34 categories of electrical appliances such as rice cookers, immersion water heaters and refrigerators, just to name a few. All the 34 categories include almost 200 different variant of appliances. All these regulated appliances are either locally manufactured or imported.

The Certification Process

Before the imported appliances are put on shelves, they need to be tested and certified. According to Ir Fairus Abd Manaf, Head of Electrical Equipment Unit, these appliances must undergo the testing process by an accredited laboratory to demonstrate that they comply with the Malaysian Standards (MS) or the International Electrotechnical Commission (IEC) standards before being allowed into Malaysia. Once approved, they are sent to SIRIM for consignment tests to verify that they adhere to the stated specifications.

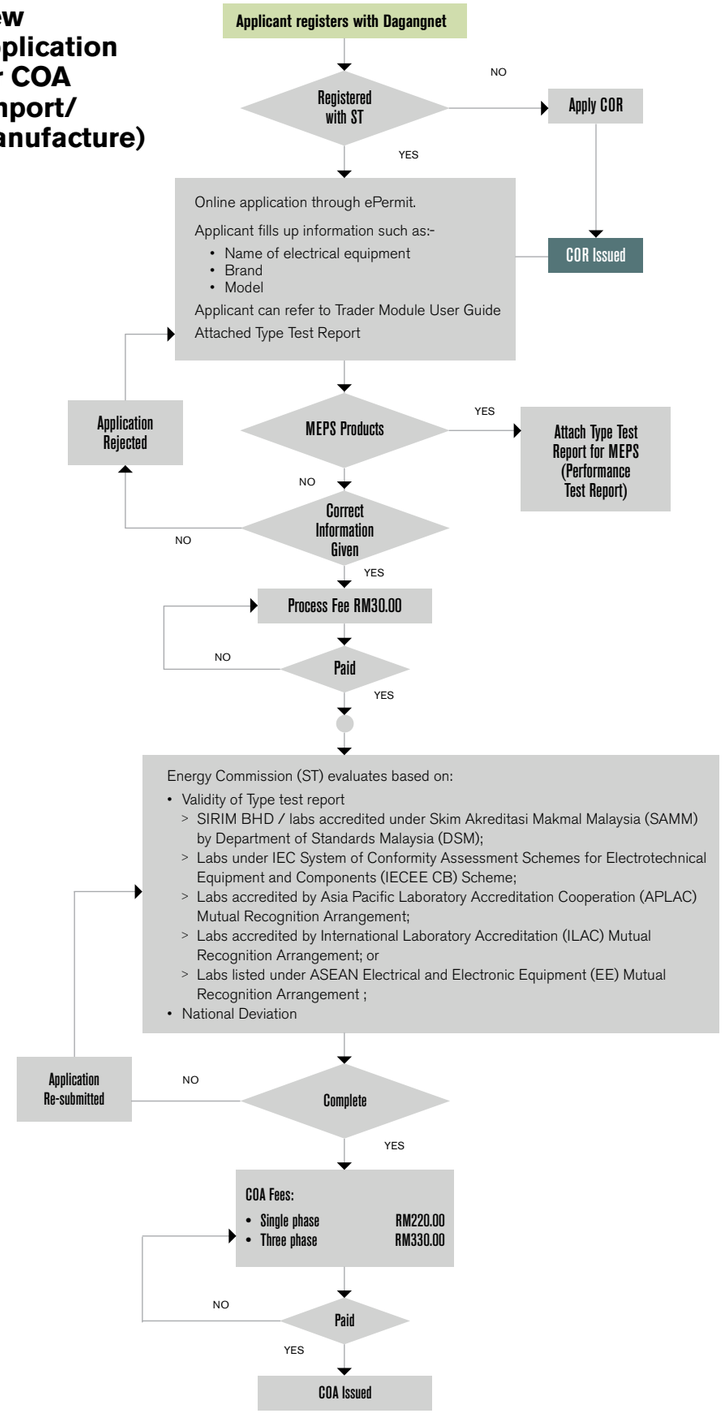
Ir Fairus added that both the overseas and local manufacturing companies need to apply for a Certificate of Approval (COA) through the online portal. This requires the registered importers and manufacturers to provide test reports stating the exact details and specifications of the electrical appliances. If the details and specifications match, the COA is then awarded to the manufacturers.

Only when the appliances pass the consignment test, a SIRIM-ST label would be attached to the appliance. Similarly for locally manufactured products, they would have to undergo a Product Certification Scheme by SIRIM before the SIRIM-ST label is attached. After which, the products are then ready to be sold to the consumers.

From time to time, SIRIM and the Energy Commission would conduct spot checks to ensure that the appliances adhere to the standards set. However, if they are not deemed up to mark then the product would be blacklisted from being sold or used in Malaysia.

Then, the Commission will issue instructions for them to be sent back or destroyed, stated Ir Fairus. The importers or manufacturers will then need to issue a Product Recall order if the electrical appliances

New Application for COA (Import/ Manufacture)



Right: *Disposal of 100 cordless water kettle in Menglembu, Perak.*

Below: *Disposal of uncertified rice cookers in Puchong, Selangor.*

are already sold to the public at large. The Commission has instructed the importers to carry out Product Recall activities and witnessed the destruction of the uncertified electrical appliances. These include 100 cordless water kettles in Menglembu, Perak and 200 uncertified rice cookers in Puchong, Selangor, recently.

The certification process of electrical appliances not only ensures standard of products but it also safeguards the consumers' safety. Ultimately, it is the Commission's priority in ensuring safety in all the avenues especially in a domestic setting. EM

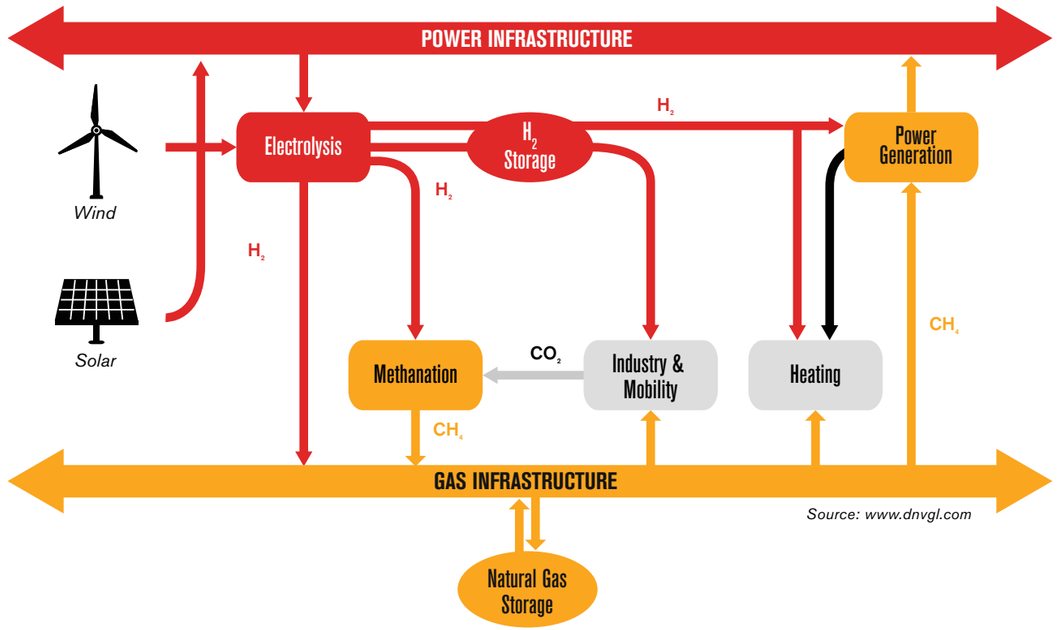
GERMANY

A WINDY SOLUTION

Despite the problems associated with them, such as their negative impact on the environment and their finite nature, fossil fuels are still the primary source of energy around the world. However, serious efforts have been made to utilise more sustainable resources, and one country has been leading the way in this – Germany. One of the most industrialised nations in the world (as well as the most in Europe), Germany is looking at a nationwide major by transitioning from non-renewable to renewable energy resources, specifically wind energy.

A New Project

In December 2016, the NEW 4.0 project was initiated in Northern Germany, combining two major locations as the starting ground for a 4-year energy transition trial project. NEW is an abbreviation of Norddeutsche Energiewende (which literally translates to North German Energy Transition) and 4.0 signifies the advent of the Fourth Industrial Revolution where breakthrough technologies are integrated into the industry.



A power-to-gas plant for hydrogen electrolysis where excess wind energy is generated as gas

The two locations for this energy transition project are Schleswig-Holstein and Hamburg. The former is a state in Germany, popular for being a major wind energy supplier whereas the latter, located just south of Schleswig-Holstein, is one of the largest power consumers in the country.

This is a trial project that may also be a means of solving the issue of rising green house gas as it is able to decrease carbon dioxide emission to as high as 70%. As such, it ties a significant relationship to the objectives of Germany's energy transition project, known as NEW 4.0, in that the usage of a renewable energy is not only possible but also an achievable solution for cleaner country-wide energy consumption in the near future.

A Unifying Effort

Stakeholders from various sectors across the region have joined hands in the realisation of this project. Professor Werner Beba, project coordinator of NEW 4.0 Project, shared that "This is the first time that the interplay of different technological approaches, the targeted integration into the energy market, and the application of the regulatory framework will be tested in an orchestrated manner as part of this large-scale practical trial. And this is what makes NEW 4.0. both unique and challenging. The findings of this project will contribute to making the necessary transformation of the entire energy system a success."

By integrating Industry 4.0 into the project, wind resource is expected to be the sole energy supplier to over 70% of the country within the first decade, gradually removing fossil fuels dependency.

The Federal Ministry of Economic Affairs (BMWi) is in full agreement with this project, and this has been manifested in the form of financial support worth Euro90 million (RM427.48 million). Showing similar approval are the governments of Schleswig-Holstein and Hamburg, with their added contribution of Euro44 million (RM209.02 million) for the four-year trial phase.

A Breeze of Confirmation

The year 2018 has heralded auspicious news about the project. Jan Kerstan, Hamburg's Senator for Environment and Energy, emphasised the advantages of this project, saying, "Excess wind power from Schleswig-Holstein is being used in the city. To do so, we point to intelligent solutions and are testing storage technologies. If they can be implemented on a large scale, it would be a quantum leap for climate protection in the north."

This statement is in regards to the rise and flow of wind energy and the limited consumption of the turbines. This necessitates the need of storage, which also led to the project's interest in industries that would be able to consume to as close an amount of energy that is being supplied. Therefore, excess wind energy is not going to waste but is being effectively restrained within efficient energy storage and conversion leading the way to a successful implementation of Industry 4.0.

Energy storage and conversion is also being incorporated in industrial sectors. Companies like Vattenfall Wärme and The Wind to Gas Energy GmbH & Co. KG have incorporated the conversion of wind energy to heat and gas, respectively, by utilising excess wind power.

Overall, the NEW 4.0 Project spells good news for the energy transition efforts in Germany, as a systematic and intelligent approach builds its foundation, with the help of Industry 4.0. This project is truly on its path to incredible results for the near future.

In this era of the Fourth Industrial Revolution, a nationwide usage of renewable resources may very well be the future of Malaysia. Looking at the progress of the NEW 4.0 Project, it only seems wise to consider a similar approach. One may argue that wind energy is too unpredictable and the fluctuating flow may seriously impact energy consumption. However, this did not deter the project in Northern Germany and with further research Malaysia could consider a future in renewable resource as a major energy source by following the footsteps of countries that are already slowly (and surely) implementing them. EM

Organised by the Energy Commission, the Town Hall Session in Sabah was an initiative to look into and address the issues faced by the Sabah Electricity Supply Industry (SESI). It was held on 28 July and the session was conducted by Yeo Bee Yin and Isnaraissah Munirah Majilis, Minister and Deputy Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC), Chan Foong Hin, Kota Kinabalu Member of Parliament and moderated by Abdul Razib Dawood, Chief Operating Officer of the Energy Commission. It was also attended by Datuk Ir Ahmad Fauzi Hasan, Chairman of the Energy Commission.

Improving Sabah's Electricity Supply Industry

SESI Stakeholders Town Hall Session

Around 220 participants showed up for the session including including Members of Parliament and State Assembly from Sabah, representatives of ministries, government agencies and local authorities as well as industry players and stakeholders. Prior to the Town Hall Session, the Minister conducted a full-length presentation to clarify the challenges faced by the SESI in order to explain to the crowd on the situation. Additionally, she also emphasised on getting an affordable, sustainable and reliable electricity supply industry in Sabah.

Chan Foong Hin, Kota Kinabalu Member of Parliament gave the welcoming speech and kick started the Town Hall Session.

The session received impressive feedbacks with comments pertaining to electricity supply issues such as having hydro as one of the energy sources, concerns on the environmental impact should the government decide to go with coal, flaws of the previous government and the weaknesses of the Sabah Electricity Sdn. Bhd. (SESB).

This half day session is hoped to have helped the government in taking the next action to solve the electricity supply in Sabah while also achieving the target to reduce the System Average Interruption Duration Index (SAIDI) in Sabah from 241 minutes/ customer/year to 100 minutes/ customer/year by 2020.

The Town Hall Session was streamed live via the Energy Commission's Facebook page and the public were also given an opportunity to provide feedback via the live online Q&A session, Pigeonhole Live.

Clockwise from top left:

Yeo Bee Yin, Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC) during the Gallery Walk session was briefed on Sabah electricity supply industry.

During feedback session, industry players and stakeholders voiced out their concerns to the panel.

Yeo Bee Yin and Isnaraissah Munirah Majilis, Minister and Deputy Minister of Energy, Science, Environment and Climate Change (MESTECC) alongside Datuk Ahmad Fauzi, the Chairman of Energy Commission and Chan Foong Hin addressing questions during the press conference.

The Town Hall Session provided a platform to address the issues and find a way forward for the Sabah electricity supply industry. The opinions and views from speakers and the public have opened doors to for the betterment of the electricity supply in Sabah. EM

SCENARIO OF FUTURE ENERGY INDUSTRY

Malaysian Energy Scenarios Workshop

Energy demand in Malaysia is expected to rise and this will result in energy security, environmental protection and economic efficiency challenges. To address this, an Energy Scenarios Workshop was carried out, conducted by Universiti Tenaga Nasional (UNITEN) in collaboration with the Energy Commission and Tenaga Nasional Berhad (TNB). Held on 16 July at UNITEN, representatives from academic, government agencies and various stakeholders from the industry were in attendance.

The main focus of this workshop was to analyse the uncertainties which will affect the future of the nation's energy sector by utilising scenario planning methodology. Additionally, it aimed to expose stakeholders and industry players on building the scenarios of the future and how it may branch into plausible futures or hidden scenarios based on scenario planning technique, brainstorm ideas and identify likely solutions to craft the desirable energy mix for Malaysia.

In his welcoming remarks, Prof. Ir Dr Tuan Ab Rashid Tuan Abdullah, Director of Institute of Energy and Policy Research at UNITEN stated that there is a need to relook at the energy sector as there was an imminent increase in the energy demand in the near term and the accessibility to new technology to develop energy resources. As conceptualising different scenarios, it not only predicts the outcome of the industry but it may spurs the Malaysian economy.

The key elements in "Strategic Planning: A Tool for Strategic Thinking" was discussed among the participants. This led to the deliberation on many uncertainties ahead as it would stretch one's perspective and mind set.
This further led to the explanation on the components required for scenario building and that there are three main elements which make up a "good scenario" which are plausibility, challenge and relevance.

Among core discussions was on "Challenges in Balancing the Development of Central Spine Forest of Malaysia". The main objective of this discussion was to bring attention to preservation and rehabilitation of the forest complex, plan potential land use and provide the management guidelines and sustainable development.
The workshop elaborated on several issues and challenges that need to be addressed in order to successfully create a Riparian Corridor – a unique plant community consisting of the vegetation growing near a river or stream, in the affected areas.

Another core discussion was on the "Scenarios Impacting the Power Industry". The workshop articulated a sustainable energy system requires the balancing of the "Energy Trilemma" – energy equity, energy security and environmental sustainability.
The challenges of balancing the "Energy Trilemma" is getting increasingly difficult in the face of 5D – decarbonisation, decentralisation, decreasing demand, deglobalisation and digitalisation.

Prof. Ir Dr Abdul Rashid, Director of Institute of Energy and Policy Research, UNITEN in his opening remarks voicing out his hopes and vision for the Malaysian energy industry.

Then, the workshop was continued with a scenario building exercise. All in all, this workshop was conducted successfully as the scenario planning talk and activities brought fruitful ideas and results for all the attendees. EM

Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY and USE OF ENERGY

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

The Energy Commission...

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

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

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

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

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

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

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

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

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