Transitioning The Nation Towards

Sustainable Energy

MALAYSIA

SUSTAINABLE ENERGY DEVELOPMENT AUTHORITY • SEDA MALAYSIA •
Vol. 1
Issue 1
2017

TOWARDS SERIOUS EMPHASIS ON SUSTAINABILITY

ENCOMPASSING THE NATION WITH CLIMATE-RESILIENT PATHWAYS

ONGKILI

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MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER (KeTTHA)

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CHAIRMAN's Message

It gives me great pleasure to pen my thoughts for SEDA's inaugural magazine. This magazine is important because it provides a platform for SEDA to update our stakeholders and public about the progress of our activities on a regular basis beyond our annual report. This year marks SEDA's 6th anniversary; the Authority being established on 1st September 2011 after the passing of the Renewable Energy Act 2011 [Act 725] and SEDA Act 2011 [Act 726] in Parliament on 27th and 28th April 2011 respectively. Sustainable energy has taken centre stage in recent years especially with the urgency of the climate change agenda. In November 2016, Malaysia ratified the Paris Climate Agreement along with the deposition of instrument with the UN Headquarters. Our Nationally Determined Contribution (NDC) is to reduce our greenhouse gas (GHG) emissions intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005. This consists of 35% on an unconditional basis and a further 10% is condition upon receipt of support from developed countries.

Globally, we've acknowledged a new megatrend on the energy horizon. Pioneered originally by the Germans, many countries are now in the process of undergoing energy transition. The record growth for Renewable Energy (RE) in 2016 has been impressive. According to a report from the International Renewable Energy Agency (IRENA), global RE generation capacity increased by 161GW in 2016, making the strongest year ever for new capacity additions and bringing the global total capacity to 2,006GW. Even more exciting, Asia accounted for 58% of new renewable additions in 2016 with a total new capacity of 812GW. Asia is also the fastest growing region in RE and this is mooted by the steep learning curve of variable RE technologies such as solar photovoltaic (PV) and wind. In 2016, for the first time in history, solar PV overtook wind in new installed capacity. Solar PV saw a record of 71GW whereas wind was at 51 GW. 2016 also saw a new record low of solar PV tariff offered at US$0.0242 per kWh in Abu Dhabi. In this respect, in some countries RE has reach grid, or at least, socket parity with conventional thermal energy. Against the backdrop of declining prices of coal, I read with interest that plans for coal-fired power plants actually dropped by almost half in 2016.

While hydropower remains a significant portion of global RE, other new RE sources with zero marginal cost, such as solar and wind, have gained significant tractions over the last decade. Driven by the climate agenda and national energy security, many countries are transitioning towards sustainable energy. During the 22nd Conference of the Parties (COP22) to the UN Framework Convention on Climate Change (UNFCCC), 47 developing countries have pledged to transit to 100% RE. Even companies have pledged for 100% RE (RE100.org) by a certain period. Malaysia is a country well-endowed with renewable resources such as hydro, solar and bioenergy. In SEDA, we believe that the future of energy lies in sustainable energy. We believe in galvanizing our resources to achieve the vision of a nation driven by sustainable energy. Our Feed-in Tariff (FiT) mechanism has been successful in spawning RE market and creating an equally strong RE industry. We have recently implemented the Net Energy Metering (NEM) as a follow up programme beyond the FiT. SEDA is also active in promoting energy demand management (EDM), having tasked to implement several such programmes under the 11th Malaysia Plan. The efforts on transitioning the nation towards sustainable energy have just begun; do come on board and expedite this transition with us.

In closing, I wish to thank the Minister of Energy, Green Technology and Water, Datuk Seri Panglima Dr. Maximus Johnity Ongkili for obliging an interview in this inaugural article. My congratulations to Ms Catherine Ridu, the Chief Executive Officer, the management and staff of SEDA for this inaugural magazine.

Datuk Dr Yee Moh Chai
Sustainable Energy Development Authority (SEDA) Malaysia

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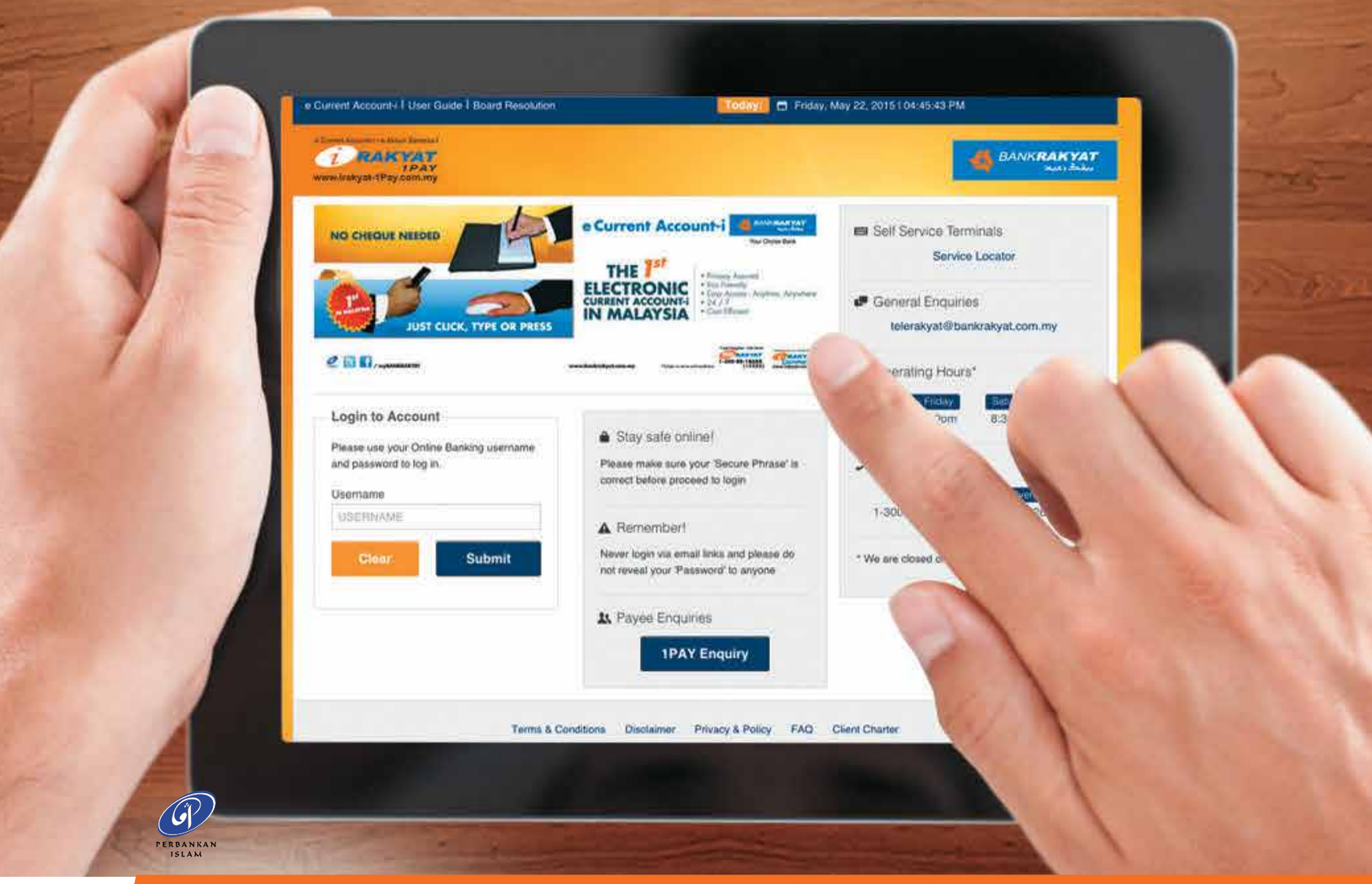

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To treat Palm Oil Mill Effluent (POME) and capture its biogas to power generation as green energy.

To generate revenue by selling the green energy to Tenaga Nasional Berhad (TNB) under the Renewable Energy Power Purchase Agreement (REPPA) at a rate under the Feed-in Tariff (FiT) mechanism issued by the Sustainable Energy Development Authority (SEDA) Malaysia.

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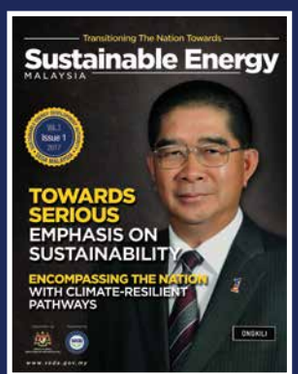

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"The adoption of renewable energy (RE) and energy efficiency applications are the main areas we need to focus on."

DATUK SERI PANGLIMA
DR. MAXIMUS JOHNITY ONGKILI
Minister of Energy,
Green Technology and
Water (KeTTHA)

ADDRESSING ENERGY NEEDS

Having pledged in the Paris Climate Agreement under the effort of the United Nations Framework Convention on Climate Change (UNFCCC), Malaysia is now committed to reduce its greenhouse gas (GHG) emissions intensity of GDP by 45% relative to 2005 levels by 2030 of which 35% reduction is unconditionally while a further 10% reduction is contingent upon receiving support from developed countries.

With this in mind, the Ministry of Energy, Green Technology and Water (KeTTHA) is currently engaging with their immediate stakeholders in the energy sector and is working together with the Ministry of Natural Resources and Environment, MNRE (National Focal Point for the UNFCCC) to draft the Nationally Determined Contribution (NDC) roadmap.

Over 80% of the country's carbon emission falls under KeTTHA's portfolio; hence climate change mitigation via reduction of carbon emission in the energy and waste/sewerage sectors must be addressed in order to achieve the pledged commitment.

"KeTTHA is still synergising with MNRE on the required GHG emissions reduction and it is a bold target which we must strive to achieve,'' said its minister, Datuk Seri Dr Maximus Johnity Ongkili.

He noted that the Paris Agreement is a critical turning point and also an indicator at global level that the world's largest economies are steadfast in their transition towards sustainability.

Closer to home, ASEAN has placed serious emphasis on sustainability and under Malaysia's chairmanship; member states expressed common aspirations towards addressing the issues and being part of the solution. ASEAN energy ministers pledged in 2015 to set a target of 23% renewables in the ASEAN Energy Mix by 2025.

"Malaysia, through its Green Growth Strategy, will encompass climate-resilient development and sustainable use of natural resources. The adoption of renewable energy (RE) and energy efficiency applications are our main focus areas,'' he added.

With this in mind, Malaysia introduced the RE Act 2011 to enforce the Feed-in Tariff (FiT) mechanism and the establishment of Sustainable Energy Development Authority (SEDA) Malaysia in the same year to ensure its successful applications.

As of February 2017, SEDA has approved in total 11,650 FiT applications with a cumulative RE capacity of 1,403.19MW. In the same period, a total of 7,553 applications with a cumulative installed RE capacity of 450.01MW has achieved commercial operation.

Out of the five renewable resources under the FiT, nearly 66% of the total commercial operational capacity comes from solar photovoltaic (PV) and 28% comes from the bioenergy sector (i.e biomass and biogas). The issues with bioenergy are not unique to Malaysia; in many countries the same challenges of ability to secure long term feedstock at reasonable price and grid access are common.

SEDA has held several stakeholders engagement with the bioenergy industry players to see how these issues can be addressed. Some of the measures included enhancing the commercial viability of carrying out the project such as reducing the annual degression rate of bioenergy to zero and expanding the scope of bonus incentive to enhance developers' eligibility.

"However, more importantly, it is clear that solar PV with the rapid declining cost and ease of installation should be promoted, given that the marginal cost is zero as the sun is a free resource,'' he said.

Reiterating further, the minister said FiT programme is never intended to run forever as it is only meant to overcome initial market development barrier on RE.

He added that a well-designed FiT programme will always have exit strategies allowing organic progression to more matured RE intervening programmes that enable an effective energy transition.

In Malaysia, an exit strategy has begun for solar PV under the FiT. Post 2017, solar PV will no longer be available under FiT, except for the category of community solar PV. This category is aimed at encouraging members of the community to install solar PV on religious buildings, schools and welfare homes.

> *"nearly 66% of the total commercial operational capacity comes from solar photovoltaic (PV) and 28% comes from the bioenergy sector."*

"Last year, KeTTHA has initiated the net energy metering (NEM) and large scale solar (LSS). The NEM is administered by SEDA while the LSS is by the Energy Commission (ST). Under the NEM, the total solar PV quota allocated is 500MW and 1,250MW for the LSS,'' he said.

Ongkili explained that the difference between the NEM and the FiT is that NEM is only applicable (so far) to solar PV, where it is based on the concept of self-consumption. Any excess solar PV electricity generated is sold to the grid at prevailing displaced cost under net billing. The net billing shall be allowed to roll over for a maximum of 24 months. Any available credits after 24 months will be forfeited. Unlike the FiT, it sells 100% of its electricity generated at some predefined premium tariff for a fixed tenure.

Therefore, from financial aspect, Ongkili added, the yield from FiT investment would be more attractive than NEM. NEM thrives in an environment where electricity tariff is unsubsidized and at market rate, hence there is considerable savings from self-consumption.

NEM is largely viewed as 'energy efficiency' measures; at macro level, the widespread applications of NEM will reduce demand on grid electricity. More importantly, solar PV has the capability to do peak shaving as the electricity generation from solar PV coincides nicely with the peak demand in electricity.

The reduction in peak demand will reduce the need in investing in more peaking plants. These peaking plants are not cost efficient to run as they generate electricity for only a few hours each day just to meet the extra demand during peak period. Another important impact of NEM is the reduced carbon footprint from cutting down requirement for more conventional peaking plants. With our NDC and SDG commitments, the implementation of the NEM is one mechanism which helps to institutionalise climate agenda in our energy policies.

This year, Ongkili said a programme dubbed MySuria will be implemented as announced by Prime Minister Datuk Seri Najib Razak under Budget 2017.

A total of 1,620 homes for the bottom 40 per cent household income group (B40) will have solar PV on their rooftops across Malaysia. The households will receive a monthly income of at least RM250 from the programme. The MySuria will be implemented by SEDA in the Peninsular Malaysia and Sabah; while the Ministry of Public Utility (MPU) will carry out similar programme in Sarawak.

"KeTTHA has an obligation to deliver quality and reliable electricity at affordable price to the people,'' said Ongkili.

Going forward, the Minister said within any electricity grid systems, there is a limit to how much of the intermittent RE (i.e solar PV) that the grid can accommodate.

For the time being, the amount of RE injection to the grid in Malaysia is still modest, and RE projects above a certain threshold capacity is already required by distribution licensees to conduct power systems study.

Acknowledging that globally there is a move towards greater decentralised distribution of RE generations; Ongkili added that Malaysia's initiatives (such as FiT, NEM, LSS) are exemplary of a gradual shift towards adoption of decentralised clean power generation.

Such adoptions lead to greater growth of electricity consumers concurrently becoming producers of electricity, a concept known as 'prosumerism'.

The Minister believes that in the future all countries will go for 100% renewables.

"Globally, we have exceeded 60% of our carbon budget,'' said Ongkili, and threw some points to ponder: "How much more should we continue to inject carbon into the atmosphere before tipping the 2 degrees Celsius?"

At current NDC pledges, he explained that the collective country pledges can only reduce the global average temperature by 2.7 degrees Celsius.

"Hence, the big question is always when will countries finally decarbonise?"

Quantifying, Ongkili said some countries have pledged to adopt 100% RE, while others have reached the mark. A mega trend on the horizon has been created by leading corporations (such as Microsoft, Google, IKEA, Apple, Facebook) as they pledged 100% RE by a certain year. They made the initiative rather than wait for the Government to trump the renewable energy drive. The expectation from the market is more environmental responsibility, as demonstrated by these corporations.

Ongkili said Malaysia needs to move forward in its sustainable energy agenda and establish itself as the ASEAN's green technology hub, with collaboration from all parties under the National Blue Ocean Strategy framework, as well as among ministries, agencies, private corporations, NGOs and concerted willpower from the rakyat.

"A paradigm shift to embrace a new electricity market and yes, basically a mindset change is what's needed to forge ahead in the green sphere,'' he concluded.

Launch of SEDA Malaysia coffee table book during the 3rd ISES 2016

HUAWEI STRING INVERTER WINS BID FOR MALAYSIA'S FIRST 50MW UTILITY PV PLANT PROJECT

HUAWEI, a leading global information and communications technology (ICT) solution provider has become one of the world's most prolific incubators of new technologies and applications. Not only do they make phones and the wireless networks that support them, they also make tablets and PCs that help you work more efficiently, watches that track your fitness, tech that makes your home smarter, and many complex electrical components you probably have never seen.

Huawei Headquarter in Shenzen, China

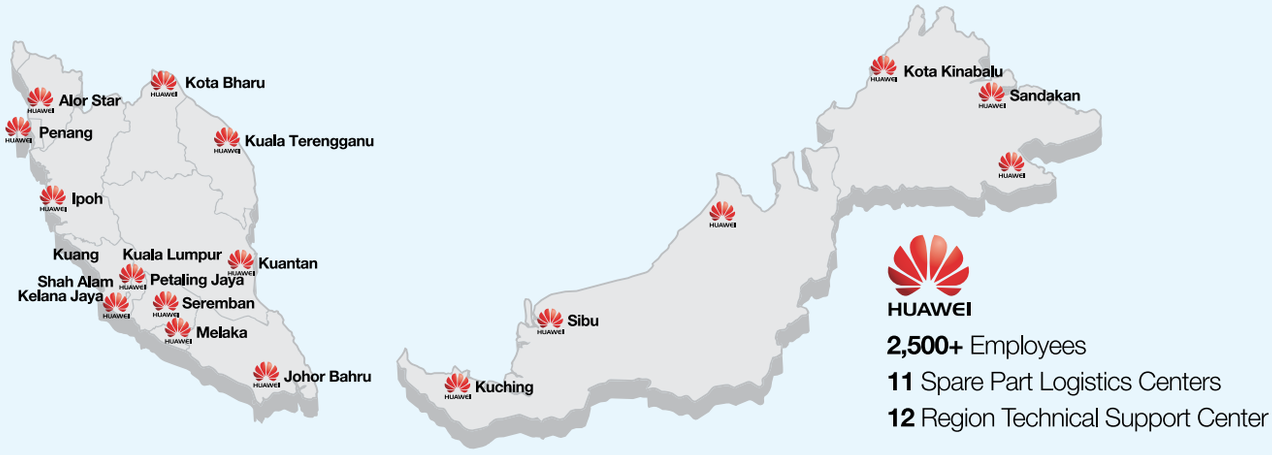
More than half of the company's 180,000 employees serving in more than 170 countries worldwide is actively involved in R&D. Huawei reinvests 30% of its U.S. revenue into local innovation and ensures a steady stream of new talent by working with more than 50 top research universities such as Harvard, MIT and Stanford.

The company was founded in 1987 as a manufacturer of phone switches, and rapidly evolved into a world leader in the field of Information and Communication Technology (ICT).

By incorporating its expertise in Digital Technology, Internet Technology, and Photovoltaic Technology, combined with innovative concepts of simple, full-digital and automatic O&M, Huawei introduces its cutting-edge FusionSolar Smart PV Solution that helps customers lower cost, lift yields and maximizes ROI.

Huawei's Smart PV Solution has been widely deployed around the world, in regions such as China, Europe, Japan, America and Asia Pacific.

As Huawei FusionSolar Smart PV Solution began to sell in Malaysia market in 2013, Huawei rapidly builds a highly professional and local marketing service team. The strong technical team brings Malaysian PV market with advanced concepts and technical innovation.



Huawei in Malaysia

Huawei FusionSolar Smart PV Solution is a 25-year "String" based PV power plant system that enables higher yields, smart O&M and greater safety and reliability.

From power plant design, construction to O&M, Huawei optimizes and innovates throughout the entire process to maximize the return for its customers while maintaining a customer centric approach and focusing on bringing optimum value to its customers.

By introducing technological innovation and speeding up PV grid parity, Huawei helps promote the sustainable growth of the PV sector.

Recently, CPI Power Engineering Co. Ltd (CPIPEC) executed a contract with Huawei to procure and use for its upcoming 50MW projects, Huawei FusionSolar Smart PV Solution, including the latest smart PV inverter (string inverter) SUN2000-42KTL, smart array control unit which integrated SmartLogger, PLC and Anti-PID Module. CPIPEC and Huawei also had a deep discussion on the development prospect of renewable energy and the intelligent O&M of PV plants.

With Malaysia's hot and humid climate, traditional power plants face certain limitations, such as difficulties in installation and maintenance, frequent failures of consumables such as external fans and fuses. Huawei Smart PV Solution can perfectly avoid these problems. The string inverter design is not simply ideal for rooftops but also widely adopted by large-scale PV plants. It has been highly recognized by the customers around the world. Huawei string inverter is protected to IP65 and can withstand perennial sun and rain, ensuring 25 years of service life. The natural cooling design without external fans and fuses eliminates the possibility of frequent faults. String inverters can be installed outdoors, which saves land and investment costs.

The flexible design makes the inverter adapt to various land situations. Power Line Communication (PLC) technology substitutes for RS485 communication cables to reduce cable routing duration and expenses as well as the line loss on signal transmission and improves data transmission efficiency.

String-level monitoring allows you to rapidly locate the PV modules with low energy yield, which ensures high energy yield and improves the maintenance efficiency.

Floating Smart PV Plant in Singapore

Here comes in Smart IV Curve Diagnosis to locate problematic PV string and analyze root causes using Huawei big data technologies - data mining and pattern recognition. Smart IV Curve Diagnosis precisely manages utility scale PV plant, reducing the testing cost compare to traditional testing.

Huawei FusionSolar Smart PV Solution requires the same initial investment CAPEX as traditional solutions and lower OPEX, but increases the energy yield by more than 3%. The inverter efficiency improves by more than 50%, thanks to its consumable-free, natural cooling, and zero-touch O&M features.

The inverter can be used together with tracker supports to both increase the energy yield efficiency and save investment cost. With higher reliability, the availability of inverter can achieve 99.996%, certified by TÜV.

Meanwhile, Huawei inverter is more grid-friendly and easy to commission, and adapts to Malaysian grid code. These advantages help solve the problems that trouble PV owners for a long time and are the main reasons why Huawei Smart PV Solution has won the customers over.

No more than 3 years ago, central inverters were seen as the one and only choice for ground-mounted plants, and string inverters were only applied in distributed scenarios like rooftops. But now, as Huawei introduced FusionSolar Smart PV solution to the global market, more and more clients have turned to string inverters for large-scale projects since the introduction of our PV solution which promises more efficiency as compared to their traditional choice, thus making Huawei No.1 in 2015 in the global inverter shipment in such a short period.

It is clearly predicted, in the future, that string inverter will take the large portion of the market, because owners hope to construct PV plants with higher efficiency, more flexibility and less O&M problems and Huawei FusionSolar Smart PV solution perfectly matches these requirements with equivalent cost.

Huawei is not only focusing on consistent and higher yields, but also provide cutting edge technology that can help customers achieve better efficiency, smart operations and overall better economics.

Worldwide, Huawei Smart PV Solution has been highly praised by customers due to its higher yields, smart O&M, safe & reliable operation. Huawei treats Malaysia as a very important market outside China. Outstanding performance of the company, prompted CPIPEC to partner with it for its renewable energy development business.

The RE market in Malaysia would undoubtedly improve due to the strong cooperation between both parties.

GLOBAL CASES

Currently in China, Huawei is in partnership with major PV investors and developers and have entered major markets in the world like Japan, Asia Pacific, EU, India and the USA for their overseas market development.

Huawei provides the SUN2000-33KTL string inverter to IKEA's rooftop-mounted smart PV plant in Kuala Lumpur.

This is a large PV plant named Baofeng 700MW ground-mounted smart PV plant in Ningxia, China. Tracking system is used in this plant, while crops are planted under the PV modules. This is a good integration of PV and agriculture.

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Since last year SEDA has been sharing technical inputs on energy management/ low carbon to nine Government and private building operators in ten of their Low Carbon programmes.

CATHERINE RIDU
Chief Executive Officer

FACILITATING A PARADIGM SHIFT

IN THE SUSTAINABLE ENERGY (SE) INDUSTRY

SEDA is recognized as the body championing SE initiatives for the country

With climate change efforts taking precedence worldwide, the renewable energy (RE) and energy efficiency (EE) sectors are undeniably the next engine for socio-economic growth. ASEAN has also long placed serious emphasis on sustainability as member states have recognised that the region is highly vulnerable to the adverse impact of climate change.

As SE is a concerned effort, there is a resolve to develop a community that is resilient to climate change through regional and national actions and therefore the widespread utilization of RE resources is the most efficient and effective way in achieving this target.

Malaysia has also pledged its commitment to reduce greenhouse gas emissions intensity by 2030 and in this regard, SEDA has been entrusted with a key role to administer and manage the implementation of the Feed-in Tariff (FiT) mechanism.

And in the five years since its establishment in 2011, SEDA has carried out many activities to promote the development of SE in the country to meet the national and regional RE agenda through the FiT mechanism.

The mechanism was introduced to encourage growth of the RE industry and until February 2017, the total capacity achieving commercial operation was 450.01MW from 7,553 FiT projects where 36.49MW was from biogas, 87.90MW from biomass, 30.30MW from small hydro and 295.32MW from solar PV. This, thus surpasses the national target of 175MW by 2020, set under the National Renewable Energy Policy and Action Plan 2010.

The 2017 quota for solar PV ends this year except for the community category. Solar PV individual and non-individual applicants who made their applications through the 2016 balloting process will be allocated this year. Despite the end of quota allocation, SEDA will continue to closely monitor the rest of the FiT mechanism; from system installations to the system performance and payment of the FiT rate until the end of the Renewable Energy Power Purchase Agreements (REPPA). For RE resources, other than solar PV, quota opening will be announced from time to time and will be allocated until it is exhausted.

Moving forward, the first quota for the Net Energy Metering (NEM) scheme was released last year and SEDA as the implementing agency had conducted workshops both in Peninsular Malaysia and Sabah to provide better understanding of the scheme and its administrations.

Apart from developing a dedicated online registration portal for the purpose of the NEM registration, the Authority has also uploaded a step-by-step guideline in SEDA's website along with weekly promotions on its social media platform. Leaflets were also distributed at every SEDA roadshows.

SEDA has also conducted an assessment study in collaboration with the Minerals and Geoscience Department under the Ministry of Natural Resources and Environment (MNRE) in geothermal power generation as another form of renewable energy resource.

> *And in the six years since its establishment in 2011, SEDA has carried out many activities to promote the development of SE in the country to meet the national and regional RE agenda through the FiT mechanism.*

The study conducted in May last year, revealed that 161.7MW of potential geothermal power generation would be prospected from two plants in Kampung Kesau in Selangor and Kampung Ulu Slim in Perak.

Geothermal was added as the fifth RE resource under the FiT mechanisms. The first geothermal plant in Malaysia, a 30MW plant in Tawau, Sabah, will achieve its commercial operation in 2019.

SEDA has also announced that the 4th International Sustainable Energy Summit (ISES) would be held next year. Preparations have started since last year and the soft launch is expected to be held in the third quarter of this year. The 3rd ISES 2016 was a success and SEDA is looking forward to another successful event.

On the ASEAN platform, SEDA has facilitated well in the ASEAN Energy Awards (AEW) for the submissions under the RE category coming out champion in the special submission category through the Agriculture Integrated Photovoltaics (AIPV) 1.075MW project in Kuala Perlis and second placing for the Off-Grid (Power) and On-Grid (National Grid) categories last year.

SEDA has performed considerably well both in the local and ASEAN region and besides this, has also actively represented Malaysia at international meetings and seminars related to the RE industry. SEDA has been chairman of the AEW since 2012.

International delegations from Indonesia, the Swedish Embassy and the China New Energy Chamber of Commerce (CNECC), to name a few, have visited SEDA to learn more about the RE implementation in Malaysia and this speaks volume of SEDA's achievement and role as the reponsible Government agency.

As the sustainable energy equation involves both RE and EE, SEDA also actively promotes decarbonization through energy demand management. As energy efficiency and conservation is an important element of Demand Side Management and must be rigorously pursued, the Government early last year, has approved the introduction of the National Energy Efficiency Action Plan to manage energy demand efficiently.

The Action Plan aims to reduce energy consumption by 52,233 gigawatt-hours over the next ten years by strengthening institutional frameworks, developing skilled capacity, establishing sustainable funding mechanics, promoting investment and integrating energy efficient initiatives.

Realizing its importance, the Government, under the 11th Malaysia Plan initiated the Energy Audit Conditional Grant with an allocation of RM54.4 million for a period of three years. Since last year SEDA has been sharing technical inputs on energy management/low carbon to nine Government and private building operators in ten of their Low Carbon programs.

Besides ICT, buildings present the biggest opportunities for carbon reduction in mitigating climate change, as they are responsible for about 80-90% of the carbon emissions during their operations and thus SEDA has taken it upon them to assist in achieving the aspiration of the National RE and EE Agenda. As a Government agency, SEDA will provide essential inputs to the Ministry in crafting the RE transitional roadmap that will be significant in preparing Malaysia to transit from fossil fuel to the clean and sustainable energy in the future.

Apart from the FiT and NEM, SEDA is also entrusted to implement the MySuria programme that will benefit a total of 1,620 homes throughout Malaysia for the bottom 40% household income group (B40). These households will have solar PV on their rooftops and each will receive at least RM250 per month income from the programme from the energy generated from their solar PV system.

SEDA has had a good successful five years and is looking forward to another five years or longer to ensure successful operation and significant contribution to the country.

#1

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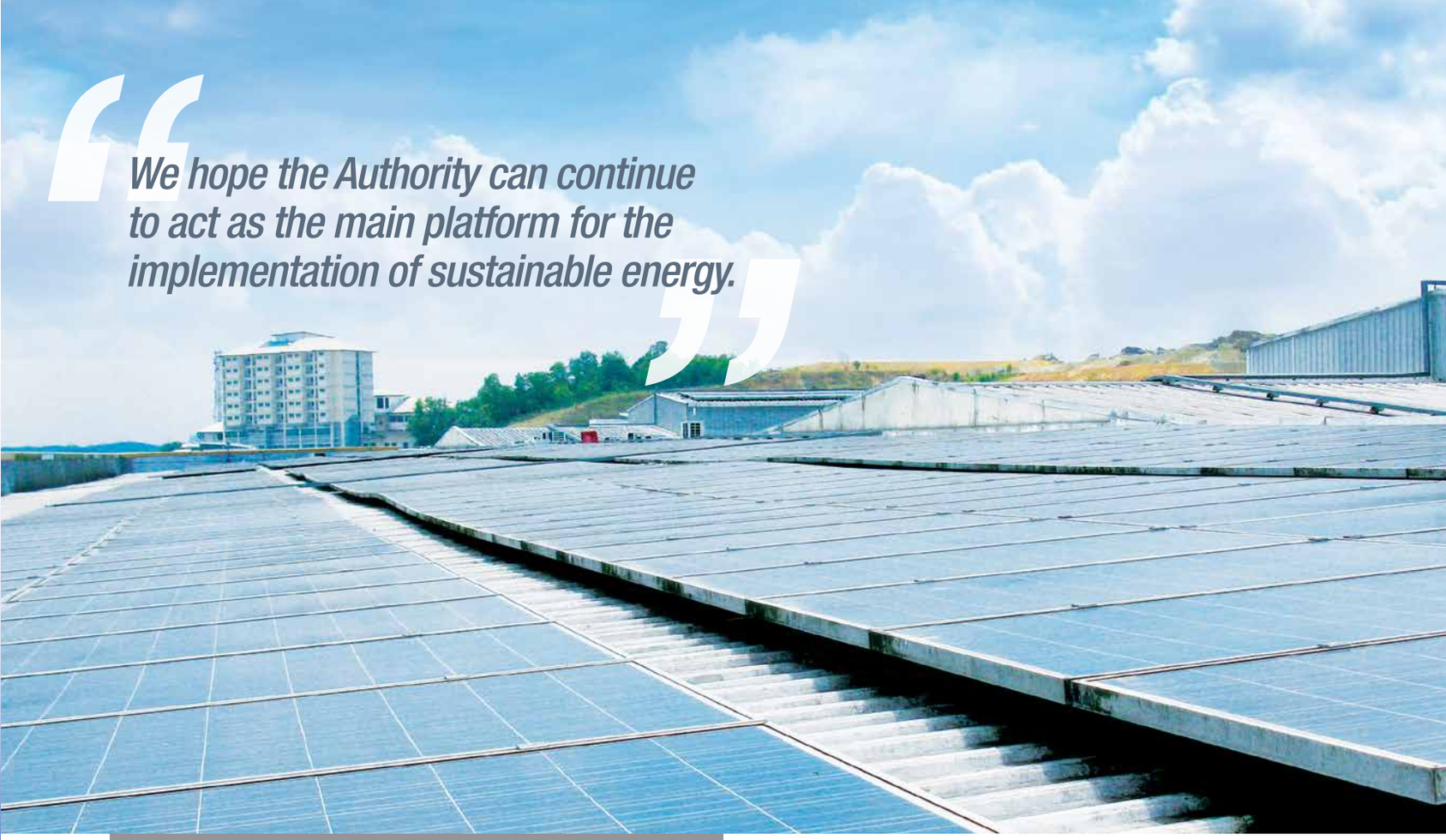
"SEDA strives to prepare Malaysia for an energy transition using RE resources available in the country, and to propel the nation from traditional dependence on fossil fuel to clean and renewable energy."

From Left (Front):
Dato' Seri Ir. Dr. Zaini Ujang, Datuk Dr. Yee Moh Chai, Tan Sri Dato' Ir (Dr) Hj Ahmad Zaidee Bin Laidin, Datuk Allauddin Bin Haji Anuar
From Left (Back):
Mr. Chan Cheu Leong, Ms Catherine Ridu, Dato' Mohd Salleh Bin Mahmud

Generating FREE ELECTRICITY From The Sun

Feed-in Tariff (FiT) Mechanism benefited Solar PV Investors

Harnessing energy from the sun appeals to everyone and it is no wonder solar PV systems are popping up everywhere now. After all, the sun's energy is free and therefore, who is there to stop us from utilizing it to our advantage?



We hope the Authority can continue to act as the main platform for the implementation of sustainable energy.

The solar PV market growth is being driven by businesses with the simple motive: saving money. Exactly what Johor Bahru based Synergy Solar Development Sdn Bhd (SSD) was doing since 2011.

The company is one of the many recipients who have benefited much from the long term support extended by Sustainable Energy Development Authority (SEDA) Malaysia.

SEDA, a statutory body under the Ministry of Energy, Green Technology and Water (KeTTHA), has been actively promoting the market on renewable energy (RE) in Malaysia. In order to grow the local RE market, SEDA offers the Feed-in Tariff (FiT) mechanism to RE producers whereby, energy generated from solar photovoltaic (PV) systems or other RE resources are sold to the distribution licensees and distributed to the national power grid.

SSD has installed solar PV systems on roof-tops of business premises, which is owned by Eastern Group, a company involved in industrial property development. SSD is a subsidiary of Eastern Group and again it only makes sense why the former is gung-ho on building their solar business.

Currently, the total capacity of their 10 PV systems nationwide is 2.8MW and given that Eastern Group has well-established building infrastructure projects, they are hoping to further extend their solar PV business.

To date, SSD has managed to sell approximately 3,500,000kWh per year, some generating less and others depending on the year of installation, to the national grid since the project started in 2011.

"The total amount of energy that we sell back to the utilities is actually equivalent to a small township household usage," said Eastern Group director, Vincent Cheong.

Under the non-individual category, SSD did not have to come out with big investments and all they needed was to come out with small capitals using their own factories to install the solar PV systems on their available rooftop spaces of 20,000-22,000 sq. ft.

For small and medium enterprise (SMEs) like SSD, considering the Renewable Energy Power Purchase Agreement (REPPA) under the FiT mechanism is up to 21 years, SSD has been lucky to be able to grab this worthy investment opportunity.

"With over 30 years' of experience in the solar industry, it has also helped us to keep in line with new technologies and requirements," added Cheong.

He reiterated that with this global paradigm shift, efforts by SEDA to encourage SMEs and other business investors to start venturing themselves into RE businesses must be applauded.

"This sets opportunities and encouragement for SMEs who are afraid to tap into this industry at the same time supporting our Government's effort to be at par with other top countries in RE development," he added.

Through the REPPA, SEDA has been availing investors a guaranteed off take agreement up to 21 years, in addition to the attractive FiT rates that will soothe investors for a reasonable Return on Investment (ROI).

Cheong opined that FiT sustains a solar PV market by securing a long term income and with REPPA in hand; it has actually helped SSD to minimize the financial risk.

He hoped the Authority can continue to act as the main driver in the implementation of sustainable energy to allow streamline process and any other fiscal incentive applications.

SSD has managed to sell approximately 3,500,000kWh per year, some generating less and others more depending on the year of installation, to the national grid since the project started in 2011.

"This would provide us a clearer picture for our future investments," said Cheong.

Looking at the future of the solar PV market, Cheong appealed for a greater push for the implementation of solar PV such as better incentive programmes on FiT returns on solar adoption as he felt this could be a great motivational factor for the already moving industries who are greatly dependant on the support of the Authority and the policy makers.

FEED-in TARIFF (FiT)

DRIVING LOCAL COMPANIES TO VENTURE INTO POWER GENERATION

A Kemayan based oil palm mill owned by Jeng Huat Bahau (Realty) Sdn Bhd (JHBRSB), considers themselves fortunate for being among the first in the industry to apply for a FiT introduced by the Sustainable Energy Development Authority (SEDA) Malaysia. News about the mechanism was floated among the palm oil millers and that was when their management decided to venture into the business of producing biogas energy.

Generally, palm oil millers in Malaysia are constantly faced with environmental issues caused by the polluting characteristics of palm oil mill effluents (POME). Therefore, when JHBRSB made the decision to develop a biogas plant; they were doing it more as a corporate social responsibility (CSR) to the community nearby rather than as a business venture.

When JHBRSB first applied for the FiT in year 2012, the tariffs came with an annual degression meaning there would be a reduction of rates if the plant failed to commission within the year it was supposed to complete and connect to the grid. With a tariff degression in place, developers were in fear of investing in premium systems for fear of not completing in time (before the 1st of the following year) for which their rate would be lowered.

"That was one reason why many millers were not keen on going into developing biogas plants under the FiT when it was first introduced," said palm oil mill manager, Jeprizin Marjan. As a result, most developers were looking at just basic low cost systems to make the project bankable, as the rates were just about right, if it was with degression (or reduction).

However, all this changed when the FiT rates were revised in year 2014 as a result of a series of engagement sessions conducted by SEDA back in 2013. The objectives of the engagement with stakeholders were to gauge the business climate and to find ways to create a healthier growth as well as increase take-up rate for biogas development in the country. As a result of that engagement, three major revisions were made to the rates namely:

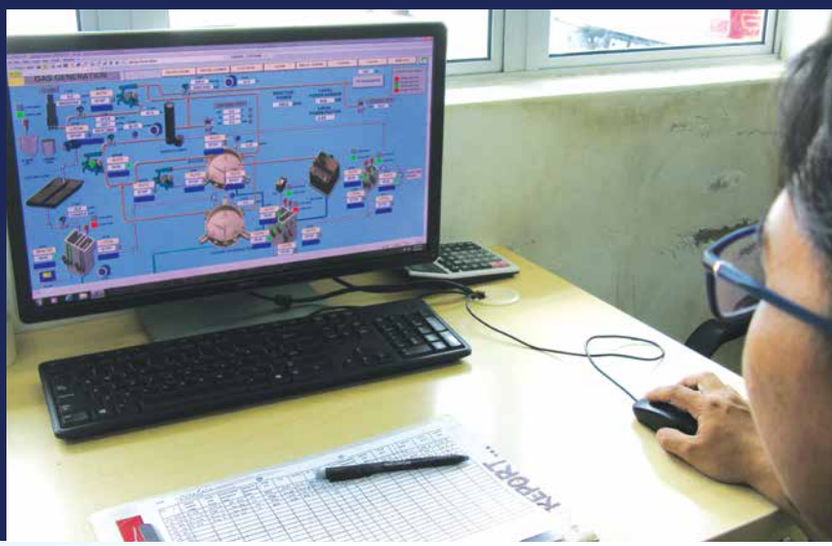
(i) the removal of the annual degression rates which meant that even if projects were unable to reach commercial operation within the year and were delayed to a new year, they would still enjoy the same rates;
(ii) the inclusion of agricultural and animal waste as part of the bonus rate for waste which was previously only for landfill waste; and
(iii) the increment of the bonus rates for locally assembled engines.

This revision was a game changer for many, especially the expansion on the eligibility under the bonus for waste. For JHBRSB, with the revision, their foray into developing biogas plants which were initially thought of as a CSR based agenda was now seen as a strong business venture.

"We are still at the learning stage and with SEDA's assistance; we are able to fulfill the entire requirement and have since been generating and exporting green electricity from a 1.2MW biogas power plant since achieving commercial operation in 2015," explained Jeprizin Marjan.

The biogas power plant was also the first to conduct the Acceptance Test and Performance Assessment (AT&PA) procedures which were enhanced requirements by SEDA with the new revision in place. According to JHBRSB, attempting to meet the requirements was indeed a challenge but it was again manageable as the procedures were based on guidelines provided by SEDA.

Jeprizin further remarked that SEDA was not only accommodative but supportive when JHBRSB made a request to re-apply for the FiT under the new revised rates. With a better rate, he added, enabled them to realize the plant with better equipment which would in turn, translate to more reliable and better output. This also meant potentially higher return in terms of generation.



Jeprizin added that the mill is only at 40 tonnes per hour (tph) capacity but they are keen to push further than the current capacity. He quipped that initially, their miller friends were skeptical of their capability to consistently produce 1.2MW of power based on their mill capacity. Beaming with pride, he confesses to be more than happy to have the bragging rights by proving them otherwise.

When asked for his advice for other industry players out there who would like to venture into this business, "My advice to other millers is to give it a go and believe that the FiT is for real. SEDA was formed to catalyze renewable energy using the FiT mechanism; we received the income from the FiT which is deposited directly into JHBRSB's bank account for the power that we generate." he said with a big grin on his face.

Looking back, Jeprizin said it was a decision well made in the interest of the company and not only have JHBRSB found a business niche but was also able to provide jobs in an untapped market. What was once waste is now a commodity; providing employment and income to Malaysians apart from generating green energy. JHBRSB is pleased to be contributing towards reducing carbon emissions as well, from their initiative and hope others will follow their footsteps in the near future.

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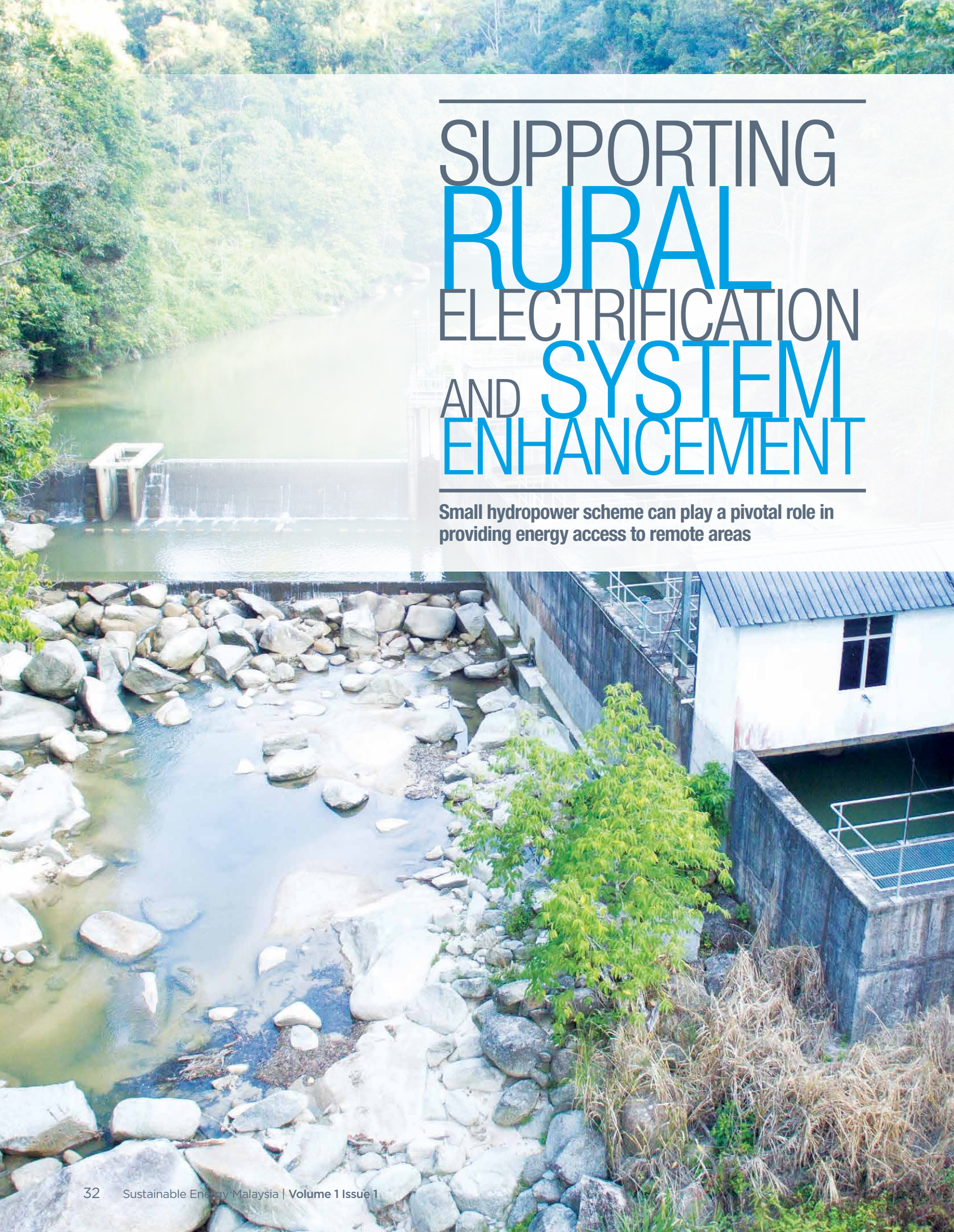
SUPPORTING RURAL ELECTRIFICATION AND SYSTEM ENHANCEMENT

Small hydropower scheme can play a pivotal role in providing energy access to remote areas



> *The plant was already in full operation with most of the required infrastructures fully constructed when they were drafted into the FiT mechanism implemented by SEDA with a new tariff of 24 sen per kWh.*

The oldest hydropower plant in the country is the 1.2MW Sungai Sempam hydropower plant in Raub. It has been in operation since early 1900s.

There are many old small hydropower plants around the world but to keep up with increased efficiency, most of them have been upgraded with modern turbines, generators and control systems. This proves that small hydro plants are sustainable and can be constructed with minimal stress to the environment.

Hydropower is the oldest and most matured renewable energy (RE) technology; therefore the technical risk is also minimal. However there are limits to its growth in the RE sector especially in areas where there are limited water resources and where there is the need to share those with agriculture and as a source of drinking water.

In Malaysia, hydropower as a source of RE is suitable because of its high annual rainfall and if these projects are well maintained and with expert guidance they could be turned into successful projects as in the case of Amcorp Perting Hydropower Plant (APHP) project in Bentong, Pahang.

This original 4MW plant, commenced construction in 2006 at Sungai Perting. It was commissioned on December 31, 2009 and initiated under the Small Renewable Energy Programme (SREP). The tariff then was 16.7 sen per kWh and even at a low tariff, the project design was optimized and with that civil cost was successfully controlled.

The management saw a need to upgrade the plant. It was upgraded from 4MW to 6MW with work commencing in June 2014 and involved minimal construction activities. Good annual rainfall is one of the main reasons contributing to upgrading the project to 6MW and to maximize energy activities.

APHP successfully achieved comercial operation effective April 27, 2015 on its expansion project. As an existing project, it was relatively easy to convert from SREP to the Feed-in Tariff (FiT) mechanism.The electricity generated from the hydro power plant is sold to Tenaga Nasional Berhad (TNB) under a 21-year Renewable Energy Power Purchase Agreement (REPPA) at an estimated value of RM8.8 million per year.

"The plant was already in full operation with most of the required infrastructures fully constructed when they were drafted into the FiT mechanism implemented by SEDA with a new tariff of 24 sen per kWh," said APHP general manager Badrul Hisham Hamdan.

He said although the construction period for the upgrading took 12 months, the existing turbines were shutdown for only two months. However, the main challenge, he added was to carry out construction works related to the upgrading without disturbing the operation of the existing plant

The plant, with the help and guidance from SEDA is operating very well and have not encountered any problems, according to Badrul.

And as far as APHP is concerned, it has been a success story. Before they were approved as the Feed-in Approval Holder (FiAH), SEDA submitted their project to participate in the ASEAN Energy Award in 2012 under the On-Grid category.

"APHP became the first hydro project from Malaysia to ever win the prestigious award. It was an achievement for us in the RE project," he reiterated further.

Proud of the APHP project, Badrul went on to further explain how the feat was achieved with detailed planning of the work involved together with close coordination between the owner, SEDA, consultant, contractor, TNB, the Bentong Forestry Department and the Pahang State Economic Planning Unit.

The source of water for the APHP project, Badrul added, is from Sg Perting and great care is taken to ensure that the water is not polluted in any way as further downstream is where the Chamang Waterfall is located.

Overall, Badrul said the journey has been exciting as the project has accomplished three major achievements, i.e. cost effective design, ASEAN Energy Award and 4-to-6MW upgrade in capacity.

According to details provided by Malaysia Small Hydro Industries Association (MASHIA) Interim Chairman, Ir. Shan Suleiman, as of December 2016 the total installed capacity for small hydropower in Malaysia is about 62.3MW of which 30.3MW is under SEDA's FiT mechanism and these consisted of 23.8MW in 4 sites located in Peninsula Malaysia and 6.5MW in two locations in Sabah.

The small hydropower plants are usually located in rural areas. These locations sometimes have no electricity supply or weak supply conditions as they are located at the end of the supply lines. Therefore Ir. Shan said these small hydropower plants would support rural electrification by enhancing the local distribution system besides contributing RE in the national energy generation mix.

RAPID DEVELOPMENT PUSHES SULPOM INTO BIOMASS BUSINESS

Unexpected break came in the form of SEDA's FiT programme

Tenaga Sulpom Biomass Sdn Bhd in Dengkil, with an installed capacity of 7MW.

THANKS to the rapid development in and around Sepang, Tenaga Sulpom Sdn Bhd (TSSB) has found a niche in the biomass business.

Founded in 1984 and with more than 30-years of milling experience, the company could not have asked for a better opportunity than what was given to them by Sustainable Energy Development Authority (SEDA) Malaysia.

TSSB decided to build and operate a 7.0MW biomass-based cogeneration power plant as a Feed-in Approval Holder (FiAH), integrating with the company owned Seri Ulu Langat Palm Oil Mill (SULPOM).

As a FiAH, TSSB is entitled to sell the energy generated from their power plant at a Feed-in Tariff (FiT) rate.

With the factory located in the jungle with rubber and oil palm plantations and with massive clearing started in 1994 for the development of the administrative capital of Putrajaya and the Kuala Lumpur International Airport (KLIA); Sulpom which was clearly hidden away was slowly getting exposed.

As more and more jungle clearings took place, Sulpom's high chimney emitting black smoke started to show up and could be seen from the highway and this did not go well with the authorities.

This was the start of their journey into FiT. Although it was not expected, circumstances had forced them into the biomass business and they have not looked back since. After all, how long would one want to be locked up in a technology that is more than two decades old?

It was in 2009 when the Department of Environment (DOE) requested the mill to upgrade the boiler and power generation system to a high efficient system which would improve combustion processes and hence reduce chimney emission.

In order to stay in business the management went through a detailed study to integrate the biomass cogeneration power plant to the palm oil mill, with the purpose of applying for the Small Renewable Energy Power (SREP) program. The program, however, was abolished before they could complete their application and Sulpom then had to make a fresh application to be drafted into the FiT program.

Since TSSB was formed as a government special purpose vehicle (SPV) – the government provided several incentives such as pioneer status by the Malaysian Investment Development Authority (MIDA) that will entitle TSSB to apply for the Green Technology Financing Scheme (GTFS) with an interest rate subsidy of 2% and a government guarantee.

The Sulpom Managing Director, Yap Hai San said all these offer were convincing to move on to this new platform, however, the management faced obstacles with financing especially with conventional banks.

These banks, he said, were not convinced with biomass power plant due to lack of successful track records of biomass power plant of past that had unsustainable business model under the SREP program where the unit rate awarded was not feasible to operate under long term condition.

"FiT was timely as the factory was using an approved technology that was good when we first started our mill operations. The factory was located within rubber and oil palm plantations in the Dengkil area and there were no environmental issues then," said Yap

He said since developments were taking place, the surrounding land areas have been classified as environmental sensitive.

Yap reiterated that following SEDA's requirements, the management started to discuss with technology providers before applying for the FiT quota.

"To convince ourselves that the biomass power plant is technically feasible, we visited various power generation plants in Sabah," added Yap.

He said banks were also not knowledgeable in the biomass sector and did not understand the technology involved.

"We were convinced and prodded on and it took us almost 18 months to obtain a bank loan," he said.

Empty Fruit Bunch (EFB) is one of the sources of fuel for Renewable Energy (RE) power generation.

The company feels the biomass project is an advantage and beneficial now because of the various incentives such as the Green Technology Financial Scheme and the FiT mechanism from SEDA made it easy for them to sell the energy generated from the power plant to the national grid.

He said although the FiT rate for biomass is lower compared to other RE resources under the FiT mechanism such as solar and biogas; the capital and operational costs are highest with this project.

"The good side is palm oil mills have benefitted from the program to overcome the challenge of empty fruit bunch (EFB) decomposition and stringent flue gas discharge," Yap pointed out.

And the good news for palm oil millers is that SEDA and many government agencies are stepping up efforts to promote sustainable energy and according to Yap, it is a good time to invest further to ensure zero discharge facility.

The mill has been generating at capacity rated 5-6MW constantly to the national grid since starting operations in April last year and is on the right track in their plans to increase the generation capacity to 7MW by the first quarter of this year.

Yap said with the current high cost of transporting biomass fuel and if there was a higher biomass FiT unit rate provided, Sulpom would seriously consider expansion plans in the future.

They are currently committed into venturing in biogas power plant project and targeted completion by 2018.

VISIONARIES FOR A **CLEAN AND GREEN** FUTURE

CENVIRO continuously proves to be a leader in sustainable waste management practices in Malaysia

If one studies the Cenviro brand identity symbol, they will notice an image of overlapping leaves in three different colours. These colours happen to represent the three key elements that drive Cenviro's vision and commitment - Environment, Community and Economy.

Indeed, Cenviro's efforts and accomplishments do show that they care about a more sustainable future for us and future generations to live in, but we will get to some of those a little later.

For now, we will touch on Cenviro's evolution since its first incarnation as Kualiti Alam Holdings Sdn Bhd (now a subsidiary company of Cenviro), incorporated on January 29, 1996.

Just two years later, the company was entrusted by the Malaysian Government to undertake the privatisation of the country's first integrated scheduled waste management centre in Bukit Nanas, Negeri Sembilan, which was launched by then Prime Minister Tun Dr. Mahathir Mohammad.

Khalid Bahsoon, Managing Director, joined UEM Environment Sdn Bhd in December 2013. Shortly after, the company underwent a restructuring exercise by Khazanah Nasional Berhad. In October 2014, the company was then rebranded as Cenviro Sdn Bhd.

"Within the first three months of my appointment, we assessed our capabilities at Kualiti Alam. We also looked for potential and other possibilities outside of the site in Seremban."

"We looked at our own capabilities, equipment, and infrastructure within the scheduled waste facility and we launched into a programme of massive improvement and upgrading."

"We improved the facilities, safety, drainage, and we even refurbished two of our incinerators capable of treating 100 tonnes and 30 tonnes of waste per day respectively," Bahsoon explained.

Khalid Bahsoon
Managing Director

Cenviro's innovation in environmental solutions shines through their Vertical Secured Landfill Project. In 2015, the existing secured landfill at Kualiti Alam was close to full capacity and there was a major problem with finding adequate space for incoming waste.

Bahsoon and his team came up with a profoundly simple solution - instead of buying new land, they would strategically create more air space by building a 24-metre high geogrid wall along the 1.7 kilometer parameter of their existing landfill.

A geogrid wall is a green wall that works as soil reinforcement; it is flexible, can be constructed easily and quickly, and has a structure designed for durability and better resistance to dynamic characteristics.

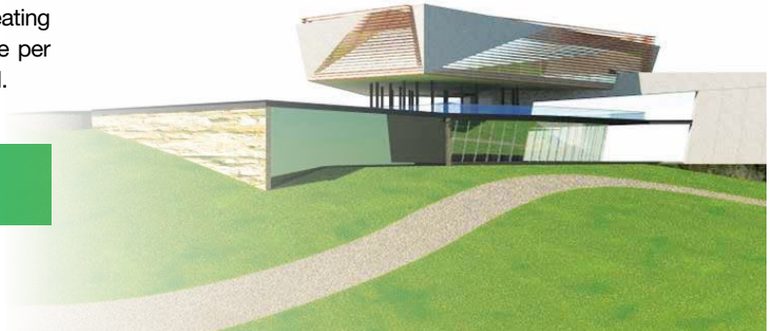
By transforming the existing landfill into a Vertical Secured Landfill, Bahsoon's team will be extending the landfill's lifespan by about 30 years while also providing an additional capacity of 4 million metric tonnes.

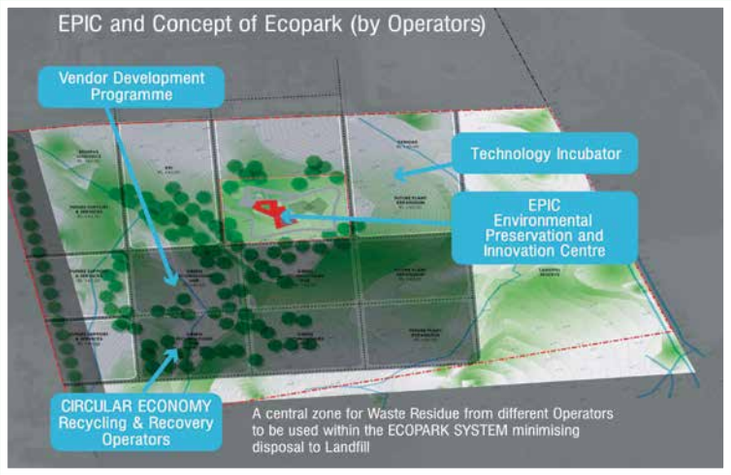
"Another advantage of the Vertical Landfill is that we can still use the secured landfill while the building of the Vertical Landfill is taking place, so we don't need to stop operations. At the same time we realised our INC1, which is the 100 tonne per day incinerator, was already quite old, and it's a very critical piece of equipment."

"It's the only major incinerator dealing with scheduled waste in Malaysia. As a matter of national safety, we had to do something. We decided to build a new incinerator. We determined that if we were to build any incinerator it would be a waste-to-energy incinerator, as long as it made economical sense.

"That incinerator is currently under construction and will be ready by August this year. It will be exporting about 2.7MWh of energy to the grid, but its capacity will be 3.4 megawatts. This falls under SEDA and FiT," Bahsoon elaborated.

Cenviro's expertise in waste management extends to the development of a Centre of Excellence (COE), also known as the Environmental Preservation and Innovation Centre (EPIC).





> *The training centre will be the first that is dedicated to waste management in Malaysia. For EPIC, 5.4 acres of land have been allocated which also forms part of an EcoPark set in 100 acres of land adjacent to the existing Kualiti Alam waste management centre.*

EPIC's goal is to develop national and institutional knowledge while also providing creative and reliable solutions for the complete spectrum of waste management and renewable energy. EPIC also stands on Five Development Pillars, which include the positive developments of the Environment, Human Capital, Innovation and Advanced Technology, a Green Economy and Social evolution.

"This facility is going to be used for certified training, educating, disseminating information to children and adults alike, everything to do with waste management."

"It's like a training institution that comes with R&D and partnerships with companies from around the world, for us to learn about different technologies and to enhance people's knowledge in Malaysia about waste."

"So if you can imagine, we'll have different levels of people coming to our training centre. Even the truck driver who transports our waste around will be certified," Bahsoon assured.

The training centre will be the first that is dedicated to waste management in Malaysia. For EPIC, 5.4 acres of land have been allocated which also forms part of an EcoPark set in 100 acres of land adjacent to the existing Kualiti Alam waste management centre.

The EcoPark happens to be one of the objectives of EPIC, in line with the part of its mandate to grow a Green Circular Economy.

"EcoPark is basically a development to encourage recycling companies to invest with us or to set up here where we receive waste, and whatever waste they need we can pass to them to recover. The concept is to become either a JV developer, a landlord, or a partner with any of these recyclers."

"We have applied for tax exemptions and so on. If anyone has a technology they want to develop here, they'll get tax breaks. We will prepare the infrastructure. Once they're in the facility, they will enjoy benefits and incentives, and they will get waste streamed from us."

"I'd like to say that we want to be the Silicon Valley of recycling and recovery with extremely high standards. Only companies with proper processes will be allowed to establish their businesses here," Bahsoon clarified.

Shan Poornam Green Technologies (SPGT), a Cenviro Associate, will be building the first fridge disassembly plant in the EcoPark. The facility will be built mainly for fridges but is also capable of accepting other Waste Electrical and Electronic Equipment (WEEE), such as washing machines and microwaves. The plant will be able to process approximately 40 to 70 fridges per hour.

This could be a timely solution for a serious problem in Malaysia where over 100,000 fridges end up in dump sites every year, potentially releasing harmful amounts of chlorofluorocarbon (CFC) into the environment. Sending discarded fridges to the disassembly plant will ensure that the CFC in them is recovered and removed safely. The proposed facility will extract CFC gas and contaminated insulation foam securely.

Cenviro, in collaboration with DONG Energy, is planning to introduce a technology known as REnescience that may prove to be a game changer for municipal solid waste management in Malaysia.

DONG Energy, a leading Danish renewable energy company, has been working with Cenviro to develop and commercialise this proprietary waste refinery technology. REnescience is a one-stop solution for the pretreatment, liquefaction, and separation of municipal solid waste by way of turning it into bio-liquid, a valuable resource for recovery and energy production.

REnescience technology is suited to the characteristics of waste generated by Malaysians because moisture makes up approximately 50-60% of our waste content.

With REnescience, water is added to the waste instead because washing the waste is part of the process. The sludge/slurry that is created through this process goes into an anaerobic digestion (AD) unit, which is then connected to a gas engine to produce energy from waste.

The first commercial 480 tonne per day REnescience plant will be ready in May 2017 in Northwich, UK. Following the successful implementation of the REnescience plant in Northwich, Cenviro and DONG plan to replicate such non-thermal waste-to-energy facilities in Malaysia.

It will be thrilling and compelling to see what Cenviro comes out with next, not to mention a relief for a nation that needs innovative green solutions before it is too late. We are confident that Cenviro is leading within the private sector the Green Revolution for the country.

"Join SEDA in building a Better Future. Sign up for our Training Programmes"

1. **Grid-Connected Photovoltaic (GCPV) Systems Design Course**

2. **Grid-Connected Photovoltaic (GCPV) Systems Course for Wireman & Chargeman**

3. **Grid-Connected Photovoltaic (GCPV) Installation and Maintenance Course**

4. **Introducton to Grid-Connected Photovoltaic (GCPV) Systems Design for Non-Engineers**

5. **Off-Grid Photovoltaic (OGPV) Systems Design Course**

For more Information, please visit our website:
www.seda.gov.my

RENEWABLE ENERGY (RE) FUND

WHAT IS THE IMPACT OF HAVING RENEWABLE ENERGY (RE) FUND TO SUPPORT THE FiT?

POSITIVE IMPACT ON :

ECONOMIC

Hedges against conventional fuel price volatility.

Creates green jobs.

RE investor security.

Creates spin off businesses.

NATIONAL AGENDA

Promotes, decentralized and a democratised form of electricity system.

Government's commitment to RE growth.

Increases energy security and autonomy.

Increases stakeholder base supporting RE.

SOCIAL

RE a common landscape for the community.

Fairer wealth distribution.

Community engagement through climate protection.

Increases public support for renewables.

ENVIRONMENT

Reduces dependency on fossil fuel.

Drives energy efficiency.

Lowers carbon dioxide (CO_2) emission for cleanier air.

Increases health of general population.

ENERGY DEMAND MANAGEMENT

AN ESSENTIAL COMPONENT OF SUSTAINABLE ENERGY

Over the past decade Malaysia's energy usage has increased in tandem with the country's industrialisation.

It cannot be denied that the industries play an important role in the Malaysian economy. The Government is also encouraging all sectors to manage energy more efficiently.

Improving energy efficiency and renewable energy are very important areas for the Government to focus on and therefore moving into renewable forms of energy, ranging from solar power to other energy resources are encouraged while retaining incentives to ensure constant production levels.

The limited supply of fossil fuels coupled with the rapid increase of energy demand as well as the negative effect of these fuels have created the need to have sustainable energy management in order to improve energy efficiency, especially in power and fuel consumption in meeting the Government's direction and goals for a balance energy security as well as in achieving the GHG reduction target.

With regards to this, the Government has set an example to various industries including other Government agencies, the private sector and even the general public on the benefits of energy efficiency with the launch of the Government Lead by Example (GLBE) initiative in 2011 which resulted in significant energy reduction and savings.

The Sustainable Energy Development Authority (SEDA) Malaysia which was established in 2011 as an implementing authority for Government initiatives, is also engaging in energy efficiency and energy conservation activities.

SEDA has set up the Energy Efficiency Unit for this initiative. It later changed its name to the Energy Demand Management (EDM) unit in 2013 and its role involved in much wider scope related to energy management which includes energy conservation, energy efficiency, the low carbon building and low carbon ICT porgram.

The EDM also known as demand side management (DSM) or the consumer demand of energy through various methods to encourage the consumer to manage and use less energy.

The energy demand management is part of the sustainable energy under the "sustainable energy pyramid" concept in order to provide realistic and affordable solutions of sustainable energy in which includes energy conservation, energy efficiency and renewable energy.

SEDA must ensure that energy efficiency and conservation is rigourously pursued. Early last year the Government approved the introduction of the National Energy Efficiency Action Plan to manage energy demand efficiently.

The Action Plan aims to reduce energy consumption by 52,233 gigawatt-hours over the next ten years, by strengthening institutional frameworks, developing skilled capacity, establishing sustainable funding mechanics, promoting investment and integrating energy efficient initiatives.

As part of the initiatives, the EDM unit also conducts awareness and technical trainings which include Low Carbon Buildings Program; Training on Understanding and Applications of Malaysian Standard: Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings (MS 1525); Training on Energy Efficiency in Air-condition and Mechanical Ventilation (ACMV) Management; Training on Energy Audit in Buildings and Training on Energy Management in Building.

SEDA through EDM unit also conducts the Low Carbon ICT program that aims to reduce energy consumption and carbon emissions in the ICT sector as ICT equipment and appliances have significant energy consumption. The Low Carbon ICT project is recognized as part of the Green Technology Roadmap by the National Green Technology & Climate Change Council which focuses at the quantitative measures on electrical energy usage and carbon emissions through the use of the carbon conversion factor formula.

Under the 11th Malaysia Plan, the Government has also initiated the Energy Audit Conditional Grant or EACG with an allocation of RM54.4 million for a period of three years. SEDA as one of the implementing agencies, administers one of the grant for commercial buildings with electricity usage of more than 100,000kWh per month. One of the major efforts of EACG is retrofitting the Government buildings especially hospitals, making them energy-efficient and able to save on utility bills. The project also includes audit grants to encourage commercial and industrial building owners the use of efficient green technologies, effectively cutting down on carbon emissions whilst saving operational costs.

The Government has placed great importance on incorporating sustainable urban planning which includes all five key sectors of energy, transport, building, waste and water.

SEDA aspires all activities by the EDM unit will create awareness and adoption of the RMK-11. The Strategic Plan will encourage the adoption of energy efficiency and low carbon initiatives and raise knowledge and education on the importance of sustainable energy and help in mitigating the climate change.

For more info on the activities and facilitations provided by the EDM unit, visit www.seda.gov.my or call 03-8870 5800.

ENERGY AUDIT CONDITIONAL PROGRAM FOR COMMERCIAL BUILDING

ELEVENTH MALAYSIA PLAN

PROJECT OVERVIEW

WWW.SEDA.GOV.MY/EAGRANT

The energy audit project by SEDA Malaysia will span over three years from 2016 until 2018. Each year, five capacity development trainings will be carried out in support of the energy audit grants. From 2010 to 2013, the recorded electricity consumption by the commercial sector is 33.6% with an increase of 4.7% annually.

Therefore, there is need to be reduce the electricity consumption for the larger scale commercial sector (electricity consumption of equal to or more than 3,000,000kWh in the next six months) through the implementation of energy efficiency activities starting with the discovery of the energy audits, energy management and commercial sector energy management (subject to EMEER 2008 of the Energy Commission).

Grants are provided for building owners to collaborate with Energy Services Companies (ESCOs) that are registered with the Energy Commission (ST). This is a mandatory requirement in order to carry out energy audits with this grant and the building owner must implement energy efficiency measures as recommended by the energy audit report.

PROJECT OBJECTIVES

Funding for energy audit facilities and briefing provided by the Government.

Capacity building training specifically for the owners of commercial buildings.

The implementation of energy in large commercial building sector.

SCOPE OF PROJECT

Provide financing facilities for carrying out energy audit to identify the amount of electricity consumed by establishing a baseline.

Human capital development in the field of audit to meet the requirements of energy demand managament in the commercial sector.

Raising the awareness about the importance of energy audit.

MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER (KeTTHA)

Suruhanjaya Tenaga
Energy Commission

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DEVELOPING HUMAN COMPETENCY IN SOLAR PHOTOVOLTAIC (PV) INDUSTRY

UPSKILLING AND UPGRADING HUMAN CAPACITY DEVELOPMENT IN THE PV INDUSTRY

Irrespective of the nature of business, human capacity development is an important strategic thrust that must be addressed in order to continuously attract, develop and retain people with capabilities and the commitment needed for any future organisational success.

This is called sustainability, a new buzzword across the board. Developing the right skills provide talent sustainability that helps to ensure a balanced and dynamic ecosystem to meet the national Renewable Energy (RE) agenda.

As the authority responsible for increasing the deployment of RE and Energy Efficiency (EE) measures in the country, SEDA believes in the importance of developing skills in the RE industry to reduce investment risks, improve bankability of projects and provide confidence.

It is with this in mind that SEDA provides training to stakeholders to ensure service providers are equipped with competent talents for safe and reliable system installations that will later increase the public's confidence in the industry.

SEDA first implemented the Institute for Sustainable Power Quality (ISPQ) Grid-Connected Solar PV course. After the license expired in March 2013, the Authority took a step further to develop its first solar PV training, the Grid-Connected Photovoltaic (GCPV) Systems Design.

SEDA conducted three workshop sessions to allow the migration of ISPQ holders to the new GCPV system design course. Designing of PV system is very much adapted to the local weather and its climate conditions, hence this course was developed rightly for the design of PV system for hot and tropical countries like Malaysia.

The training course covers design of GCPV system which includes integrating various components such as the solar PV modules, inverter and balance of systems (BoS), information about GCPV systems and relevant local requirements and standards for the installation. This course is open for local as well as international participants and is suitable for designing for countries with similar climatic conditions to Malaysia.

Like other solar PV related trainings offered by SEDA, the GCPV training is conducted at the training partners' facility. The training partners are the Universiti Teknologi MARA (Shah Alam Campus) and Selangor Human Resource Development Centre (SHRDC).

The entire duration of the course is eight days, comprising of both theory and practical sessions ending with a competency exam. Those with a degree in Electrical or Mechanical Engineering are preferred but candidates with a minimum of Diploma in Engineering or Degree in Applied Science (Physics) are also accepted.

Besides the GCPV systems design course, other GCPV trainings offered by SEDA include the PV systems course for wireman and chargeman. This course is partnered with Universiti Kuala Lumpur-British Malaysian Institute, Universiti Teknikal Melaka (UTeM) Malaysia, Akademi Binaan Malaysia (Wilayah Utara), Institut Kemahiran Mara (Kota Kinabalu) and Kolej Kemahiran Tinggi Mara (Pasir Mas).

The five day course is structured to expose the trainees to solar PV technology, specifically covering both the basic GCPV systems and the key components of such systems.

A basic installation and maintenance of the GCPV systems course is also offered by SEDA in partnership with Akademi Binaan Malaysia (Wilayah Utara), Selangor Human Resource Development Centre (SHRDC), Kedah Industrial Skills and Management Development Centre (KISMEC), Sungai Petani and Terengganu Skills Development Centre (TESDEC), Kuala Terengganu.

As human capital development is an important priority for SEDA, the training is not limited to only solar PV technology. Non PV-related training workshops for biomass, biogas and small hydro are also provided from time to time and as when required.

As the PV industry is new and emerging, SEDA has introduced the courses to non-engineers to expand the industry's pool of talents with the hope that these trainings will help faciliate in the growth of this sector.

Last year, 170 participants attended the training programmes provided by SEDA through our training partners. For more info on the trainings offered, visit SEDA's website at www.seda.gov.my or call: 03-8870 5800.

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NEM
Net Energy Metering

Net Energy Metering (NEM):

AN ORGANIC EXPANSION OF SOLAR PV MARKET BEYOND THE FiT

HARNESSING SOLAR POTENTIAL THROUGH NEM

As renewable energy (RE) is a relatively new form of energy source, the Government needs to provide confidence to its investors on their returns in investment and reliability in the systems.

This is where Sustainable Energy Development Authority (SEDA) Malaysia, as a statutory body under the Ministry of Energy, Green Technology & Water (KeTTHA) plays a significant role in the development of RE in Malaysia.

Formed under the SEDA Act 2011, the Authority is promoting and implementing RE in Malaysia. SEDA and KeTTHA introduced the Net Energy Metering (NEM) scheme into the fray as a follow-up to the Feed-in Tariff (FiT) mechanism to further enhance the growth of solar PV market in Malaysia.

The NEM will provide domestic market continuity for solar PV and in turn, encourage industry growth. Promoting PV market among the residentials, communities and commercial businesses enable the non-utility sector to engage in a larger role in addressing climate change by generating clean energy. The quota under the FiT for solar PV will come to an end this year except for Community Quota.

The NEM will allow the public to be “prosumers” instead, a term used to describe active electricity consumers because they both consume and produce electricity.

If the users which include all domestic, commercial and industrial sectors and as long as they are customers of Tenaga Nasional Berhad (TNB) for Peninsular Malaysia or Sabah Electricity Sdn Bhd (SESB) for Sabah and FT Labuan, are producing more than what they are consuming, the excess is exported to the grid. We are among the pioneer implementer of NEM in the region.

The NEM is a billing mechanism whereby energy produced from installed solar PV system is consumed first, and any excess is exported and sold to the distribution licensees (DLs). The calculation for the net billing of electricity will be based on the following: Net Billing = (Energy Consumed from DL (kWh) x Gazetted Tariff) – (Energy Exported to DL (kWh) x Prevailing Cost). The net billing or credit shall be allowed to roll over for a maximum of 24 months and any available credits after 24 months will be forfeited.

For domestic residential consumers, the maximum capacity of the PV system installed is 12kWp for single phase or 72kWp for 3 phase systems. For commercial and industrial consumers, the maximum capacity of the PV system installed shall be 1MWp or 75% of maximum demand or 60% of fuse rating or 60% of current transformer (whichever is lower).

The PV system can be installed on the rooftop of buildings and on the garage, car park and similar buildings. Interconnection to the DL's network shall be done only through indirect mode, i.e. within owner's internal distribution board only.

SEDA had said that the country would be implementing its 500MW of solar PV quota for NEM starting late 2016 until 2020, with 100MW capacity limit a year whereby 90MW will be allocated for Peninsular Malaysia and 10MW for Sabah.

The objective of NEM is to promote and encourage greater RE generation by prioritising internal consumption before any excess power is fed to the grid. This is meant to be both cost-efficient and environmentally friendly.

SEDA's primary role is to develop an RE market and secondarily, to develop an RE industry and their efforts is one of the many opportunities and platforms for energy companies, communities and individuals to adopt a cleaner and more sustainable form of energy generation.

NEM is one of its few mechanisms to transit the country from fossil fuel towards RE generation in an effort for Malaysia to address the issues of climate change and national energy security.

Promoting the use of solar PV system for commercial consumers are being encouraged by SEDA as implementing the NEM reduces the carbon footprint and greenhouse gas emissions, and reduce the need for planting up of peaking plants to meet peak electricity.

The NEM system in the country has been long time coming and implementing them is part of SEDA's renewable energy agenda and since 2011, the Government made efforts towards renewable energy development and identifying the issues of adopting the market forces to deliver the intended outcomes towards clean electricity generation. All these are part of SEDA's national objective for increasing renewable energy in the electricity system.

Like FiT, the aim of NEM is to spawn the RE market and industry in Malaysia and create new business opportunities for the industry.

To make it easy for Malaysians to apply for the NEM, SEDA has announced the e-NEM online system for registered electrical contractors to submit NEM applications on behalf of their clients.

NEM applications shall be processed by SEDA within 30 days from the date of complete submission. A NEM certificate will be issued to the successful applicants.

SEDA wants to ensure that sustainable energy plays a vital role in the nation's economic development and environment conservation. The implementation of NEM in the country can be considered as part of that initiative. NEM will enable more home and building owners to generate electricity with solar PV, while also selling excess to the grid. This will not only save money but also enable those who invest in solar PV system to recover their investment. For more information regarding NEM visit SEDA's website at www.seda.gov.my or email your inquires to NEM@seda.gov.my.

NEM
Net Energy Metering

"Solar Energy, Empowering the Consumers"

Concept of NEM

UNDERSTANDING NET METERING

The energy generated by PV is consumed in situ and any excess energy generated is exported to the grid.

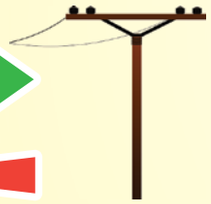
Excess energy not used by your home goes back to the electricity grid

Energy used by your home from the electricity grid

Solar PV array converts energy from sunlight into electricity

- The inverter converts the electricity produced by the solar array from direct current (DC) to alternating current (AC).
- PV meter measures the energy generated by the solar PV system.

- The Bidirectional Meter.
- Indicates energy usage and excess energy produced



- Utility pole / distribution line

For more information regarding NEM or how to apply, please visit:
www.seda.gov.my

MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER (KeTTHA)

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Calendar
of events

The final strategic thrust under the National Renewable Energy Policy and Action Plan (NREPAP) relates to developing awareness programme so there is a greater acceptance and participation by the general public and private sector in the sustainable energy programmes administered by SEDA.

The activities cover local awareness programmes that include engagement with stakeholders through seminars/workshops, open days, exhibitions, collaboration with NGO partners as well as international liaisons through meetings and seminars attended.

17-26
february2016

OME
SEDA Malaysia featured in the Oh My English Jan 2016 issue, where we had 10 roadshows across Klang Valley, spanning primary and secondary schools.

5-8
october 2016

IGEM 2016
SEDA Malaysia participated in the 7th IGEM held at Kuala Lumpur Convention Center. Last year's IGEM was special as His Royal Highness Tengku Amir Shah ibni Sultan Sharafuddin Idris Shah Al-Haj visited SEDA Malaysia's booth and showed his support on the importance of sustainable energy to the world by making his pledge.

19 october & 7 november2016

BRIEFINGS ON THE NET ENERGY METERING (NEM) SCHEME

The briefings provided information on the NEM scheme; they were held in the Everly Hotel, Putrajaya on 19th October 2016 and Le Meridien Hotel, Kota Kinabalu on 7th November 2016.

5-6 november2016

SEDA MALAYSIA OPEN DAY 2016

SEDA expanded the awareness program to the outskirt community by organizing one of its Open Day series in Kota Marudu, Sabah in conjunction with their local annual festival, The Pesta Jagung from 5-6 November 2016.

7-8 march2017

2ND ANNUAL POWER PLANT INNOVATION SUMMIT

Dato' Seri Ir. Dr Zaini bin Ujang, Secretary General, Ministry of Energy, Green Technology and Water (KeTTHA) and Authority member of SEDA delivering his keynote address during the 2nd Annual Power Plant Innovation Forum.

Chief Operating Officer of SEDA Malaysia, Ir. Akmal Rahimi bin Abu Samah was one of the panel speakers for a panel discussion to share challenges faced by Malaysia in increasing the RE share in the energy mix during the 2nd Annual Power Plant Innovation Summit. The summit was held from 7th to 8th March 2017 at Aloft Hotel, Kuala Lumpur and was organized by Fleming.

17 march2017

MoU BETWEEN SEDA AND UiTM

A Memorandum of Understanding (MoU) between SEDA Malaysia and UiTM Shah Alam was signed on 17th March 2017 at Dewan Canseleri UiTM Shah Alam.

This collaboration since it first started in 2013 has produced and recognized over 150 Qualified Person (QPs) in the field solar PV.

Germany Shows The Way Forward In Terms Of

PV Deployment In Europe

Solar is an established energy source in the EU's power generation portfolio

Whenever solar power is discussed in Europe, emphasis is always on Germany which is its largest market because of its experience in policy and incentives in photovoltaic (PV) deployment.

Solar power is supplying 4% of electricity demand in the European Union (EU), based on the total installed PV capacity by the end of last year. The EU's top three solar electricity markets are Germany, Italy, and Greece where solar energy covers more than 7% of their need.

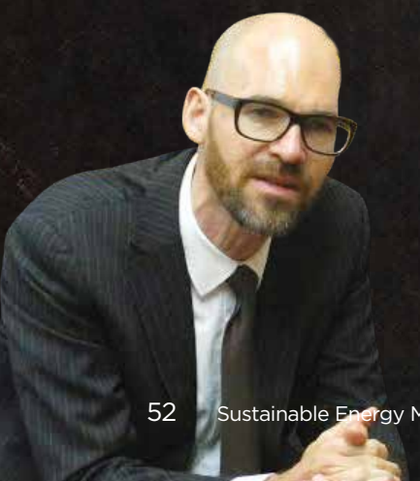
"However, Italy is the most 'solarized' country in Europe, around 8% of power consumption is supplied by PVs," said Michael Schmela, Executive Advisor (Solar-Power Europe, Germany).

Speaking at the sidelines of the International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM 2016) held in Kuala Lumpur in October last year, Schmela who is also a member of the leadership team of Solar-Power Europe added that with 17 of the 28 EU members having solar contributing more than 1% of their electricity demand.

Solar has become an established energy source in the EU's power generation capacities with over 100GW of total solar capacity installed as of Spring 2016. Apart from solar energy, winds add 20GW or 75% of the newly added power generation capacities.

"Although solar energy is growing fast in the EU, the solar sector in Europe is still in a transition phase. There are the ups and downs in the industry," added Schmela who has 20 years' experience in the solar industry.

For example, he reiterated that on the heels of Europe's solar boom cycle, there was an unsustainable peak in 2011 when 22.4GW was installed. A strong market consolidation has followed.



"The state of solar can be probably best seen in Germany"

Michael Schmela,
Executive Advisor,
Solar-Power Europe, Germany.

However, between 2011 and 2014, there was a decline each year in the volumes of new PV grid-connections in Europe, reaching a five year low at 7.1GW in 2014.

In 2015 demand grew by 15% due to the enormous growth in the United Kingdom but there were signs that demand will be lower in 2016.

"The state of solar can be probably best seen in Germany, the continent's largest market with a total share of over 40% of the cumulative installed capacity," he further reiterated.

While Germany has significantly diversified its power mix towards renewable, growing from 4% to 27% in 2014, the Renewable Energy Act (EEG) surcharge has increased to 6.14 euro cents per kWh in 2015.

The EEG (German: Erneuerbare-Energien-Gesetz), which first came to force in 2000, is a series of German laws that originally provided a Feed-in Tariff (FiT) scheme to encourage the generation of renewable electricity. It has been amended several times since.

With new technologies and declining prices, in particular PVs, there is strong expansion of renewables and this has led to much lower wholesale electricity price in Germany.

"This has to a certain extent balanced the FiT surcharges on electricity prices," added Schmela.

Germany saw a strong solar growth phase until 2012, however the PV market has strongly decreased.

And according to Schmela, the EEG was once gain revised in 2016 and the market is waiting for a new impetus.

MANAGEMENT OF SOLAR FARM

SOLAR farms are catching up as Thailand moves towards built and commissioned solar photovoltaic (PV) plants in reducing the country's dependence on oil.

They have now reached the point where the private sector is leading the way in implementing solar energy projects.

Solar PV systems are now playing a major role which started from very small beginnings of government sponsored demonstration projects.

Built and commissioned solar PV power plant is now a success story for project owners and their next mission is to operate the plant to generate high energy yield and create income.

"The plant is so designed and the financial model of the project is based on energy generation that the plant has to deliver to the utility grid over its operation life," said Dr. Wuthipong Suponthana, Managing Director of Leonics Co.

However, Wuthipong said the solar farms have to be well maintained for high performance in order to yield good income.

An experienced hand in designing and implementing grid connected PV power farm for more than 50MWp in Thailand, Wuthipong pointed out that the operations and management (O&M) teams must ensure that any energy investment made into the future pays off, and guarantees profits for any renewable asset operator, owner or investors.

"The service teams must track the plants continuously and carry out any necessary curative maintenance work necessary, in order to ensure power plants remain in high performance," added Wuthipong.

This includes high maintenance performance of the inverters, MV transformers, switch gears, all PV strings combiner boxes and disconnecting devices in the power plant.

Reiterating further, Wuthipong who has reviewed many PV components and systems standards before they are published and become IEC (International Electrotechnical Commission) standards, said the other important part is to manage the plant to operate with high performance by using IEC performance evaluation ratio with plant monitoring system.

"This is to alert the O&M engineers when performance of the solar plant dropped. Analyzing on causes of plant performance dropping and action is very important to gain back high PV power plant yield," added Wuthipong.

Currently, most solar farm installations use imported modules and other supportive components and Thailand aims to entice foreign solar investors to use local materials like what Malaysia is doing to keep investment costs low and at the same time create job opportunities.

"Malaysia is the only Southeast Asian nation whose solar usage is on par with Thailand's and offers enticements to foreign solar investors to use local materials," he further reiterated.

Germany, on the other hand, the world's largest PV market has created 300,000 local jobs from more than 20 years' experience in the industry.

8.67MWp PV Power farm at Prajinburi, Thailand. The plant belongs to L-Solar 1 Co., Ltd, a Subsidiary company of Loxley Public Company Limited. It has been operating since 2 Dec 2011.

The import duty on solar panels was waived several years ago to promote renewable energy development and market players can use this incentive provided by the Thai government to move the industry which also include setting up solar farms.

A drop in high power plant yield, added Wuthipong, could come from visible causes such as weed, soils, broken modules and non-visible causes such as PV defective from workmanship, hot spot and potential induced degradation (also called as PID), in crystalline PV modules, caused by so-called stray currents.

"This usually happens when PV power plant using monocrystalline silicon (mc-Si) module and operated in warm and humid climate such as ASEAN countries and this effect may cause power loss of up to 20-80%," said Wuthipong.

He said these could also affect modules tested to be PID resistant and therefore both plant owners and engineers should have enough knowledge to mitigate PID and restore PV power.

"The service teams must track the plants continuously and carry out any curative maintenance work necessary, in order to ensure power plants remain in high performance".

Dr. Wuthipong Suponthana,
Managing Director of Leonics Co.

RENEWABLES GIVEN PRIORITY ON GERMANY'S POWER GRIDS

RE: AN INNOVATIVE AND SUCCESSFUL ELECTRICITY PARADIGM

PHOTOVOLTAICS (PV) will play a significant role in the future shaped by sustainable power production.

Countries around Europe are building their renewable capacity in order to reduce their carbon emissions and boost energy security.

This is because of demand in power supply and conventional plant breakdowns and these events may provide a case to build technologies that can manage this oversupply.

Electricity grids are transforming as renewables proliferate but concerns due to fluctuations in renewables sources could limit the ultimate potential for high penetrations of renewables.

"In Germany net metering and injection of surplus power into the grid under the Feed-in Tariff (FiT) scheme is widely used for PV installations of up to 10MW peak so far".

German Solar Association
Managing Director,
Dr. Matthias Eichelbronner

In 2015 Germany installed about 1.46GW new PV capacities, which corresponds to about 2% of new installments worldwide. Renewables were only able to meet demand because of its strong export capability. It is, therefore, no small wonder that Germany's Renewable Energy (RE) sector is among the most innovative and successful worldwide.

In July last year, German lawmakers voted to limit the expansion of renewable power, in response to concerns that the country's efforts to promote green energy have resulted in too much too soon.

The quick rise of renewables has resulted in a power glut as Germans exercised greater energy efficiency. Renewables are given priority on Germany's power grids and the capacity limits are aimed at slowing the tide of RE flooding the market giving the expansion of grid infrastructure time to catch up.

Wind power has always been part of energy and RE in Germany with installed capacity of 44,947MW, producing about 8% of the country's total electric power. The government has always been very supportive of wind power and by 2019 wind turbines would gradually plateaued as solar energy is positioned to play a crucial role in Germany's future energy mix.

Grid integrated PV achieved 39,698MW of installations at the end of 2015. The grid received an amount of 38,432GWh of power supply which equals 6.4% of the national power consumption.

Having achieved this and expecting a further growth of PV in the years to come, the grid management is challenged to integrate the PV next to wind power as a second intermittent source into the electricity supply system.

"Demand and supply sides have to be balanced out using forecasts and dispatching systems to minimize conventional back-up power and system losses," said German Solar Association Managing Director, Dr. Matthias Eichelbronner.

Eichelbronner, who worked as a research associate for different projects in renewable energy (RE) and energy efficiency in hydropower in Germany and wind power in Poland and Spain, he was also instrumental in the basic groundwork for renewable energy policy and penetration in his country.

Speaking to reporters after a panel discussion on "Management of Utility Grid under Increasing PV Penetration" at the IGEM 2016 in Kuala Lumpur last year, he said since PV rooftop installations are the most common RE application on private homes, commercial buildings and industrial sectors, in Germany net metering and evacuation of surplus power into the grid under the Feed-in Tariff (FiT) scheme is widely used for PV installations of up to 10MW peak so far.

"The grid integration takes place at the 400V level and the mid voltage level depending on the capacity of the given grid access point," he said.

Nevertheless, he added that larger ground mounted installations are still ongoing following an auction scheme since early last year.

"This clearly reflects the issues related to the achievements of PV on a national level and as well as the impacts on the local grid level when new installations are to be connected," he reiterated.

Eichelbronner's different assignments working with GIZ Germany, a government agency experienced in sustainable solutions, followed up with support local entities in India, Indonesia, Vietnam and Malaysia in matters of PV and bioenergy in respect to project development, quality control and project finance with local banks.

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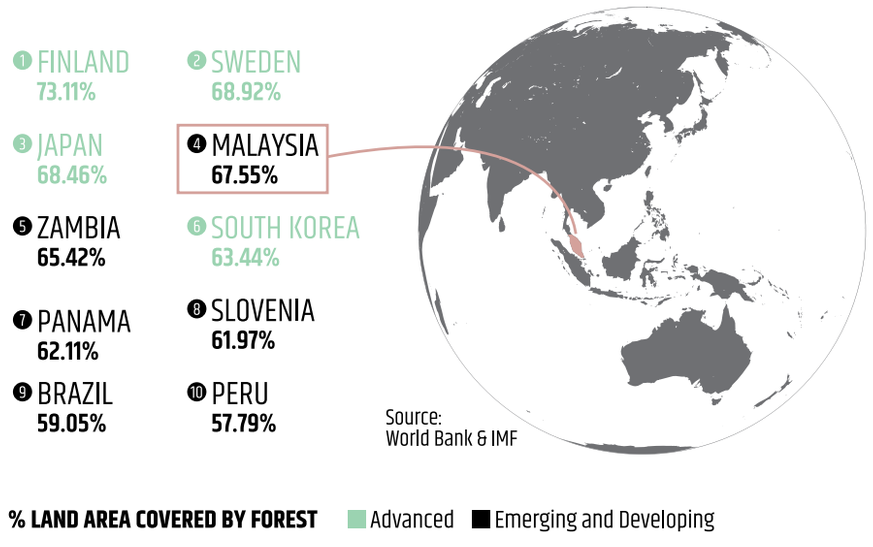

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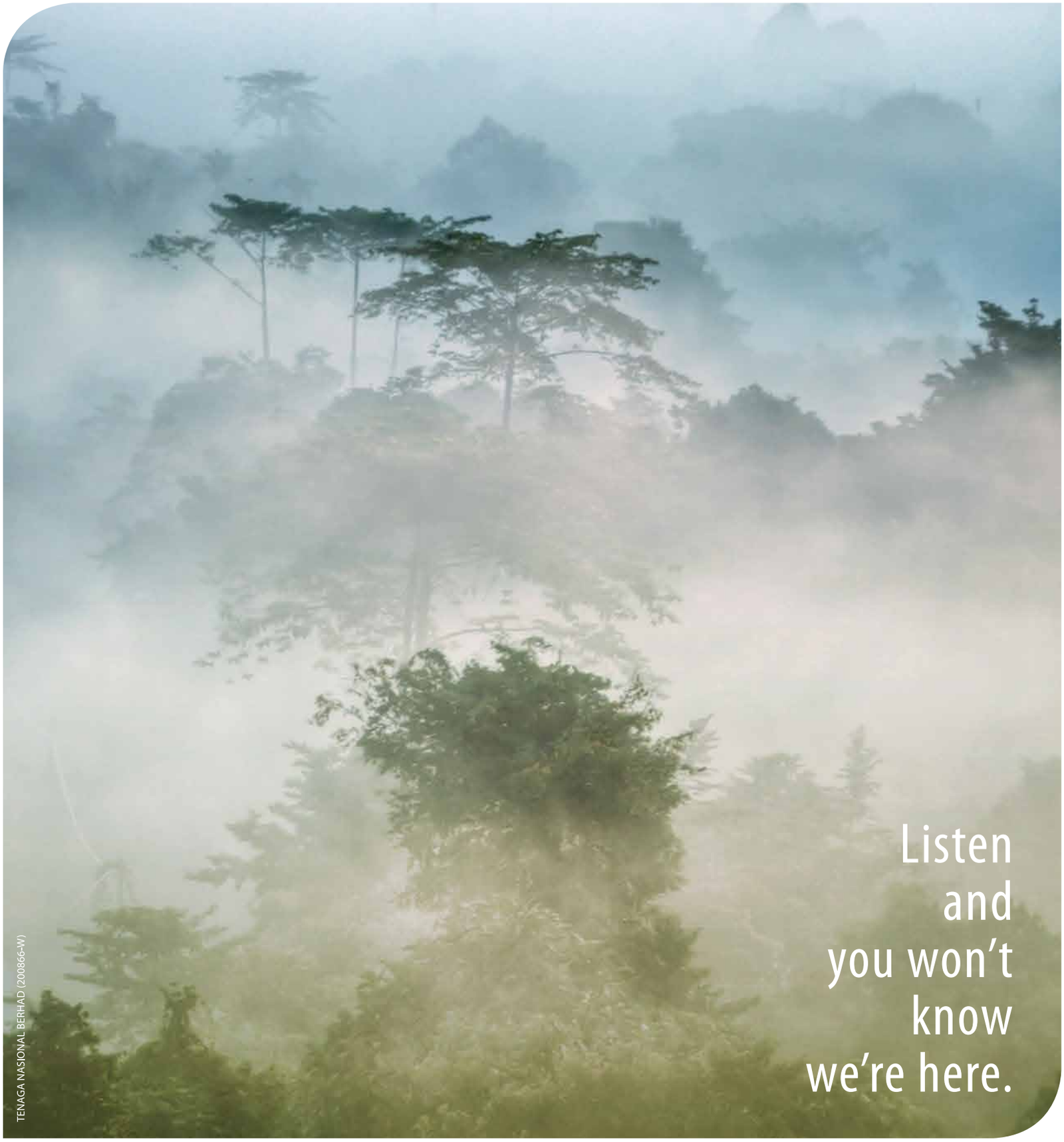

Down below, the natural sounds of the forest can be heard echoing across the land. All is as it has long been, as it should be, despite the fact that construction of the Puah and Tembat hydroelectric dams began in 2010. We have gone to great lengths to ensure the everyday lives of bats, birds, gaurs, tigers, tapirs, elephants and rhinoceroses were disturbed as little as possible. Selective clearing of the forest and the creation of special corridors that allow the 'natives' to roam and forage freely has helped us make significant progress; as a business, and a responsible, eco-friendly neighbour.

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