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MALAYSIA

CHANGING MINDSETS TOWARDS A NEW ENERGY PARADIGM

ASTANA EXPO 2017 CREATING A GREEN FUTURE WITHOUT BORDERS

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CHAIRMAN's Message

The inaugural magazine released in April this year received very favourable feedback from both the public and private sectors in domestic and international domains. Since the inaugural release, the highlights in the past four months, from the Authority's perspective, are Malaysia's participation in the Astana Expo 2017 held in Kazakhstan. The duration of the Expo runs from June 10 until September 10, 2017. The theme of the Expo, Future Energy, aligns with global trending concerns on the future of energy. Although many forms of energy are on display, sustainable energy remains the focus at the Expo. Several memorandums of understanding (MoUs) have also been signed; among them was a collaboration between the Ministry of Energy, Green Technology and Water (KeTTHA), Malaysia and the Ministry of Energy, Kazakhstan in the fields of green technologies.

Noticeably at the Astana Expo 2017, the Ministerial Conference and the 8th International Forum on Energy for Sustainable Development, renewable energy is no longer regarded as a token energy capacity required to satisfy a green image for international marketing purpose. The conclusions reached at the various forums were that true national energy security and climate change mitigation measures can only be found in renewable resources and not carbon resources. Against this backdrop, countries are pledging high renewable energy contribution in their energy mix by a certain target year. During the Malaysia Energy Forum, organised by the Ministry of Energy, Green Technology and Water (KeTTHA), Malaysia on June 12, 2017, with support from the Authority, the Minister YB Datuk Seri Panglima Dr. Maximus Johnity Ongkili believes that Malaysia should achieve at least 50% of renewable energy in the electricity mix by 2050.

I have just received a copy of the highlights of REN21 report on Global Status of Renewables 2017. It is interesting to note that 2016 represented the third year in a row where global CO_2 emissions from fossil fuel and the industry sector remained stable despite a 3% growth in the global economy and therefore, there is an increased demand for energy. This translates to the start of decoupling of economic growth and CO_2 emissions; the contribution towards emission reduction is largely due to the increasing planting up of renewable energy in the electricity generating mix. A second interesting highlight is the changing paradigm of the electricity system. Baseload electricity supply, which used to be a critical condition to fulfil, is getting less relevant in the new electricity system. Citing from REN21, the key lesson for integrating large shares of variable renewable generation is to "ensure maximum flexibility in the power system."

This should be a cue to the Authority on our next areas of focus on enablers to increase renewable energy share in the energy mix. Globally, energy storage systems are gaining importance to provide intraday, intermediate and long haul energy tie over when the sun sets or hides behind the clouds and/or the wind stops blowing. At this juncture, it is accurate to say that some forms of renewable energy have achieved grid parity (or at least socket parity) with conventional carbon based power plants. It is predicted that once the combined levelised cost of energy (LCoE) for solar and wind, and energy storage receives the same grid parity, this will mark the end of the carbon era and the need for intervening policies for renewable energy.

In this issue, I wish to thank the Secretary-General of the Ministry of Energy, Green Technology and Water (KeTTHA), Malaysia, and also an Authority Member, Dato' Seri Ir. Dr. Zaini Ujang, for sharing his insights on the renewable energy agenda for the country. I wish to thank various contributors, sponsors, editorial team led by Ms. Catherine Ridu, that have collectively made this publication possible. This issue is released in conjunction with Malaysia's 60th Merdeka (Independence) celebration. On this note, I wish the readers Salam 1Malaysia and Salam Merdeka, Negaraku Sehati Sejiwa.

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

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- To provide a sustainable solution for palm oil mill industry waste management by reducing carbon emission through a controlled methane capture system.
- To implement the green agenda and to be aligned with the National Renewable Energy Policy.

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EMBRACING A **NEW ENERGY** PARADIGM

Dato' Seri Ir. Dr. Zaini Ujang, Secretary-General of the Ministry of Energy, Green Technology and Water (KeTTHA), started his career as an industrious academic where his scholastic achievements and thought leadership in water matters were recognised locally and internationally.

Zaini has published over 200 technical papers, plus 22 books, chapters, monographs, and technical reports on environmental engineering; he and his former co-workers have registered 21 patents and copyrights. Professor Mogens Henze, an expert in environmental engineering, once sought Zaini's expertise to co-edit two books entitled 'Municipal Wastewater Management in Developing Countries' and 'Environmental Biotechnology.'

When Zaini became Vice Chancellor of Universiti Teknologi Malaysia (UTM) in October 2008, he was only 44 years old at the time. Before his current appointment with KeTTHA, Zaini held the same position in the Ministry of Higher Education. On August 5, 2016, Zaini replaced Datuk Loo Took Gee as Secretary-General of KeTTHA following the latter's retirement.

More recently, Zaini was the Malaysian Commissioner for EXPO 2017 in Astana, Kazakhstan. The opening of the Malaysia Pavilion at EXPO, running from June 10 to September 10, was officiated by The Honourable Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of KeTTHA. Zaini expected 200,000 visitors to explore the Malaysia Pavilion throughout the duration of the Exposition. The Pavilion highlights Malaysia's green capabilities to an international audience at EXPO 2017.

"We are very much aware of the need to have a diversified and balanced energy mix. For the power sector, we are confident that we can support the government's commitment under the Paris Agreement."

DATO' SERI IR. DR. ZAINI UJANG
Secretary-General of the Ministry of Energy, Green Technology and Water (KeTTHA)

The Secretary-General catching up on the day's matters with Catherine Ridu, CEO of SEDA Malaysia.

Back in Putrajaya, Zaini took the time to discuss the current interconnecting landscapes of Malaysia's power sector and electricity market respectively.

Under the recent ASEAN Plan of Action for Energy Cooperation (APAEC), the target for renewable energy (RE) is 23% of the total primary energy supply by 2025. Zaini states that for the power sector in Malaysia, it does follow the ASEAN definition of RE which includes electricity generated from large hydroelectric power (HEP).

"At present, RE constitutes approximately 22.5% of the country's total electricity generating capacity. Malaysia aspires to uphold the target set by ASEAN, which we are currently working towards," Zaini affirmed.

Hydropower plants play a key role in providing a balance to the electricity market as more variable RE, such as solar, is injected into the grid. Cheap electricity like hydropower has zero marginal cost, and in Sarawak there is an abundance of HEP resources with the technical potential of 20,000MW. Zaini was able to shed some light on the status of the long-standing plan to bring Sarawak's hydro resources to the rest of the country.

"Sarawak has huge hydro potential which can help in providing flexibility to resources that are more intermittent in nature. The issues with drawing Sarawak's hydro are no longer technical in nature, but rather in terms of commercial viability with regards to the investment cost of the submarine cable. Because the cable will run through Indonesian water, there is also a need to address the international and legal ramifications, as well as the geopolitical consensus," he explained.

"Nevertheless, Sarawak's hydro is important for the future of the energy system in the country. Any country that has large hydro potential serves as a natural energy storage provider for itself as well as its neighbouring countries."

In November 2016, Malaysia pledged at the Conference of the Parties (COP) 21 in Paris to reduce 45% of its carbon intensity by 2030. Malaysia produced significantly higher than average carbon emissions in 2013, which was recorded at 8.0 metric tonnes per capita based on the World Bank's data.

The ASEAN RE target should contribute to the country's overall goal of reducing greenhouse gas (GHG) emissions intensity of Gross Domestic Product (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 conditional upon receipt of climate finance, technology transfer, and capacity building from developed countries.

Be that as it may, coal-fired power plants are still the main source of electricity in the country that contribute to GHG emissions, which may increase to ~60% by 2020. There has also been an increasing concern for stranded carbon assets globally. Will this increase in carbon assets not run the risk of being stranded or crowd out the need for more RE in the generation mix?

Hydropower plants play a key role in providing a balance to the electricity market as more variable RE, such as solar, is injected into the grid.

"We are very much aware of the need to have a diversified and balanced energy mix. For the power sector, we are confident that we can support the government's commitment under the Paris Agreement.

"In fact, based on our planning, we stand guided by the Herfindahl-Hirschman index (HHI) of not more than 0.4. That means we will be reducing the coal generation capacity, and at the same time gradually increase the share of gas and RE in the fuel mix - but it would increase the extra cost to the system," Zaini asserted.

Despite the aforementioned issues of intermittency, solar photovoltaic (PV) remains as one of the main sources of RE in the country. Malaysia targeted 9% of the total installed capacity of RE to be from solar PV by 2020 under the 11th Malaysia Plan. Appropriately, KeTTHA has put in place several initiatives such as Large-Scale Solar (LSS), Net Energy Metering (NEM), and also the Feed-in Tariff (FiT) to encourage the growth of solar energy in the country.

"One of the key outcomes of the FiT scheme is that we observed solar PV to have the highest take-up rate compared to other RE sources. Currently, solar PV represents 67% of the total capacity commissioned under FiT. That is 338MW out of the 508MW commissioned under the FiT scheme, way beyond the 9% target of solar PV from the total installed capacity of RE," said Zaini.

Furthermore, 450MW of solar capacity has been awarded under the LSS programme which was introduced by the government last year. KeTTHA has received a lot of applications from committed RE developers to participate in the programme. The condition set by the Energy Commission which requires all bidders to pay a Performance Bond to register their interest guarantees a more serious involvement from the private sector. If a bidder fails to implement the solar project, their Performance Bond will be forfeited.

"The amount of the bond can go as high as RM 10 million. We see that many companies are very interested to be a part of government solar initiatives. However, as much as we want our people to embrace solar power, we must be mindful of the fact that too much solar power in the system can create instability to the electricity supply system," Zaini cautioned.

"The issues of intermittency, the readiness of the grid system, and the cost of planting-up will have to be addressed if we are to put more solar power into the system. The threshold for solar power in an electricity grid is 15%. Beyond that threshold, a lot of effort will have to be instituted to ensure that the electricity supply system remains robust.

"Therefore, the Ministry together with the Sustainable Energy Development Authority (SEDA) Malaysia and the Energy Commission are finding ways to address those issues," he added.

Presently, the NEM and LSS programmes have solar PV quota allocations until 2020 whilst FiT will eventually organically exit to give way to these programmes. Against this backdrop, Zaini thinks that plans by KeTTHA to scale up RE in the energy mix beyond 2020 needs a paradigm shift on the country's part.

"In Malaysia, we have sufficient RE technical potential to meet the electricity needs. At the macro level, there is a need to change the electricity system market from baseload to a combined energy and balancing markets. A whole new paradigm of the electricity system is required.

"For this reason, the energy transition is so-named because such a transformation cannot happen overnight, but through years of planning and commitment," Zaini reasoned.

Some characteristics of a new energy paradigm includes decarbonisation through the use of RE, decentralisation, digitalisation such as the smart grid and the use of blockchain technologies, and democratisation.

Will Malaysia be able to move towards a change in mindset in order to embrace the new energy paradigm, and additionally discard the present baseload electricity market and migrate to one that is made up of liberalised energy and balancing markets? Time will tell, but Zaini is optimistic and has faith in the country.

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ASTANA EXPO 2017

Ongkili invites global players to create Green Future with Malaysia

KeTTHA Minister YB Datuk Seri Panglima Dr. Maximus Johnity Ongkili (left) with Kazakhstan Vice Minister of Energy Gani Sadibekov during the MoU at the Malaysia Energy Forum, Astana EXPO 2017.

In front of an audience comprising private and government organisations from around the globe, among others, Minister of Energy, Green Technology and Water (KeTTHA) The Honourable Datuk Seri Panglima Dr. Maximus Johnity Ongkili and Rapil Zhoshybayev, Commissioner of EXPO 2017, officiated the opening of the Malaysia Pavilion at EXPO 2017 in Astana, Kazakhstan on June 10.

Accompanying Ongkili were several country commissioners and senior officials from KeTTHA and its agencies.

Over 150 entities participated in various activities lined up to promote and showcase best practices and what Malaysia has to offer in green energy. Malaysia's own delegation included 62 speakers and 94 private and government organisations. EXPO 2017, themed "Future Energy," runs until Sept 10.

"Malaysia is the most forested emerging market among the world's top 100 nations. So naturally, Green Growth is in our nature and we plan to prove to the world that emerging markets like Malaysia can and should be leaders of green growth. I am confident that the Malaysia Pavilion will inspire action towards a green future. And with today's opening, we are officially inviting the world to create a green future with Malaysia," Ongkili stated.

The Malaysia Pavilion serves a dual purpose for business matching as well as showcasing Malaysia's green growth and our culture that makes "Malaysia, Truly Asia." Carrying the theme of "Powering Green Growth," the Malaysia Pavilion showcases our country's journey towards a green future through five main sections: 1. Powering the Nation, 2. National Transformation, 3. Empowering the Vision, 4. Energy of Harmony, and 5. Malaysia Business Centre.

In the spirit of unity and collaboration, Malaysia and Kazakhstan also signed a Memorandum of Understanding (MoU) on bilateral cooperation in the field of green technology just two days later on June 12. Ongkili and Gani Sadibekov, Kazakhstan's Vice Minister of Energy, signed the MoU at the Malaysia Energy Forum held in conjunction with EXPO 2017. This MoU should contribute to the RM1 billion in trades and investments that our country aims to secure at EXPO 2017.

The Malaysia Energy Forum theme was "Tapping the Potential of the ASEAN Energy Market," attended by 150 delegates including government officials, corporate leaders, and advocates in the energy industry. The Forum was one of the many programmes organised by our country to showcase the nation's emerging market leadership in Green Growth. It was a platform for vibrant discussions centred on how ASEAN countries can balance their energy needs to meet a growing economy and institutionalising the climate agenda in their energy policies.

"We believe that the future lies in sustainable energy. We want to fully utilise our resources to achieve the vision of a nation driven by sustainable energy. ASEAN as a region must continue to strengthen regional cooperation especially in sharing best practices in energy development and utilisation in order to increase its effectiveness in facing global challenges," commented Ongkili, who was also one of the Forum panelists.

On the same day, Ongkili also announced Malaysia was pledging to add one watt of solar generating capacity for every one social media post that inspires Green Growth and helps to propagate the #MyButterflyEffect campaign throughout EXPO 2017. He invited his counterparts from the over 100 nations participating at EXPO to join the 1 Post = 1 Watt pledge. This call-to-action was yet another programme organised by our country for EXPO 2017 to evince our market leadership.

"We believe that the future lies in sustainable energy. We want to fully utilise our resources to achieve the vision of a nation driven by sustainable energy..."

By the second day, it was recorded that the Malaysia Pavilion was visited by 4,942 participants, a very successful and encouraging opening. On the first day alone, the Malaysia Pavilion welcomed over 15 ministerial officials and EXPO commissioners from Thailand to South Africa. Many were impressed with the renewable energy projects highlighted in the Pavilion, such as the solar farm that works doubly for electricity generation and agriculture.

A representative giving a brief explanation to The Honourable Minister at the Malaysia Pavilion.

"They were impressed with our rainforest immersion being incredibly lifelike, and said our content on renewable energy, sustainable growth, and energy efficiency to display Malaysia's measures to decarbonise our economy was inspiring, informative, and of quality. They also liked how our showcase was not just a hard sell, but incorporated our cultural demonstrations and Malaysian cuisine when the Pavilion tour ends with a taste of Malaysia for the visitors," Ongkili shared.

The focus of the first week of EXPO 2017 was on Renewable Energy (June 12-16), and a riveting week it was as our country identified USD1 billion worth of potential cooperation in energy projects between Malaysian companies and their Kazakh counterparts. Managing Director of Pekat Group, Chin Soo Mau, stated that the company's subsidiary, Pekat Solar Sdn Bhd, has been offered to acquire 75% of equity in a Kazakhstan government-owned company for USD10 million.

"We are keen to acquire equity in this government-owned company, subject to terms and conditions. It involves a 250MW solar project in Kazakhstan valued at USD250 million. There is good potential in this acquisition as the Kazakhstan Government is increasing renewable energy into its power generation mix. This equity purchase will be Pekat Group's biggest investment overseas," said Chin, adding that Pekat was expected to sign a non-disclosure agreement with the company the following week.

A total of 27 Kazakh companies and seven Malaysian companies attended the first business matching session held in conjunction with the Renewable Energy Week.

In the same Week, SEDA Malaysia hosted a panel discussion on "Energy Transition for Developing Countries: Challenges and Strategies," moderated by Catherine Ridu, CEO of SEDA, with panelists from Tenaga Nasional Berhad (TNB), Sarawak Energy Berhad (SEB), Malaysian Photovoltaic Industry Association (MPIA) and Sabah Electricity Sdn Bhd (SESB).

Key issues on energy transition were discussed among the panelists, including the integration of large-scale variable renewable energy. Panelists did come to agree that Malaysia should encourage more distributed renewable power generations via existing mechanisms such as the Feed-in Tariff (FiT), net energy metering (NEM), and self-consumption.

Gladys Mak, FiT Director of SEDA, also presented a case study of FiT in Malaysia during the first week. Participants of the talk were given a walkthrough of how FiT was chosen as the catalyst for renewable energy in Malaysia and where the nation currently stands in the industry.

The key impact from FiT is that our country experienced growth seven times, from 65MW of renewable energy prior to the introduction of FiT in 2011, to 500MW with FiT today. Another stand-out effect from FiT in place is that the cost of solar PV has significantly reduced over time at about 63% (from USD4,443 [RM19,000] in 2011 to USD1,647 [RM7,000] in 2016).

EXPO 2017's second week on Energy Efficiency (June 19-23) saw our country's representatives continuing to advocate for Green Growth. Malaysia has recognised that energy efficiency is essential to ensure sufficient, reliable, affordable, and a sustainable energy system for the future. Under our National Energy Efficiency Action Plan (NEEAP) of 2015, we are aiming to reduce our electricity consumption by 52,233GWh (8%) over a 10-year period and thus reducing carbon emissions by 38 million tonnes CO_2eq by 2025.

On June 20, the Energy Commission of Malaysia moderated a talk on "Accelerating Energy Efficiency for the Future," followed by a session on the "National Energy Efficiency Action Plan for Malaysia." On June 21, SEDA held a talk on the "Implementation of Energy Efficiency Initiatives in Malaysia." Besides these Initiatives, SEDA has also developed its own Sustainable Low Carbon Building Method and matrices for improving buildings' demand-side management and reducing their operating costs.

Universiti Teknologi Malaysia discussed "Transformation Towards Energy Management System" on June 22, while the Energy Commission of Malaysia shared its views on the challenges Malaysia will face in managing energy efficiency in 2017. The next day, Universiti Teknikal Malaysia presented on the "Internet-of-Things for Energy Monitoring System with Demand Response Applications."

Part of the programme on June 23 also showcased the GaN on GaN Invention and Development of Blue Light Emitting Diodes (LEDs) project that involves a scientific collaboration between key industry players and academia, including Universiti Sains Malaysia and the Solid State Lighting and Energy Electron Center at University of California, Santa Barbara (UCSB). This collaboration targets to produce high luminaire LEDs up to 250 Lm/W for 2" and 4" LED chips in Malaysia for the first time.

The third week of EXPO 2017 (June 26-30) proved to be productive as well, where potential collaboration in bio-based and innovation projects worth more than USD113 million between Malaysian companies and their counterparts from Kazakhstan, India, China, and Switzerland were identified. The business matching sessions held during the Green Innovation Week were organised by the Malaysian Ministry of Science, Technology & Innovation (MOSTI) at the Malaysia Pavilion.

Zainal Azman Abu Kasim, Project Director and Senior Vice-President of BioIndustrial, Bioeconomy Corporation, commented: "I am happy with the outcome of the Green Innovation Week and impressed with the eagerness of Malaysian bio-based and innovation companies to explore the Central Asian market. We had close to 34,000 guests visit the Malaysia Pavilion during this Week, and a total of 20 business matching activities that took place between all three agencies of Bioeconomy Corporation, SIRIM and YIM."

The Honourable Minister handing over SEDA's inaugural magazine to H.E. Syed Mohamad Bakri Syed Abd Rahman, Malaysian Ambassador to Kazakhstan, after his visit to the Business Centre.

SEDA Malaysia CEO Catherine Ridu (left) moderating the forum on Energy Transition for Developing Countries: Challenges & Strategies with MPIA, SEB, SESB and TNBR as panelists.

Early in the Green Innovation Week, Bioeconomy Corporation also announced on June 27 that Malaysia would soon be home to the world's first bio-based chemical manufacturing plant as industrial biotechnology company Verdezyne prepares for the groundbreaking ceremony of the Verde Palm Plant on July 30, 2017. The 20,000 square feet plant in the state of Johor will use palm oil to produce 10,000 metric tonnes of Dodecanedioic Acid (Diacid) per year, a much more environmentally friendly and sustainable alternative to petroleum-derived chemicals.

"This first-of-its-kind bio-based plant showcases Malaysia's readiness towards becoming one of the leading bioeconomy nations, and is an important milestone for the country as bioeconomy plays a key role in Malaysia's aspiration to become a high-income developed nation by 2020. To achieve this, the bio-based industry in Malaysia must step up, if not stay one step ahead, in the development of green and bio-based technologies and innovation," Zainal Azman observed.

In total, five MoUs were exchanged during the third week of EXPO 2017, including:

1. Ronser Biotech (a BioNexus Status company) exchanged an MoU with MEC LLP, appointing them as the exclusive representative to distribute Wastewater Treatment Solutions products and services, targeting to achieve USD20 million in market shares in three years into Kazakhstan and Central Asia.
2. Another MoU was signed between KazBiotechnologies with Ronser for treating sewage that is discharged into rivers.
3. iCYCLE Malaysia Sdn Bhd, which deals in online waste management applications and solutions from the source, sponsored by Multimedia University (MMU) 2016, exchanged MoUs worth USD250,000 with representatives from the Tianhe District, Guangzhou and Kerala, India.
4. Free the Seed Sdn Bhd, a manufacturer of biodegradable packaging made from rice husks and straws, exchanged an MoU worth USD30 million with Nusantara LLP, estimated to be realised in two years.

Climate change was the hot topic at the Malaysia Pavilion during the fourth week of EXPO 2017, the Climate Change and Sustainability Week (July 3-7). There were speakers from Governments, NGOs, international organisations, and private sectors discussing the initiatives and strategies in addressing climate change and sustainability in Malaysia, roles of key players and each level of stakeholders, as well as progress in pursuing green initiatives.

Malaysia has committed to reduce its greenhouse gas (GHG) emissions intensity of the GDP by 45% by 2030, relative to the 2005 base year levels. This involves a 35% voluntary reduction, while 10% is contingent upon receipt of climate finance, technology transfer, and capacity building from developed countries.

To that end, the Week kicked off with talks by the Ministry of Natural Resources and Environment, Malaysia (NRE) on our commitment after the 2015 Paris Agreement, with emphasis on the policies and mitigation actions that have been initiated and implemented by our country. This was then followed by a presentation on "Growth and Development in A Sustainable Future" by Malaysia's Economic Planning Unit (EPU).

On July 4, the Forest Research Institute of Malaysia (FRIM) shared the nation's plans to maintain its leadership position as one of the world's best performers in forest conservation through sustainable forest management, while WWF Malaysia spoke on "The Importance of Biodiversity in the Context of Climate Change and Sustainability."

There was also a business matching session on July 5 at the Malaysia Pavilion that aimed to connect Malaysian companies with their Kazakh counterparts in the green space to enhance their business networks. To address other challenges in "Pursuing Green Growth for Sustainability and Resilience," the NRE also moderated a panel discussion on the same day with key players from the Malaysian Government, NGOs, and business leaders from the private sector.

Hydropower took centrestage at the Malaysia Pavilion on July 6-7 when Tenaga Nasional Berhad Research (TNBR) presented a talk on "Ensuring Environment and Ecosystem Sustainability During Development of Hydroelectric Projects in Malaysia." At the same time, the National Energy University (UNITEN) discussed dam safety and sustainability, in addition to the Interactive Dam Safety Decision Support System (INSPIRE). The National Water Services Commission of Malaysia (SPAN) also presented on "Water Resource Management in Malaysia."

"After months of intense planning and preparation, the Malaysia Pavilion was finally open to the world to highlight Malaysia's green capabilities. We expect 200,000 visitors to explore the Malaysia Pavilion throughout the duration of EXPO 2017. Malaysia is in a position to inspire the world to stimulate green growth, and in these 13 weeks, we plan to do just that," affirmed KeTTHA Secretary-General Dato' Seri Ir. Dr. Zaini Ujang.

EPIC IS ALIVE!

Minister of Natural Resources and Environment launches Environmental Preservation and Innovation Centre – EPIC, the first Centre of Excellence for Waste Management in Malaysia

In the first issue of Transitioning the Nation Towards Sustainable Energy (TTNTSE) published in April 2017, Cenviro Group Managing Director, Khalid Bahsoon shared with us the company's vision and mission to extends its expertise with the establishment of Malaysia's first Centre of Excellence (COE) for Sustainable Environment and Waste Management, the Environmental Preservation and Innovation Centre (EPIC).

On the 17th of July 2017, the launching ceremony of EPIC took place in Cenviro Eco Park in Sendayan TechValley, Seremban Negri Sembilan. The building was officiated by Natural Resources and Environment Minister, YB. Dato Sri Dr. Haji Wan Junaidi bin Tuanku Jaafar.

EPIC is an integrated training centre that is dedicated to waste management in Malaysia. 5.4 acres of land has been allocated to the building, which forms part of an Eco Park set in 100 acres of land adjacent to the existing Kualiti Alam Waste Management Centre.

EPIC is a catalyst to our national interest to accelerate development in the waste industry.

EPIC's goal is to develop national and instituitional knowledge while also providing creative and reliable solutions for the complete spectrum of waste management and renewable energy.

EPIC stands on Four Development Pillars which include;

- The positive developments of the Human Capital
- Innovation and Advanced Technology
- A Green Economy
- And Environmental Awareness and Social Responsibility

In respect of certification, EPIC is partnering with the Chatered Institution of Wastes Management (CIWM) United Kingdom to establish the first chapter of Chartered Institute of Waste Management outside United Kingdom. The CIWM Malaysia has the recognition to certify and qualify the waste and environmental management workforce. This will also provide a professional establishment to the industry as the future voice to the government.

The EPIC building is designed by renowned architect Hijjas Kasturi has been certified with Green Building Index (GBI rating) with solar power on the roof and its construction is based on a bio-climatic design with green features such as rain harvesting solar and the use of recycled materials. This building is the 17th Platinum GBI in the country and the first in Negri Sembilan.

"We are excited for the EPIC journey. In line with our vision as the Heart of the Green Solutions Revolution, we pray that EPIC will meet its objectives to uplift the nation's waste management standards for future generations and move the waste industry to the new era of holistic waste management while promoting circular economy." said Bahsoon.

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We are committed to continuously caring for a cleaner and more liveable environment for generations to come. We are consistently developing and commercialising leading edge technologies in waste management, renewable energy and human capital development for future sustainability.

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ADVANCING THE RE AGENDA

SEDA must reinvent itself and create more urgency at all levels of society

Ir. Akmal Rahimi Abu Samah, Chief Operating Officer of SEDA Malaysia, started his career with Tenaga Nasional Berhad where he was involved in business development, design, construction, and project management for various power plant, substation, cogeneration, and other energy-related projects.

He remained there for 14 years before joining a few consultancy practices where Akmal undertook projects in the fields of power distribution system, renewable energy (RE), energy efficiency (EE), and cooling systems, providing both technical and financial advisory roles to his clients.

Prior to joining SEDA, Akmal was General Manager of the Special Projects Division at Malaysian Resources Corporation Berhad (MRCB). He was specifically tasked to establish and manage MRCB's district cooling business, where he was in charge of the planning, project execution, and operation of the plants.

This year marks the COO's first working anniversary with SEDA.

"The past year has been both challenging and interesting for me. Coming from the non-government sector, I had to adapt quickly to the intricacies of operating in a government environment. Luckily, with strong support from everyone in SEDA, this transition was made less painful and happened more swiftly," Akmal shared.

"I also had to get a good grasp of the workings of our FiT mechanism and enhance my knowledge on the RE technologies. My technical background and experience in the power industry did help to expedite this whole process of settling into the job."

Due to the nature of the FiT mechanism, Akmal finds that the greatest challenge he faces from the operational implementation of FiT is the management of the RE Fund.

"The RE Fund is really the lifeblood of our FiT programme. We have to ensure that the Distribution Licensees (DLs) collect Fund contributions on a monthly basis from electricity consumers efficiently. They then have to remit this money into the Fund as prescribed in the existing Acts & Regulations in a timely manner. This becomes the Fund's income," he explained.

After completing the monetary cycle, Akmal said income is then used to pay DLs when they claim against the differential cost i.e. the difference between the tariff and the displaced cost. This is also a monthly process, and to ensure that it is executed appropriately under the provisions of the Acts & Regulations, SEDA has to conduct audits on DLs. All of this is part of SEDA's responsibility under the Act, which in turn ensures that the Fund is properly ring-fenced and the FiT programme remains sustainable in the long run.

"Perhaps one of the most encouraging feedback I have received so far relating to SEDA's administration of FiT is the strong corporate governance we have in place. Transparency is important to garner the trust of our stakeholders, especially with regards to how quota is awarded and how the RE Fund is expended. To this end, SEDA endeavors to uphold governance via the sharing of information on our website and by being responsive to stakeholders' constructive feedback," he relayed.

However, as the FiT programme is in its final year of execution, the obvious query for Akmal - and SEDA in general - is, what now?

"That is a big question for me. I have been asking that question to myself and others, inside and outside of SEDA, to get some ideas on the path that we can take from here. Apparently, many people want more RE in the energy mix. Some are more passionate than others to see that our country goes in a big way in RE deployment - but challenges remain," he said.

"The electricity market needs to be liberalised, and we need to remove subsidies for fossil fuels. As a continuation in the government's push for more RE, the large-scale solar (LSS) and net energy metering (NEM) programmes were introduced last year. These would help to provide sustenance to the solar PV deployment in the country.

"But those are just short- and medium-term measures to scale up RE, and they are just on solar PV. A major policy change and clearer direction must be set if we are to see much larger RE contributions in the electricity mix, one that has a long-term view of the rapid growth of RE. From there, we can craft new programmes to achieve the desired results," Akmal reflected.

With the recent introduction of LSS and NEM and solar PV having the highest number of applications in the FiT programme, it cannot be denied that solar-generated electricity is the most convenient and accessible RE despite the high costs of its initial investment. To strengthen the industry, particularly in terms of overcoming the intermittency of the solar resource, Akmal assured that Malaysia is realising the importance of energy storage technology.

"It would definitely make a difference; it is one of the important elements required to have a bigger share of solar PV in our system. We are beginning to create the market for this and kickstart the adoption of energy storage on a broader scale," he added.

Also according to Akmal, energy storage will provide the crucial energy balancing system to overcome the variability of solar energy. Battery storage system is now undergoing the same trajectory in terms of price reduction and efficiency improvements that were once experienced by solar modules. Coupled with other energy balancing systems, the argument about the intermittency of certain types of RE can be put to rest.

As the country transitions from FiT to NEM, solar PV's role in the RE industry also grows - but not without hurdles. The start of the NEM programme seems to be plagued with a slow uptake, creating much frustration from service providers. Akmal thinks that a change in consumers' perspectives could help smoothen the transition.

"The general public thinks that there is not enough incentive in the programme. A lot of them still have the view of trying to make money through this programme. That is why when they find out that the rate for selling the excess energy is lower than the rate of buying the energy from the grid, they become disinterested.

We don't want to be left behind in the energy transition movement that is taking place all over the world.

"But if they look at it as a means of avoiding buying power from the grid when the solar PV system is generating energy, then it will be a different story altogether. The challenge then remains in comparing the cost of generating energy on their own to buying energy from the utility company. Since our electricity tariff is generally very low, it does not make for a favourable analysis for the prospective consumers - or prosumers, for that matter," Akmal observed.

He also pointed out that the other "drawback" of the programme is the fact that energy sold to the grid can only be counted as credit to the consumer; there is no cash transaction that the consumer can enjoy as "income" from selling the energy.

SEDA's current key targets for NEM are the handful of segments of electricity consumers who are supportive or stand to benefit from the programme. These segments include commercial consumers connected at low voltage levels as well as residential consumers with high energy consumptions. They both fall in the high tariff category, where replacing the energy bought from the utilities with their own generation makes more economic sense.

"The challenge for them though, is the upfront cost involved in the installation of the solar PV system. We are trying to address all these issues, together with the Energy Commission as the regulator for this programme," Akmal commented.

"One possible solution is through the solar PV system leasing programme. This is being worked out, and we hope to be able to crystallise the mechanism to implement this in the near future."

Another issue that cannot be ignored is the less-than-satisfactory return on investment (ROI) for residential NEM participants. One of the solutions Akmal identified requires the government reducing or removing the fossil fuel subsidy, and this in turn would most likely cause an increase in the electricity tariff. Such a practice has already been implemented in other countries where the residential tariff is high, thus the move towards solar PV becomes the natural choice for consumers.

"There has been some discussion about introducing some incentives to the residential consumers. The Ministry, through the Energy Commission, is coming up with a proposal to introduce a tax relief for individuals who invest in solar PV systems. We will have to wait and see what this proposal brings," Akmal added.

Indeed, there is a strong and ongoing global trend of having more RE in power generation. Akmal called the nation to be fully aware of this and to prepare itself for the impending change.

Malaysia is already preparing to utilise one of the main enablers for a larger RE share, in this case the smart grid. The utility company is steadily putting the infrastructure in place, though we have yet to see the full impact and capability of the smart grid.

Akmal noted that the real applications will come with the advent of smart grid technologies, where the power system will have more "intelligence" to accept and manage a larger share of RE in the system. This makes the system more dynamic, and it will be able to handle both technical and commercial complexities more readily which only augurs well for RE.

"We are also going to see lower prices for equipment, especially for solar modules and batteries. We have yet to see any noticeable impacts of electric vehicles to the grid system, and in turn the demand for RE due to this. Nonetheless, the drive towards more RE is unstoppable worldwide. Malaysia can't resist this trend. Rather than wait for it to come to our shores, we had better prepare ourselves and embrace it," Akmal pointed out.

Even a well-intentioned process like the advancement of the RE agenda requires financial aid in order to succeed. Currently, RE projects across the board are having difficulties with obtaining financing in the development of the RE industry.

"Some project developers are facing this issue. Lenders tend to assess the creditworthiness of the developers themselves, rather than the project. Therefore, it is crucial to develop industry players who have good track records and have the right technical and financial capabilities to handle RE projects," said Akmal.

"We try to assist them wherever we can. SEDA does this by engaging the project developers and the lenders in order to understand both parties better. Through the feedback that we receive, we are able to formulate better policies and design better mechanisms for our RE programmes. We are still learning from all of these experiences, but we must not take too long to change when things are not working well."

Additionally, Akmal stressed that SEDA needs to create more awareness, and more importantly, create more urgency at all levels of society so that the public can demand higher commitments from the government to advance the RE agenda.

"SEDA as the authority in RE pledges to push for a greater RE agenda in the country. All stakeholders should work in unison toward our common goal of reducing our carbon footprint. We should all be bolder in our targets and actions for RE adoption. We don't want to be left behind in the energy transition movement that is taking place all over the world," he cautioned.

Akmal continued: "SEDA must reinvent itself. We used to be the envy of other ASEAN countries in the development of RE. Today, many other countries like Thailand, Vietnam, the Philippines, and even Singapore have seen the rapid growth of RE in their respective countries.

"SEDA will need to push harder for stronger policies for RE development, and at the same time review current action plans and targets in this area. We might need to have a complete reassessment of the various RE potentials in the country. Some assumptions made a few years ago may not be valid anymore. This is where we have to go back to the drawing board and chart a new path for the development of RE in Malaysia."

#1

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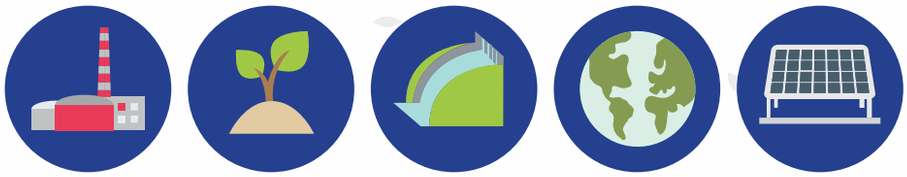
A BRIEF HISTORY OF **FiT IN MALAYSIA**



The Feed-in Tariff (FiT) is a policy mechanism whereby Distribution Licensees (DLs i.e. grid operators such as TNB, SESB, NUR, etc.) are obliged to buy electricity from indigenous renewable energy (RE) resources for a specific duration and at a fixed premium price.

FiT is legally enforced given that its implementation is mandated under the Renewable Energy Act 2011 (Act 725) which was gazetted on December 1, 2011. The Sustainable Energy Development Authority (SEDA) Malaysia established under the Sustainable Energy Development Authority Act 2011 (Act 726) is a statutory body tasked to administer and to implement the FiT mechanism.

By guaranteeing access to the grid and setting a favourable price per unit of RE, the FiT mechanism would ensure that RE becomes a viable and sound long-term investment for companies, industries, and also for individuals. Today, installations using RE resources derived from solar photovoltaic (PV), biogas, biomass, small hydro and geothermal power plants are eligible for FiT.

The signing of the Renewable Energy Power Purchasing Agreement (REPPA) between RE producers and DLs guarantees a fixed payment of 16 years for biogas and biomass plants, and 21 years for solar PV, small hydro and geothermal power plants. A pool of funds known as the Renewable Energy Fund (RE Fund) established under Act 725 ensures that FiT payments can be distributed to RE producers participating in FiT, known as Feed-in Approval Holders (FiAHs).

The FiT instrument is primarily designed to catalyse the increase in shares of RE in the national electricity mix, as a means to achieve energy security and combat climate change. Nonetheless, its impact on the socioeconomic development of RE is widespread. The FiT mechanism revolutionised the RE market whereby the demand from the private sector to develop RE installations grew exponentially. In turn, this led to a rapid rise of RE job opportunities, the expansion of RE in the education system, and greater awareness among the public in regards to the benefits of greening the energy industry.

In 2016, the maturity of the solar market and industry under FiT led to a policy shift towards Large-Scale Solar (LSS) and Net Energy Metering (NEM), which sets a more ambitious national target for the deployment of solar PV installations. Biogas, biomass, and small hydro installations will still continue to be deployed under the FiT mechanism until such a time when the respective technology reaches grid-parity, or until the RE Fund has been fully utilised to satisfy the resource potential.

As of June 30, there are already ~8000 power generators connected to the grid, with a total installed capacity of about half a gigawatt under FiT compared to only 65MW before FiT took off

CUMULATIVE APPROVED FiT APPLICATIONS BY RESOURCE (AS OF JUNE 30, 2017)

BIOGAS	BIOMASS	SMALL HYDRO	GEOTHERMAL	SOLAR PV
118 applications	**42** applications	**50** applications	**1** application	**11,786** applications
215MW capacity	**375.69MW** capacity	**389MW** capacity	**37MW** capacity	**438.59MW** capacity
14.75%	**25.82%**	**26.75%**	**2.54%**	**30.14%**

CUMULATIVE PROJECTS ACHIEVING COMMERCIAL OPERATION (AS OF JUNE 30, 2017)

BIOGAS	BIOMASS	SMALL HYDRO	SOLAR PV
28 applications	8 applications	6 applications	8,021 applications
52.02MW capacity	87.90MW capacity	30.30MW capacity	338.02MW capacity
10.23%	17.29%	5.96%	66.51%

To a certain extent, FiT has been successful in increasing the shares of RE for on-grid power. The mechanism has done what it was intended for - to catalyse RE, create a sustainable market, drive costs down especially for solar PV, while also creating an industry of RE-related businesses.

The targets set under the National Renewable Energy Policy and Action Plan (NREPAP) were ambitious and based on a 2% collection for the RE Fund. Critics will say that FiT has fallen short from these targets but then again, to be fair, we started off with only a 1% collection (initially without Sabah) and rising to 1.6% only in 2014 (with the inclusion of Sabah).

Considering all factors, the implementation of FiT has never been this successful in other countries around the region. We are only into the sixth year of its implementation, but we have already progressed to introducing other programmes for solar PV since FiT has successfully driven down costs for solar. We have also seen a sharp increase in biogas power plants - a non-existent phenomenon before FiT was in place.

The FiT instrument exponentially expanded the RE industry via the creation of new jobs, manufacturing companies, associations, and the like. The number of RE occupations increased from 5,154 in 2011 to 25,424 in 2017, and with this increase came the development of highly skilled workers in the field of RE.

SMEs in solar and biogas can now export their expertises and services overseas. We have seen a number of companies in the service sector, groomed under the FiT programme, exporting their services to neighbouring countries such as Singapore, Bangladesh, the Philippines, and other ASEAN nations.

Apart from that, we have also seen purely oil and gas servicing companies shifting towards the field of RE due to the increase in demand for biogas engines/boilers for biomass plants in the region as a result of FiT in Malaysia.

Prior to the introduction of FiT, our government initiated the Small Renewable Energy Program (SREP) under the 8th Malaysian Plan as a means to introduce RE as the fifth fuel. After nine years of SREP (2001-2009), the program only managed to add an additional 53MW of RE power to the grid. Today, with just over five years of FiT, the RE capacity installed under this mechanism has crossed the 500MW mark.

In the next installment of this section, we will discuss the FiT Division's experiences with each RE resource, namely solar PV, biogas, biomass, and small hydropower. We hope you stay tuned until the next issue.

Feedback for this article was provided by Gladys Mak (Director), Ir. Zamri Laton, Koh Keng Sen, Ahmad Syafiq, Rubita Hani, Frederick Wong, and Nur Haziqah of the FiT Division.

The Feed-in Tariff (FiT) Division, led by Director Gladys Mak.

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The Practicality of Going Green

A bird's eye view of Surau Darussalam and its solar panels.

Taman Nirwana is a neighbourhood in Ampang, Selangor that houses a cacophony of diverse developments targeted towards all walks of life, not unsimilar to the rest of the township. Also nestled within Taman Nirwana is Surau Darussalam, a small mosque that is frequented by the surrounding Muslim community.

Surau Darussalam became a Feed-in Approval Holder (FiAH) through its committee that had the vision and foresight to apply under SEDA Malaysia's community quota for solar photovoltaic (PV). As a FiAH community, the Surau is entitled to sell renewable energy (RE) at the Feed-in Tariff (FiT) rate, and this helps create income for its monthly operating costs of ~RM 10,000.

"We needed to expand to cater to the growing congregation. Since we were building an extension, I suggested the roof be solar panels," said Tuan Haji Abdul Malik Abdul Suban.

Pekat Solar Sdn Bhd was the service provider of choice when Surau Darussalam made plans to install a solar roof for its community. The company - among other things - imparted advice relating to the installation capacity, monthly energy generation, and monthly income based on that generation.

"The solar roof just seemed like a more practical solution compared to a zinc roof. Although the installation cost was fairly high, we could not overlook our long-term goal; we are now able to maintain a more steady income, and our monthly costs were cut down by a little over 50%," Abdul Malik reflected.

The installation of Surau Darussalam's solar panels came in at the tidy sum of RM 400,000. The generation of 48 kWh per month provides the Surau with ~RM 5,000, depending on the weather. Indeed, the Surau Darussalam community is one of the luckier ones in Malaysia as lack of funding always creates a barrier for most others to see their projects through.

According to Abdul Malik, the community was encouraged to apply for the project as the committee made them aware of the benefits of a solar roof. More inspiring is the fact that they also wanted to assist the government by doing their part in reducing their carbon footprint.

Though, as it always goes with change, the initial reaction of the community was one of doubt and they questioned the introduction of the project. Tuan Haji Mohd Yusoff Husain, Chairman of Surau Darussalam, also said that while most of the community and committee members were onboard, there were still others who could not quite comprehend the benefits.

"They did not understand why we were doing this, and there was a lot of resistance. But when we explained and justified the move to them, it sparked their curiosity and interest - and they are now intrigued," Mohd Yusoff continued.

"Our prayers now even take place in the shade of the solar panels."

Imam Haji Abdul Aziz Baiti took the time to express his deep appreciation for what SEDA has done for the Surau Darussalam community through this project, and the campaigning efforts they have made thus far through the use of print media and television advertisements. Yet, in light of the community's own initial reaction, he also believes that the organisation could gain from utilising different public awareness strategies.

"SEDA should probably promote RE through social media more; that is the era we are in now. The government could also offer tax deductions for individuals who install solar roofs for their homes, or any other types of incentives to encourage more people to participate," Abdul Aziz added.

IN IT TO GREEN IT

Pekat Solar Sdn Bhd ventured into the photovoltaic (PV) sector in 2006, and they have since grown in leaps and bounds to become a leading solar PV solutions provider in the country. The company has developed and completed a substantial number of landmarked projects under its belt, such as the 100-kWp installment for the Ministry of International Trade and Industry building.

However, Pekat is not a company whose only concern is to tap into the renewable energy (RE) industry - Pekat is in it to sincerely help along the RE agenda as a matter of environmental responsibility. This is exemplified in their ongoing engagement with the community surrounding Surau Darussalam in Ampang, Selangor. Pekat was introduced to the community through one of its business associates.

"Pekat practices good corporate citizenship through ways that serve the common good of the communities at large. We do this by transferring our expertise and knowledge to these communities," shared Adam Chew, Pekat General Manager.

Chew also believes that the Feed-in Approval (FiA) programme benefits the communities by creating a more sustainable living with clean energy. FiA becomes further successful with service providers like Pekat who maintain relations between the communities and the government i.e. SEDA Malaysia.

"In general, the majority of the nation is well aware of the current environmental issues the world is facing. As Pekat visits the communities, we share our knowledge on our government's policies, in this case the FiT programme," he said.

"We promote renewable and green technologies among the nation, and we help the public understand SEDA's function in assisting Malaysia to create a sustainable environment."

When the Renewable Energy Act was gazetted in April 2011 and the Feed-in Tariff (FiT) mechanism was implemented in December 2011, the RE market - particularly for solar PV - rose to a whole new level. Chew opines that the FiT policy was carried out in a successful and practical manner.

Nonetheless, there is always room for improvement, especially in regards to RE incentives.

"Currently, only commercial and industrial investments into solar PV are feasible. There are the Green Investment Tax Allowance and the Capital Allowance to provide them with a good return through the double tax exemptions.

"Our leaders should propose more incentives like tax exemptions to individuals, and perhaps even lower the capital investment into green technology," Chew suggested.

Left to right: *Tuan Haji Abdul Malik Abdul Suban, Tuan Haji Mohd Yusoff Husain, and Imam Haji Abdul Aziz Baiti in discussion with the Pekat Solar General Manager, Adam Chew at Surau Darussalam.*

Malaysia Energy Forum:

Tapping the Potential of ASEAN Energy Market

At the end of 2015, developing countries had joined developed countries in one accord to combat climate change by pledging their greenhouse gas (GHG) emissions reduction in the Paris Agreement. Studies have also shown that the greatest economic growth will be in the east i.e. Asian countries. On the 12th June 2017, the Ministry of Energy, Green Technology and Water, with the support from SEDA, organized a Malaysia Energy Forum with the theme, "Tapping the Potential of ASEAN Energy Market." The Forum was held in Astana Marriott Hotel, Astana, Kazakhstan in conjunction with the Astana EXPO 2017.

GREEN FUTURE MALAYSIA

Why the focus on ASEAN?

ASEAN is comprised of 10 nations and is home to approximately 625 million people. The combined gross domestic production (GDP) in 2015 was close to US$2.8 trillion and ASEAN is the sixth largest economy in the world. On a year to year basis, its GDP growth is estimated to be 5% per annum. The electricity demand in the ASEAN region is projected to increase at an annual rate of 5.8% over the next 20 years. It is also estimated that today 100 million people in ASEAN do not have access to electricity. Against this backdrop and drawing upon the theme of Future Energy for the Expo 2017, we believe there is a huge potential in the ASEAN energy market. While energy transition is a megatrend adopted by many countries, in the ASEAN region, coal and petroleum maintain strong foothold in the energy mix in both the electricity and transportation sectors. The key issues are centred on how ASEAN countries can balance their energy needs to meet a growing economy and institutionalizing the climate agenda in their energy policies.

THE WHO'S WHO @ THE ENERGY FORUM

1. Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of Energy, Green Technology and Water, Malaysia
2. Dr. Peter du Pont, Climate Change Team Lead, USAID Asia
3. Ir. Dr. Sanjayan Velautham, Executive Director, ASEAN Energy Centre
4. Mr. Frank Haugwitz, Director of Asia Europe Clean Energy (Solar), Advisory Co. Ltd.
5. Mr. Dan Millison, Manager of Transcendergy, LLC

Forum Chair: Tan Sri Ir. Dr. Ahmad Tajuddin Ali, Non-Independent Non-Executive Chairman of UEM Group and Chairman of ESOS Committee

KEY TAKEAWAYS FROM THE PANELLISTS

1. The Minister:
   - Aspirations for renewable energy in Malaysia, target of 50% of RE in the electricity mix by 2050;
   - Energy storage systems can help solar PV to scale up significantly in the electricity mix;
   - There are multiple strategies to achieve decarbonizing of electricity; there is a need to consider the climate agenda;
   - Baseload will eventually phase out in the future electricity market.

The Honourable Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of KeTTHA, one of the panelists.

2. Dr. Peter du Pont:
   - Energy transition is unstoppable catalysed by declining prices of RE and urgency of climate agenda.
   - Avoid policy intermittency; policies guiding the energy transition should be consistent and not intermittent in nature. This is to protect the confidence of investors who will invest in distributed RE power plants.
   - Work with utilities to transit to avoid the spiral death syndrome that is happening to power utilities in Europe.
   - Regulatory reform on electricity market is required to provide open access to greater deployment of distributed RE plants.

3. Dr. Sanjayan Velautham:
   - Open access is not limited to domestic electricity market but regional e.g. ASEAN Power Grid. The cross border electricity trading is important to provide the energy balancing market.
   - In order to manage the intermittency of variable renewable energy, it is essential to create an energy balancing market. The components of energy balancing markets can include:
     - » the traditional RE such as hydro, biomass, geothermal
     - » the generation fluctuation of VRE is inversely related to the spatial distribution of the VRE plants, the more widespread the VRE plants are, the less the generation fluctuation
     - » Energy Efficiency is still crucial in the energy balancing market

Tan Sri Ir. Dr. Ahmad Tajuddin Ali, Forum Chair.

4. Dan Millison:
   - The best way to avoid stranded assets are to stop planting up new fossil fuel power plants.
   - It is a misconception that imported coal helps a nation to improve energy security. The best energy security derives from energy sources which are locally available and renewable, and does not contribute to climate change.
   - There is no future in Carbon Capture Storage (CCS) but Carbon Capture and Utilization (CCU) may be more viable.
   - Digitization of electricity market includes blockchain technologies which are important component of Internet-of-Things (IoT), can support carbon credit trading, virtual power plants and energy storages (through aggregating a block of physical power plants/energy storages), and the smart grid.
   - Baseload will no longer be relevant in the future of electricity market.

5. Peter Haugwitz:
   - Chinese government is serious about curbing coal fired power plants. Last year the utilization of thermal power plants dropped by 199 hrs year on year to just 4,165 hrs, thus reaching a level not seen since 1964!
   - Energy storage is crucial in the energy balancing market; we have different forms of energy storage systems for different applications (e.g. intraday, long haul). Energy storage can be a solution where grid curtailment is high in China. Almost a dozen provinces still show prohibitively high levels of curtailments with Gansu Province taking the lead at 43%.
   - China sees a booming energy storage industry and market in the horizon. By the end of its 12th Five-Year-Plan (2011-2015), China was home to approximately 141MW of installed stationary energy storage capacity, representing an approximately 12% global share. This share is expected to increase in the course of the 13th Five-Year-Plan (2016- 2020) period.

Final Words

The future of the electricity system can be summarized in 4Ds: decentralized, decarbonized, democratized and digitalized. It is hoped that the outcome of the forum can be meaningfully internalized with the key stakeholders who will shape the future of Malaysia's and Kazakhstan's electricity markets.

"I aspire for renewable energy to reach 50% in the electricity mix by 2050... Baseload will eventually phase out in the future electricity market,"
Datuk Seri Maximus.

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FUTURE
MALAYSIA

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POWER SAVINGS WITH SOLAR PANELS

Solarvest Paves The Way For Malaysians To Profit From Solar-Generated Electricity Sales

Solarvest Energy Sdn Bhd started with only four employees in 2012, and in just five years they have proven to be able to play the solar game with an international expansion in sight.

The company first operated out of one rented space in Alor Star and has since set up offices in Kuala Lumpur, Seberang Prai, and additional offices in Alor Star. Solarvest now employs 80 individuals - and they expect sales to double this year.

"We worked hard to find a niche market that had been overlooked. And we found that market in the residential segment, where demand for solar projects was on a smaller scale compared to industrial solar projects," said Davis Chong, Managing Director of Solarvest.

The decision to refocus the company onto the residential market was an innovative move by management; competing with established players in the year of its inception would have seen the company's inevitable downfall. Due to Solarvest's marketing strategy that targeted the residential sector, the company was able to rise up and make its mark on the solar scene.

"Solarvest was the first photovoltaic (PV) engineering, procurement, and construction (EPC) company in the country to install solar PV systems for residential properties," Chong added.

Today, Solarvest is a solar power investment company that designs and installs sound solar PV systems to commercial, industrial, and domestic building owners in Malaysia through their trademark, the Solarvest solution.

Chong continued: "As a SEDA-recognised solar PV system installer, we offer smooth all-in-one services to ensure your investment is simple and fruitful. We're committed to drive Malaysians towards national energy security and naturally, we start by assisting our people to transit to renewable energy (RE) sources, especially solar."

The company strives to always begin their EPC services with a conscientious feasibility study on an intended solar PV site. Attention to detail and thorough analysis of the resources are practiced in order for the PV systems to generate the maximum energy yield for their investors. Not only does Solarvest fully customise a particular PV system, they also obtain the public generating license on their customer's behalf.

"This is followed by a worthy procurement process, through cherry-picking the best performing Tier 1 solar components for a project. Since 2012, we've developed stringent construction capabilities and expertise which are applied to the installation of a solar PV system. All these qualities don't just give our customers peace of mind, They also guarantee a neat and quick construction.

"While solar PV systems typically last about 30 years, we seek to ensure they function at peak performance throughout this duration. Hence, our advantage extends to comprehensive maintenance services, to help you keep the system as good as new!" Chong affirmed.

ET Solar, a partner of Solarvest, is one of the most reputable and reliable global Tier 1 solar energy solution providers in Germany. The company believes that the Germans' reputation of being the leaders in solar technology is attributable to their rigorous product expectations and their practice of employing only the best skills to ensure maximum energy yield.

In that respect, one of Solarvest"s best performing projects is a 1MW Building Integrated PV roof in Pokok Sena, Kedah which has outperformed the forecast at 4.5 sun hours. In one year, the system has generated an impressive 1,642.5MWh of solar energy.

"Solarvest learns from the best. From system designing to the procurement of main components, we perpetually adhere to the German standard to guarantee that our systems run at peak performance," Chong shared.

When the Feed-in Tariff (FiT) scheme was introduced by SEDA in 2012, Solarvest soon after began paving the path for Malaysians to earn passive income from the sale of electricity when they refocused their efforts on the residential market.

Many were sceptical of what was perceived as a "good deal" at the time, not to mention the hefty investment costs warded off many more. According to Chong, though, the adoption of solar power can reduce electricity bills quite significantly for both commercial and residential users.

"We also put much effort into educating the residential sector on the economic and environmental benefits that they can get from using solar energy," he added.

Indeed, it was a journey of faith, trust, and love for the environment that brought Solarvest's system owners together in this scheme.

"We helped SEDA convey their promises to the public and on our side, made sure all solar projects by our company are of the best quality and durability. These features keep our systems functioning at peak performance, and subsequently this guarantees Tenaga Nasional (TNB) bill savings."

Combined efforts under the attractive FiT scheme intrigued a significant portion of Malaysians to start installing solar PV systems. As a result, the solar PV market grew by leaps and bounds within four short years. As the market matured, Net Energy Metering (NEM) was then launched to benefit more industrial and commercial energy consumers.

"These commercial plants can self-consume the energy they produce to cut down on their utility expenses. SEDA has done a good job in encouraging the transition from conventional utility based on carbon sources to RE," Chong observed.

The amount of solar quota secured by Solarvest under both FiT and NEM alone was recorded at ~35MW. Moreover, the implementation of FiT started a domino effect of benefits received by the company, that extended (but not limited) to more experience and expertise in Malaysia to develop the RE market; job opportunities to retain talent in the country; and a steady income from Solarvest's own FiT solar farm.

Chong also finds SEDA to have many strengths that are helping to ease the transition towards RE, such as responsive support and guidance on RE industries, the technical know how that is required for such a transition, a vast operational network with government bodies, the ability to exercise fair judgment during a crisis, as well as timely solutions to disputes that manifest every now and then.

Certainly, there is always room for improvement, especially when it comes to a process such as expanding the RE agenda in the country. To that end, Chong is of the opinion that SEDA could partner with all learning institutions in Malaysia to install solar PV systems; RE systems should be a building requirement in all new structures; and SEDA could also create more marketing campaigns that are aimed towards educating the public.

Furthermore, as a country that is strategically situated close to the Equator, there is so much potential for Malaysia to grow the solar PV market. This is especially in terms of inducing more investors here, to establish more solar farms and develop the manufacturing industry while also boosting the national economy.

Solarvest is also poised to do some expanding of its own - the company currently owns about 13-15% in shares of the country's solar energy market. With years of experience catering to the local market, Chong believes that the company is now ripe for an overseas expansion. There is already a strategy in the works to penetrate the Southeast Asian solar energy market in the next two years. He also acknowledges that the Solarvest team has the right skillsets and synergy to put the company on the regional map.

"So far, all of our projects lie within Malaysia; the farthest we've gone is Sabah. Now that we have ample experience and networks in the Malaysian market and with authorities, we do look forward to also reaching beyond the Asia Pacific region.

"Solarvest is known for our insistence on quality and thus, we enjoy great trust with the local governing bodies. We believe that in all markets, expertise, ethics, and sincerity are the key to reliable services," Chong concluded.

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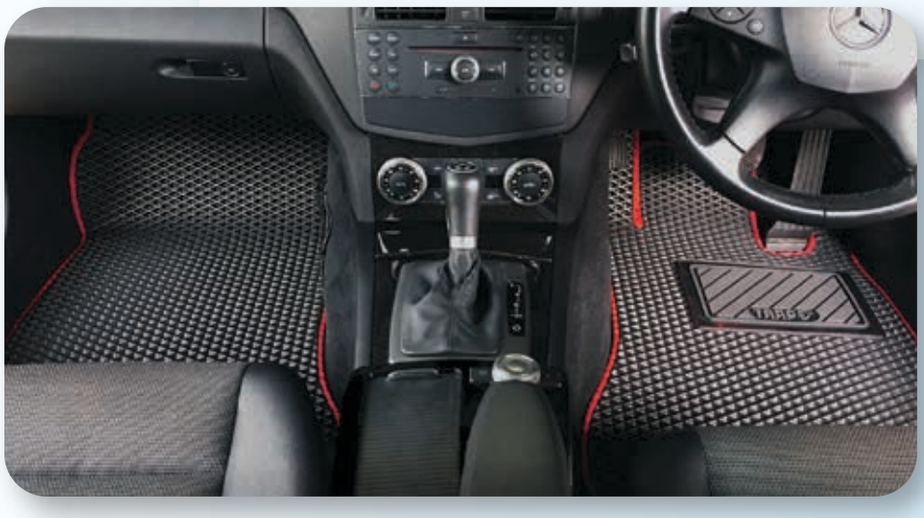

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SCAN

*Trapo Introduction Video

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Integral to energy management

SEDA appointed as the implementing agency to promote, facilitate, and process EACG applications

The Energy Audit Conditional Grant (EACG) is a special energy efficiency (EE) project in Malaysia cum incentive programme under the 11th Malaysia Plan (RMK-11), approved by the Economic Planning Unit of the Prime Minister's Department. The Ministry of Energy, Green Technology and Water (KeTTHA) acts as the executing ministry while the Energy Commission serves as the project's secretariat.

SEDA Malaysia was appointed by a Steering Committee in KeTTHA as the implementing agency on behalf of the government to promote, facilitate, and process applications from commercial building owners. Completed applications are submitted to the Technical Committee Meeting (chaired by the Energy Commission) for verification and later brought to the Steering Committee (chaired by KeTTHA) for final approval.

SEDA is also in charge of management duties as well as monitoring EACG for the commercial buildings sector. The main objective is to facilitate the efforts of large and medium commercial buildings in managing and reducing their energy consumption.

EACG is a three-year project ending in 2018. Any commercial building that refers to the electricity tariff commercial code and consumes more than 100,000 kWh/month is eligible to apply for the grant through the Energy Demand Management (EDM) Unit of SEDA. The Grant provides financial assistance to the building owner/management, in addition to covering the cost of the energy audit conducted by a registered energy service company (ESCO) in the building itself.

Furthermore, SEDA provides training for energy management and energy audit capacity building to key personnel working the commercial buildings. During the three-year implementation period, facilitation and assistance will be given to ensure the energy savings targets are achieved. This includes consultation and monitoring. We are also able to provide further financial assistance to building owners who have limitations in implementing energy saving measures, possibly through exploring the potential of energy saving performance contracting (ESPC) with registered ESCOs in Malaysia.

One of the benefits apply to the commercial building personnel who are actively involved in the project - they are eligible to apply to become a Registered Electrical Energy Manager (REEM) by the Energy Commission. As further appreciation for the endeavours taken on to reduce energy and carbon in buildings, SEDA plans to issue certificates of achievement based on the degree of energy and carbon reduction of each building. This is accessible through our voluntary initiative programme, the Low Carbon Building Assessment for Sustainable Energy (using GreenPASS).

Energy audits are an integral part of energy management activities; they require a systematic process to identify the current energy consumption pattern, set a baseline, and also identify the energy savings potential of buildings. The EACG programme provides a platform that facilitates building owners to implement energy saving measures based on the results of the energy audit report.

The commercial buildings sector is one of the largest energy-consuming sectors in our country, thus this EE programme has been identified as a key element in managing and reducing carbon consumption and emissions. EACG is expected to catalyse the implementation of the energy audit programme in Malaysia by providing evidence based on practical and viable executions of energy saving measures.

We also hope that awareness surrounding the benefits of the programme will increase, and that indeed they are replicable through this energy saving programme in the commercial buildings sector. This kind of situation will create confidence and serve as motivation for both building owners and ESCOs, not to mention the buildings sector as a whole, to make sustainable energy the common practice in Malaysia.

EACG should drive sustainable energy initiatives, particularly in regards to EE and the industry's investments related to the Low Carbon programme. As energy generation is the greater source of carbon emissions, the programme will assuredly have a significant impact on reducing carbon emissions in our country.

Energy audit in progress.

A technician inspecting an electrical circuit as part of the energy audit process.

By identifying the energy savings potential which is measured through the energy audit, the electrical energy savings achieved through the implementation of the energy saving measures proposed in the energy audit report will be in accordance with the Conditional Grant Agreement. This will help reduce electricity demand, which in turn reduces electricity generation and carbon emissions at the same time.

The main challenge lies with attracting interest from building owners to apply for EACG. Most of them are sceptical of the implementation of the energy saving measures after the energy audit is completed, much less achieve the energy savings target. SEDA is here to assure that the energy savings implementation project is not a new industry in Malaysia. Many organisations have taken part and are enjoying the benefits of the project.

To motivate and further facilitate commercial building owners, we conducted numerous briefing workshops to share the lessons learnt from past successful energy savings implementation projects, both in government and private buildings. These were products of a combined effort between KeTTHA, the Energy Commission, and GreenTech Malaysia.

So far, there have been 65 EACG recipients with diverse commercial buildings such as shopping malls, commercial offices, private hospitals, educational institutions, government linked companies, and statutory bodies (local authorities).

Based on the energy audits that have been completed, SEDA has identified that most buildings have energy savings potential that can be achieved within 15-18% of the common energy saving measures, if implemented within a three-year duration. Even with no cost measures, these also help to significantly reduce the energy consumption of certain buildings.

As with any other grant, there is an annual quota for the number of EACG recipients. The number varies each year as it depends on the budget approval SEDA receives from the annual RMK-11 budget.

The Energy Audit Conditional Grant is limited, administered on a first-come-first-served basis, and is eligible to those interested in and committed to reducing their energy consumption.

Details of the grant can be obtained at www.seda.gov.my/eagrant or by contacting SEDA Malaysia at rohaiza@seda.gov.my / 03-8870 5853 / 019-282 9102.

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PROVING THEY CAN ACCOMPLISH

CGE willing to invest to achieve the best quality in green technology

Left to right: Abdul Malik Mohd Hussin, Tan Sri Datuk Seri Mohd Hussin Abd Hamid, and Datuk Khairuddin Mohd Hussin.

There are industry benchmarks, but the goals that the company has set for itself is to strive to exceed these standards in order to develop top quality green technology and deliver customer satisfaction.

That is the principle Concord Green Energy (CGE) Sdn Bhd lives by.

"It is simply that we should be our own biggest critic in our pursuit for excellence," said CGE Executive Chairman, Tan Sri Datuk Seri Mohd Hussin Abd Hamid.

"We have to prove to ourselves first that we can do and deliver what we promise. If we can do that, CGE would be a major contributor in facilitating other parties and stakeholders, such as regulatory bodies like SEDA, in achieving the Malaysian Green Agenda," Hussin added.

With Malaysia being the second largest palm oil producer in the world, CGE decided to pursue a continuing collaboration with Felda in 2014. It is a natural decision for Hussin in view of his background as former Chairman/Director of several banks, which enables him to see first-hand the viability of biogas business propositions.

"Our country is blessed with huge oil palm cultivated lands. Hence, being a major palm oil producing country, prospecting for biogas in the palm oil industry is a natural course to take as it presents the best opportunity to promote production of biogas for conversion to green energy. It serves as an opportunity for us to advance the Green Agenda," said Hussin.

And the CGE story begins...

CGE Chief Executive Officer, Datuk Khairuddin Mohd Hussin, said palm oil is an available and renewable resource. The acreage of oil palm plantations is also increasing and since it is a non-depleting resource, the venture seemed like a good business plan.

The next course is to tap into Felda's resources as they are the largest plantation owner in Malaysia.

"THERE ARE SEVERAL RESOURCES BUT PALM OIL MADE THE MOST SENSE BECAUSE IT IS NOT DECLINING - RATHER, IT IS A KEY COMPONENT OF THE MALAYSIAN ECONOMY," SAID KHAIRUDDIN.

CGE receives all their feedstock from the palm oil mill effluents (POME) of Felda mills as they follow a structured system in their processing and producing, which then goes into CGE's biogas system facilities.

CGE, the developer for Felda's biogas project, is a subsidiary of Concord Alliance Sdn Bhd. The company has a very experienced technical team and is able to provide a full range of technical services as a one-stop centre. CGE has a full complement of Engineering, Procurement, Construction and Commissioning (EPCC) services, as well as Operations and Maintenance (O&M) capabilities for a biogas project. Construction of each biogas plant typically takes a period of one year until commissioning and revenue generation.

"As for the technology utilised by CGE, we aim for our biogas plant to be the reference project and benchmark for the industry. In view of that, we want to ensure quality is not compromised. For example, we have engaged and brought onboard Martin Campbell from KPSR Construction for the design and technology, as our technical director in the CGE Group. Secondly, notwithstanding the higher costs, we source our gas engine providers overseas - Europe to be precise - as we want to ensure that we only engage reputable gas engine suppliers," Khairuddin explained.

Currently, CGE is only operating within Malaysia but are keeping its options open. The priority for now, however, is to complete its projects with Felda which are expected to be commissioned and earning revenue in 2018. CGE has also signed with Tenaga Nasional (TNB) under the Renewable Energy Power Purchase Agreement to convert biogas into electricity and onsell the electricity produced into the national grid for a period of 16 years.

"When we operate mills around Malaysia, we are also creating job opportunities, not only for family members of Felda employees but also work and construction opportunities for local contractors at each location."

CGE is currently developing the biogas plant with power generation facilities for Felda in two phases. Under phase one, they are currently working on four mills - two each in Johor and Pahang, each producing between 1-1.3MWh.

Among the several other potential sources of revenue in the biogas industry, CGE believes that the quota provided by SEDA under the Feed-in Tariff (FiT) mechanism gives them a great deal of comfort and assurance of fixed income over 16 years. Through FiT, mill owners and developers can undertake biogas projects not only to comply with government regulations, but at the same time to be involved with income generation. Additionally, FiT also allows for an accurate projection of cash flow, which enhances accountability and transparency for the developer and all interested parties, particularly the financial institutions.

"SEDA plays a vital role as the forefront for direction, which is significant in implementing and expanding the RE agenda in the country. This is because the government is committed to promoting the Green Agenda, thus creating incentives such as grants, soft loans, and tax exemptions for industry players," Khairuddin commended.

"What we like about working with SEDA is that they are very dynamic with knowledgeable technical personnel coming from various backgrounds in the industry. As such, SEDA has been fully supportive of the developers and FiT quota holders. They take a proactive role in engaging with the developers and FiT quota holders to keep abreast of the progress of developments. To further SEDA's engagement with us, they also carry out Q&A sessions, open days and workshops, among many others.

"What I am saying is this - they listen to us. They are willing to understand and to empathise. So, it makes it easier for us to work," Khairuddin shared.

He also pointed out that the Malaysian Palm Oil Board requires that by 2020, it will become mandatory for all oil palm mills to have its own biogas facilities. One of the biggest challenges lies with the treatment of palm oil mill effluents (POME).

Under the conventional method, POME goes into the first pond, and depending on the size of the mills, overflows into a series of open ponding systems before the final discharge into rivers.

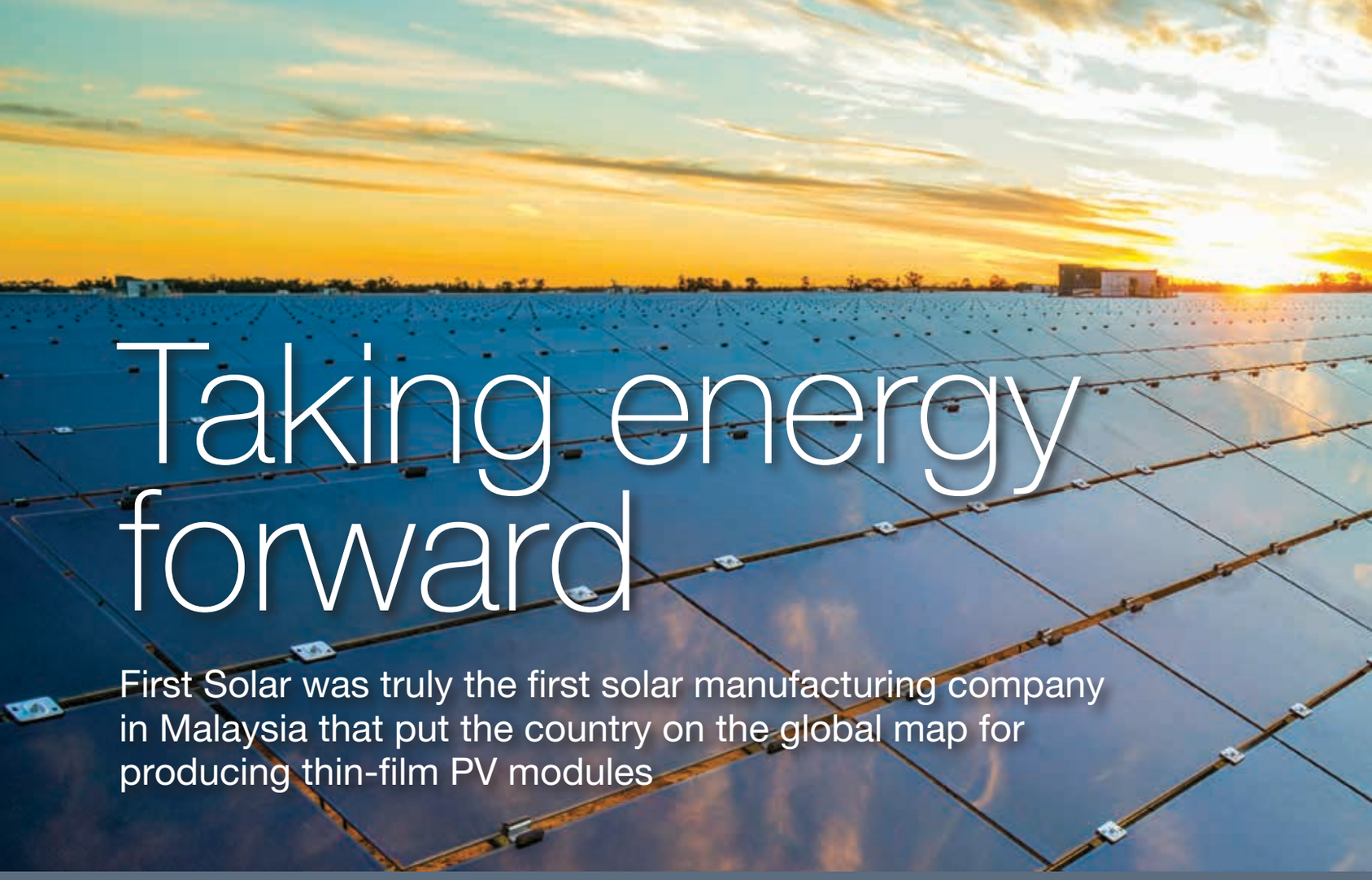
CGE provides several sustainable solutions for palm oil and industry waste management. This is to ensure carbon emissions are reduced through controlled methane capture systems. These reduce unpleasant smells, carbon emissions and air pollutions, and there is also significant space conservation. More importantly, they ensure a systematic and efficient waste management treatment.

And finally, does CGE have expansion plans beyond Malaysia?

"Presently, our projects are in Malaysia. We have had several enquiries from mill owners and investors in two other countries in the region to be involved in biogas projects. Our doors are always open to these possibilities but our priority at this point in time is to complete and operate our Felda projects well.

"In Malaysia, the legislation, policies, laws, and regulations are very structured and consistent. On top of that, we have various financial aids and government incentives to guide and assist the industry players, especially new start-ups in the industry," Khairuddin added.

CONCORD GROUP



Taking energy forward

First Solar was truly the first solar manufacturing company in Malaysia that put the country on the global map for producing thin-film PV modules

First Solar has been a player in the photovoltaic (PV) industry since 1999, and in that time they have developed, financed, engineered, constructed, and are currently operating many of the world's largest grid-connected PV power plants.

The company's presence in Malaysia is significant and their state-of-the-art manufacturing facility happens to be the world's largest high-technology manufacturing site, producing their self-developed and advanced thin-film PV modules. First Solar's manufacturing capacity stood at a substantial 2.4GW at the end of 2016, where the site currently produces the company's Series 4 modules.

"We're currently transitioning from our Series 4 to our new Series 6 product which will enable us to maximise the intrinsic cost advantage of our technology. Tool installation for Series 6 will begin in the fourth quarter of this year, running through the first quarter of 2018. Production is expected to start in the third quarter of 2018 through the fourth quarter of 2018, which will allow us to increase the capacity to more than what we've installed in the past," shared Dato' P'ng Soo Hong, Managing Director of First Solar in Malaysia.

When First Solar arrived and invested in Malaysia, there were no PV manufacturing facilities or industry technical experts in the country. The company was the first to bring in experiences such as the technology for Cadmium Telluride (CdTe) thin-film manufacturing, solar expertise, as well as suppliers from across the globe to localise in Malaysia. These, among others, contribute to the supply chain cluster and provide opportunities such as employment with the international suppliers that set up shop in the country.

"From these efforts, we created a multitier of upstream and downstream businesses for the local economy and industry. First Solar is truly the first solar PV manufacturing company in Malaysia. We brought in our technology and experts from the US to get our people trained in Malaysia. At the same time, we also sent our operators and technicians to the US and Germany for training. Fast forward 10 years, and today we have our own line of talent, our own engineers, and also high-volume, highly skilled manufacturing operators. This also contributes to the supply chain cluster and benefits the local industry," P'ng affirmed.

First Solar's experiences across the solar value chain promises to reduce risks while delivering more reliable, dependable, and cost-effective solutions to their customers. Apart from being committed to sustainable PV manufacturing, responsible construction practices, and environmentally-friendly products, the company also aspires to encourage further adoption of solar in Malaysia.

Although First Solar's export percentage is in the high 90s, P'ng commented that the company has always wanted to help Malaysia develop more solar farms. While there is the advantage of sales opportunities from developing solar farms and with solar being more common in the country, the company believes solar has a significant role to play in increasing Malaysia's renewable energy percentage in the country's energy mix.

"The energy mix is one of the very important factors. We're currently engaged in discussions with several stakeholders including Ministry of Energy, Green Technology and Water (KeTTHA), SEDA, and Ministry of Natural Resources and Environment (NRE) ministers to discuss the importance of solar's long term contribution and opportunities for scale to further contribute to the country's energy mix.

First Solar's Nyngan Solar Farm in New South Wales, Australia.

"The FiT programme is good as a kickstarter to overcome the initial market barrier, however, it's critical for any good FiT programme to have an exit strategy to make way for sustainable programmes to take over once a PV market is established."

"It's a healthy sign that the NEM programme is in place; it indicates some maturity in the PV market that is weaning off of artificial financial support. Another enabling factor to scale up RE in the country is education; a heightened sense of awareness will always be important. Awareness about the need to conserve our environment against the impacts of climate change while meeting national energy, food, and water security," P'ng reflected.

"At First Solar, our job is to also educate the general public especially on what PV is and how we can make others receptive to PV. Particularly, energy generation should not compromise food and water security which will be more crucial as the world's population increases and land mass decreases."

In addition to realising their mission statement of promoting PV awareness, First Solar's endeavours at providing a very strong helpline to universities and technical schools also serve as their way of contributing back to society. One of the ways this is executed is by First Solar partnering up with local universities to develop solar-related curriculum.

The company has also organised a few programmes for schools, and the public in general, that further help promote awareness especially among the younger generation of students. There have been solar-based competitions for students where participants assemble cars or robots which are then powered by solar electricity. Examples such as these illustrate that First Solar is committed to promoting PV awareness,

The company surpassed over USD 1 billion in cumulative spendings on research and development last year, which adds testament to First Solar's gravity as a company. This investment has been consistent over the last many years, compared to their competitors, and has truly allowed First Solar to improve. Just 10 years ago, First Solar's efficiency was at about 10%; today, it is at 16.9% for production modules.

"We actually improved sevenfold over the last decade or so - that's the main benefit of properly investing in R&D. Now, our competitors are improving as well, but not at the rate we are. There's a reason why we're quickly catching up to them, and to a certain extent we're performing better in certain countries.

"For example, in Malaysia, our product has a better temperature coefficient, better spectral response, and is robust against shading. All of these help to increase the energy yield by up to 8%, depending on the region," P'ng explained.

"At First Solar, our job is to also educate the general public especially on what PV is and how we can make others receptive to PV."

"See, our technology has been around for more than 15 years, but the crystalline silicon module market has been here for more than 30 years. Even though their technology is mature, that doesn't mean that it's better than ours. So because of the three factors that I mentioned earlier, they allow our modules to produce more energy even though our efficiency may be equal to our crystalline-based competitors. All of these give us different advantages."

Energy generation from solar PV systems have also been found to correspond well with peak energy demand, which usually occurs in the morning or the early afternoon when people are just starting or in the middle of their days. For this purpose, there are peaking power plants that run only when there is peak demand for electricity. The power that is supplied commands a much higher price because the plants are only operational for a short duration of time.

If a peaking power plant is only going to run for a short or a highly variable amount of time, the concept does not make economic sense and the fluctuating conditions would severely strain the equipment, too. To that end, solar PV power plants are ideal for this need because they will help reduce the need for peaking plants, as they generate electricity when electricity demand is highest.

The reduction of operating peaking plants translates to a lower electricity tariff as today's peak electricity is largely dependent upon natural gas, which still requires subsidies to keep the tariff affordable. However, this doesn't mean that one can immediately do away with gas power plants. In fact, gas power plants can come in very handy by providing flexible power generation when PV electricity generation is low.

"As an example, one of our projects, Copper Mountain I in Nevada, is located next to an existing natural gas combined cycle power plant. This hybrid solution demonstrates solar's potential to integrate and operate within a fleet of generation sources. This project won the Solar Project of the Year Award 2010," said P'ng.

"Our customers there save money on electricity because of this project, and instead of using fossil fuels, they're using solar. The farm doesn't need any additional resources except for sunlight which comes naturally and in abundance in Nevada - and the sun won't give you an invoice to charge you. It's all very affordable, and it helps our customers increase their profits because they only have to invest once in the beginning."

The quality of First Solar's PV modules has earned them a spot among four other modules in the world to pass Atlas 25+, the Thresher, and TUV Long-Term Sequential Tests. The company's product comes with a 25-year warranty which not many other manufacturers are able to match.

P'ng stated that all of this ties back to First Solar's mission to enable very clean energy, in an affordable manner, and a sustainable way for the people.

"The three keywords are affordable, clean, and sustainable. When we have all of these in our mission statement, it means that we will never compromise any of our quality controls in our manufacturing. If you want to enable the energy in a sustainable and an affordable way, the product has to be of the highest quality," he added.

In tandem with upholding their mission statement, First Solar is also continuously working out ways to support more low-cost manufacturing processes. This is so that the company will save money, in addition to them assisting these processes that put lower-cost products into the market.

With so many global solar manufacturers crowding the scene, all with their own product costs and energy pricings, First Solar strives to place the best, affordable price on their product. This price also needs to reflect the quality of the product and the project management as a whole. It is a fine balance as the company has responsibilities towards their investors and shareholders, too - the goal is always to make their product affordable, sustainable, and clean, but in order for them to do so they would need to generate returns.

The gist of First Solar's pricing strategy is to continuously bring down the costs of manufacturing in order to meet the market price. About 10 years ago, the cost was at $1 per watt. Today, it has reduced about 50-60% per watt. P'ng stated that this is a huge improvement on First Solar's part.

"PV pricing will always go down. It may stay stagnant for a while, but it will always go down because this is an open market. When you compete in the open market, prices will always be lowered," P'ng observed.

He also projected there to be very interesting discussions surrounding the future of Malaysia's energy mix.

"We still need to look at how the energy population reacts to it. This will have to come from the discussion on the next 5- to 10-year energy mix.

"We have a PM who is very committed to CO_2 emission reduction. As a country that is fast approaching the 'developed nation' status, there is a need to decouple the country's GDP growth from CO_2 emission growth. A country can transition from a brown to a green economy without compromising the environment," P'ng explained.

"This could be something for SEDA to look into and decide on how we can effectively transform the energy sector while protecting economic growth. Energy and economic growth is not a zero sum game; we can gain both economically and reduce our carbon footprint at the same time."

To the critics of solar's so-called intermittency, P'ng pointed out that Malaysia receives 1,600 hours of solar irradiance per year compared to Germany which receives only 900 hours (a figure he attributed as one of the worst for our country).

"If Germany can install 38GW of solar PV systems that benefit their people, why can't we do the same in Malaysia? Energy storage is an emerging technology that can help to scale up solar PV installations and moderate the grid. In this respect, I don't think it's right to say that solar is an unreliable source of electricity - this just shows that we need to promote more awareness and educate people to get them to really understand what five hours of irradiance per day can mean," he reasoned.

"We all know that solar panels won't function at night - that's a fact. The question is how do we improve our utility of the five hours when they do function. Perhaps it'll still have to adhere to the five-hour limit, because that won't change. But because of the technological improvements, we can get more energy yield. Five hours today and five hours in the future will produce different results. We have to act instead of complaining about perceived obstacles."

According to P'ng, while the community and the public in general have benefitted from FiT, how SEDA brings PV to the next level depends on their objectives and their charter. P'ng is of the opinion that SEDA needs to enable a process that allows the general public to apply solutions more effectively.

"FiT is good but it's not supposed to stay for long. NEM is the one with staying power as it doesn't depend on subsidies. In advanced countries, there are energy markets that support peer-to-peer solar power trading, virtual net metering, virtual power plants, and solar leasing mechanisms which advance the commercial models of solar PV.

"SEDA and the Energy Commission may have to look into the current energy market structure and explore enablers that bring the true value of electricity to the people, preferably those that are affordable, reliable, and environmentally responsible. SEDA needs to be more vocal and advocate for what they're supposed to do," P'ng concluded.

First Solar's Greenough River Solar Farm, southeast of Geraldton in Western Australia.

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 Malaysia.

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.

Chief Minister of Johor, YAB Dato' Mohamed Khaled Nordin and Secretary-General of KeTTHA, YBhg. Dato' Seri Ir. Dr. Zaini Ujang visited SEDA Malaysia's booth.

29-30 april 2017

Perkarangan Pasar Nelayan, Kg. Pasir Gudang Bharu, Pasir Gudang Johor

"Program Sungaiku Hartaku"

SEDA Malaysia together with other agencies of KeTTHA creating awareness on the importance of preserving the environment and natural resources particularly water resources and sustainable practises among local community and students.

1may2017

Pisompuran Square, Tambunan Sabah

Launching Ceremony of the Kaamatan Festival

13-14 may2017

Kota Marudu, Sabah

SEDA Malaysia's Open Day in conjunction with Kaamatan Festival

30-31 may2017

Kadazandusun Cultural Association (KDCA) Panampang, Sabah

Closing Ceremony of Kaamatan Festival

Besides celebrating the Kaamatan Festival with eventful cultural activities, SEDA Malaysia had the opportunity to engage the local community by promoting sustainable energy development to them. Among the activities were SEDA Malaysia Open Day and TN50 Aspiration. The event was graced by the presences of YB Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of KeTTHA and Tan Sri Datuk Seri Panglima Joseph Pairin Kitingan, Deputy Chief Minister of Sabah.

15 may2017

Le Meridien Hotel, Kota Kinabalu, Sabah

Renewable Energy Initiatives Briefing for Sabah and WP Labuan

The briefing that was attended by industry players, potential investors, and the public provided highlights on the Net Energy Metering (NEM) scheme and the Energy Audit Conditional Grant (EACG) for commercial buildings. Apart from that, a presentation by the Malaysian Investment Development Authority (MIDA) on tax incentives for renewable energy was also included.

The event was officiated by YB Dato' Sri Dr. James Dawos Mamit, Deputy Minister of KeTTHA, and accompanied by YB Dato' Sri S.K. Devamany, Acting Deputy Minister of KeTTHA.

5-8 june2017

Bangkok, Thailand

ASEAN Sustainable Energy Week

Event highlights during the ASEAN Sustainable Energy Week that was held in Bangkok, Thailand. Malaysia's delegation was led by YB Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of KeTTHA and accompanied by Ms. Catherine Ridu, CEO of SEDA Malaysia. It was a great opportunity whereby our delegation had the chance to attend fruitful bilateral meetings with the Minister of Energy of Thailand and also the Vice Minister of Energy and Mines of Lao PDR.

10 june- 10 september 2017

Astana, Kazakhstan

Astana EXPO 2017 at Kazakhstan
The Malaysian delegation including SEDA Malaysia and led by KeTTHA was proud to share the stage with over 100 nations, showcasing achievements and a vision on how we can best power our modern world.

It was an honour to demonstrate to the world that green growth is in our nature. The delegation was led by YB Datuk Seri Panglima Dr. Maximus Johnity Ongkili, Minister of KeTTHA.

19 july 2017

SEDA Malaysia Office, Putrajaya

SEDA Malaysia's Raya Open House 2017
A yearly and essential event by SEDA Malaysia celebrating Eid with our fellow staff, stakeholders and partners. The event was graced by the presences of Minister of KeTTHA, Acting Deputy Minister of KeTTHA, Chairman of SEDA Malaysia and CEOs of Agencies under KeTTHA.

12th ASIA CLEAN ENERGY FORUM (ACEF) 2017

The Future is Here:

A Special Coverage on Integrating Large Scale Variable Renewable Energy to the Grid

BACKGROUND

The 12th Asian Clean Energy Forum 2017 was jointly organized by the Asian Development Bank (ADB), USAID, and the Korea Energy Agency (KEA). The forum was held at ADB's HQ in Manila, Philippines from 5th to 8th June 2017. SEDA Malaysia's CCO, Dr Wei-nee Chen, was invited to be Track Co-Chair for Charting the Future of Clean Energy in Asia, and be a Session Chair in one of the 5 sessions under the Futures Track, and also the Chair in Session 2 under the 10th Asia Solar Energy Forum (ASEF) 2017. Ms Arnis Abdul Rashid from the Corporate Communication, SEDA was also at the ACEF. In this article, they recapped the highlights of a globally trending topic on a deepdive workshop (DDW) on Integrating Large Scale Variable Renewable Energy (VRE) to the Grid.

DDW: INTEGRATING LARGE SCALE VARIABLE RENEWABLE ENERGY (VRE) TO THE GRID

It's a foregone conclusion that only two variable renewable resources will scale up in the years to come i.e. solar and wind (GiZ). With these forms of intermittent energy source, new challenges arise when it comes to integrating large VRE to the electricity grid. For the past few ACEFs, sessions on this trending topic continued and this year, the session was moderated by Prof Dr Ing. Christoph Menke, a full professor for energy technology at the Trier University of Applied Science, Germany. The panellists were Ms Jaquelin Cochran, National RE Lab (NREL, USA), Mr Niels Ehlers, 50Hertz Transmission (Germany), Mr Kashish Bhambhani, Powergrid Corp (India) and Mr Frank Seidel, GIZ (Germany).

Under the new energy paradigm, baseload capacity is making way as increasing VRE 'eats away' the share of baseload electricity. The new energy paradigm embraces the creation of a flexible energy market (or sometimes called the energy balancing market). A study by NREL demonstrates the principles of the need for 'big and fast' flexible power systems. The frequently used options to increase flexibility can be seen in the exhibit below.

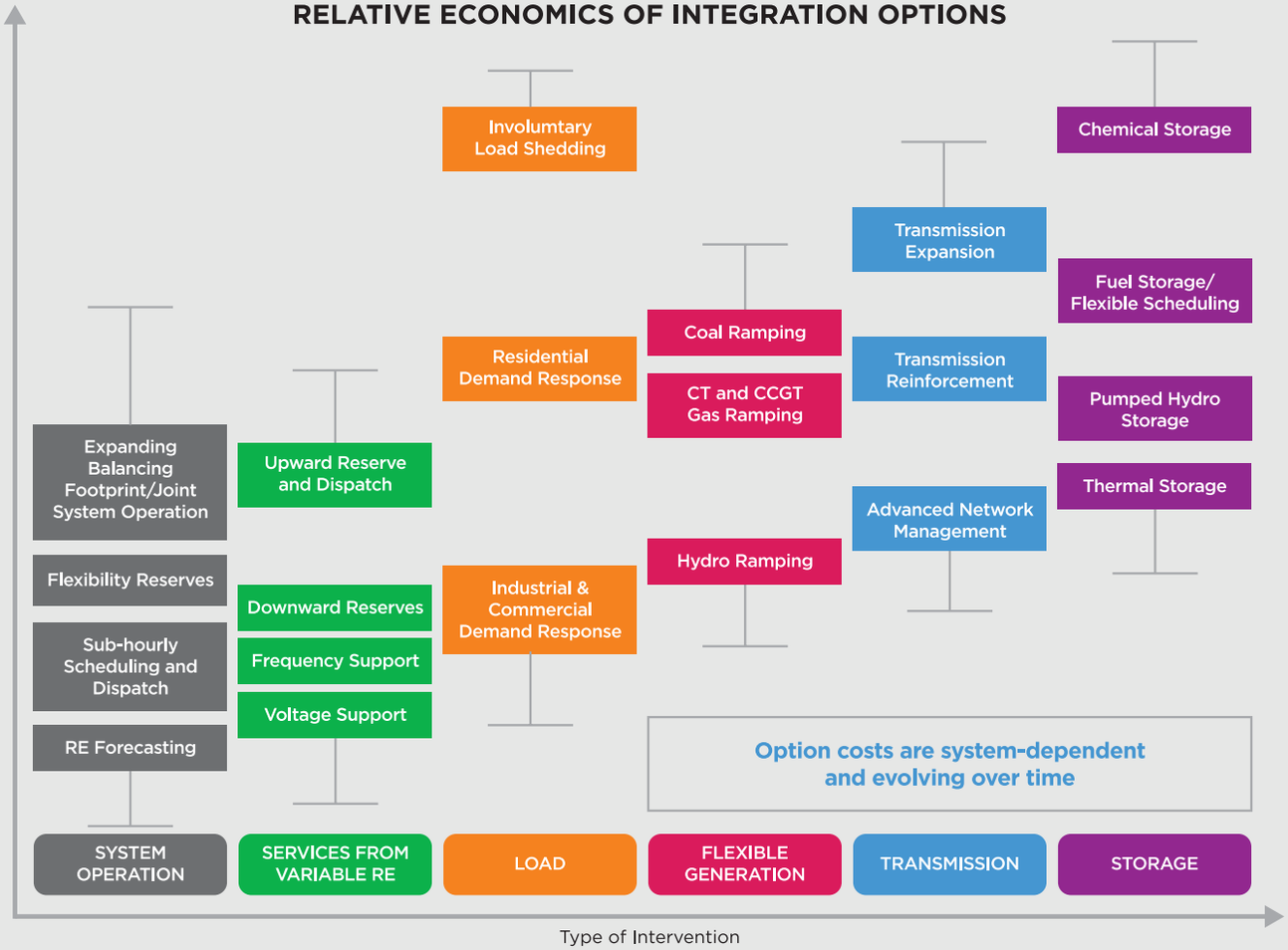


Exhibit Demonstrating Options to Increase Flexibility in the new Energy Market (Source: NREL)

Left to right: Dr. Hong-peng Liu, Chief of Energy, UNESCAP with Dr. Wei-nee Chen and Arnis Abdul Rashid of SEDA Malaysia.

Specifically, NREL broke the pathways of achieving flexibility into non-market and market mechanisms. The exhibit below shows the pathways to achieve the 'big and fast' flexibility via non-market mechanisms.

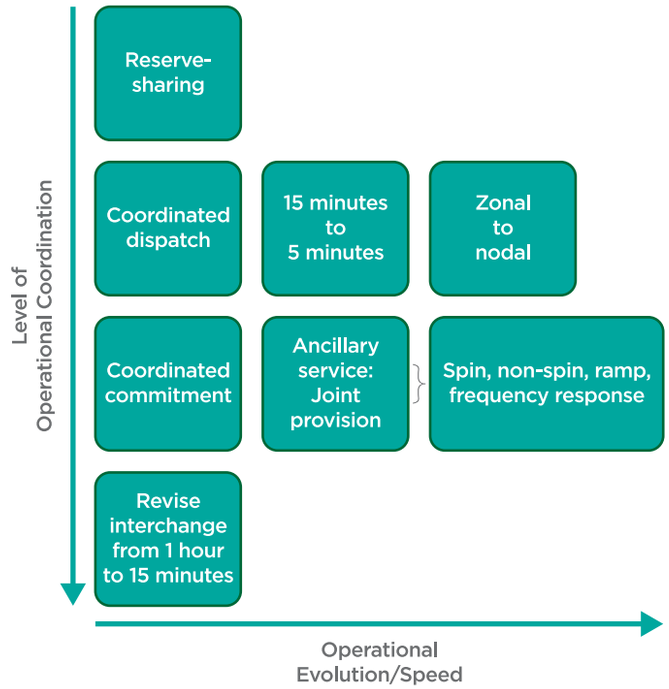


Exhibit Showing Pathways to Achieve 'Big and Fast' Flexible Power Systems via the Non-Market Mechanism (Source: NREL)

Mechanisms to achieve the 'big and fast' flexibility in power systems leveraging on market mechanisms include increasing balancing area footprint for example through aggregation and geographical diversity, increasing balancing area, and coordinate cross border reserve sharing, creation of an Energy Imbalance Market (EIM) and consolidated market operations. According to NREL, an EIM pools electricity generation within a region to balance the variability of electricity demand and Re resources. Other measures are to speed up dispatch, having faster interchange, and shorter gate closure.

50 Hertz, a German transmission grid operation (TSO) presented elements of a successful energy transition which are summarized in the exhibit below.

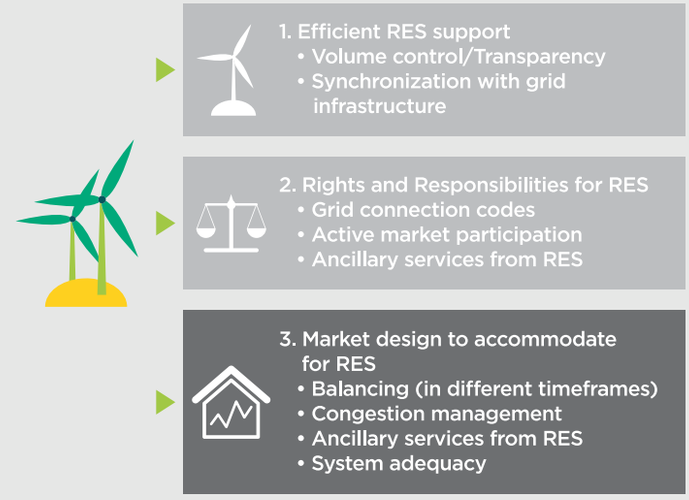


Exhibit Showing Pathways to Achieve 'Big and Fast' Flexible Power Systems via the Non-Market Mechanism (Source: NREL)

50 Hertz currently operates a grid system in Germany which has 26% of renewable energy in the electricity capacity mix and 47.8% of renewable energy share in power consumption. Given the high share of renewable energy in Germany's electricity grid, balancing the grid under various renewable energy volatility will require varying strategies (see exhibit below).

RES volatility	Implemented Solutions	
Days to Hours	• New auctions for **strategic reserves** • Contracting of **reserve power plants** • *Capacity market if necessary*	Grid Extension
Hours to Minutes	• International **market coupling** • Introduction of a **liquid intraday market** • Usage of **15-min products**	
Minutes to Seconds	• International imbalance netting (IGCC*) • Allow new market participants in the balancing market (battery storage, loads, wind turbines) • Dynamic allocation of balancing capacity	

*International Grid Control Cooperation

Exhibit on Balancing the Grid in Different Time frames (Source: 50Hertz)

Source: ACEF 2017, Asian Development Bank

Dr. Wei-nee Chen, Chief Corporate Officer, SEDA Malaysia.

Speaker from PowerGrid Corp (India) shared on the renewable energy management centres (REMCs) which are established to addressing the intermittency nature of VRE and facilitate grid integration. There are 11 REMCs in the planning; seven in states load despatch centre (LDCs), three at regional LDCs and one at National LDC. The key tool is to leverage on forecasting system on very short interval (15 minutes), day ahead, intraday and week ahead basis. Forecast is based on a combination and aggregation module with statistical combination of multiple forecasts using auto adaptive algorithms to help generate a blended and hence, more accurate forecast. This REMC is under phase 1 implementation with support from GiZ.

CONVERGING THEMES

There were nearly 200 presentations over the four days at the 12th ACEF 2017. There are several key themes that converge and resonate at the forum. The forum agreed that the global energy transition phenomenon is unstoppable; energy transition is not just about renewable energy; a successful energy transition requires multi-prong approaches spanning strong and consistent policies, technologies, financial and institutional changes. The discussion on energy transition cannot neglect the current carbon assets that have been invested. To prevent stranded existing carbon assets, there is a need to optimize these assets until the end of their useful lifespan; however, it is only prudent that the government has in place policies that discourages planting up of new thermal power plants (in particular coal and nuclear) to prevent such assets from being stranded. Also, the energy transition is not just about electricity, a true energy transition should factor in transportation as this sector contributes significantly to the global GHG emissions. When shall we start the energy transition? The time is now; we do not have the time to wait for perfect conditions.

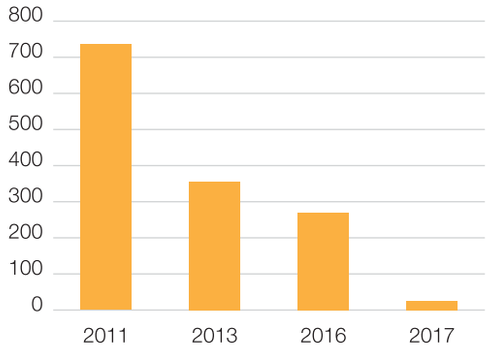
The Future for Coal is **Crystal Clear**; so is Solar PV

by Dan Millison, Manager of Transcendergy, LLC

Global Coal-Fired Power Plant Downward Growth Trend

The figure below summarizes projections compiled by the author beginning in 2011. The 2011 projections were consistent with various reports and government plans as of 2010-11; that projection was the 2011 business-as-usual scenario (BAU). The 2013 projections noted that coal import terminal and intermodal transshipment capacity were rate-limiting factors, especially for India. The 2016 projection was fully consistent with the IEA 2016 Energy Outlook that forecast net coal-fired growth of 2100 Terawatt-hours per year by 2030; dividing 2100TWh/y by 7000 hours per year of operation yields 300GW net capacity addition (see the 2nd figure and table below). The mid-2017 projection incorporates latest news from India and Indonesia, noted below.

Forecasts for Net Coal Fired Growth (GW)



China's growth scenario in early 2011 was for net capacity addition of 300GW. The projected net decrease of 150GW by 2030 is supported by observations from the Chinese government implying a surplus of electricity: according to the China Electricity Council, curtailment of hydropower, solar, and wind in 2016 was 110 Terawatt-hours (TWh).

Dan Millison, strong advocator of the energy transition.

India's BAU scenario for 280GW assumes that domestic coal supply continues to increase and there are no other supply chain constraints. The BAU scenario is based on 2011 scenarios for economic growth and expected share of coal in the mix. Import terminal and intermodal trans-shipment capacity was the rate-limiting factor on coal-fired growth a few years ago, but now the rate-limiting factors are growth of domestic coal output and government of India (GOI) willingness to enforce progressively more stringent pollution control standards (primary pollutants – not GHGs).

According to Asian Development Bank (ADB) report on Indonesia (Pradeep Tharakan, 2016), the 10GW called for in the first "fast track" program launched in 2006 has yet to be completed (maybe 8GW was in place by year-end 2015). Based on the experience since 2006, the 33GW of coal shown for Indonesia should logically be classified as "fantasy." As of early 2016, Indonesia was planning to add 35GW total capacity, but not all of that would be coal; as of mid-2017 the 35GW target has been revised downward (unofficially) to 15GW.

Vietnam's projection is probably the most realistic, but this additional capacity will mainly utilize imported coal which does not improve energy security.

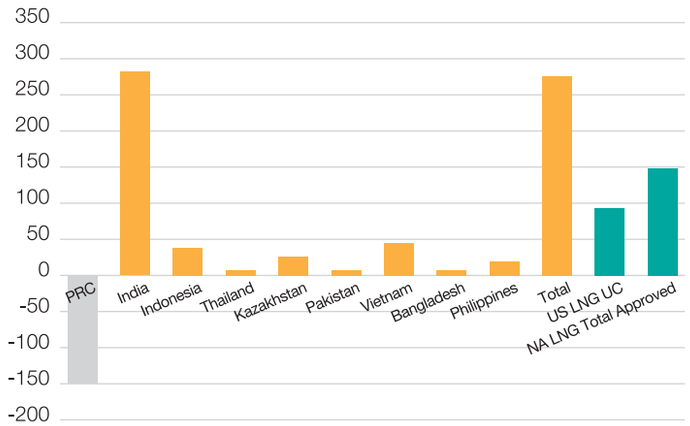
These projections were originally prepared for an ADB in-house effort in 2011, and have been updated periodically since then; the 2011 projection for net coal-fired growth was about 800GW, mostly in China and India.

Key references for the 2016 update are: Li Zhidong. 2014. Peak Coal in China: Rethinking the Unimaginable. National Bureau of Asia Research, Special Report No. 47, November 2014; this paper presents different scenarios, noting that coal use could peak in 2015; http://www.nbr.org/publications/element.apsx?id=792

Han Phoumin. 2015. Enabling Clean-Coal Technologies in Emerging Asia. 2015 Summit Working Paper. Pacific Energy Summit, Beijing, PRC.

The figure and accompanying table below shows an updated outlook as of June 2017 based on recent news from India and Indonesia, where coal-fired capacity increases are projected to be much lower than expected only a year ago. In India, no net increase in coal-fired capacity is expected beyond year 2022 after plants currently under construction are completed, so only 50GW of net capacity increases. Indonesia's total capacity addition is now only 15GW; the figure below assumes that all 15GW is coal, while in reality a large portion may be renewables.

Projection as of Mid-2016



GW = gigawatt, US LNG UC = United States Liquified Natural Gas under construction, NA LNG = all approved export projects in Canada and the United States. LNG exports from North America could cover about half of the projected coal-fired electricity output.

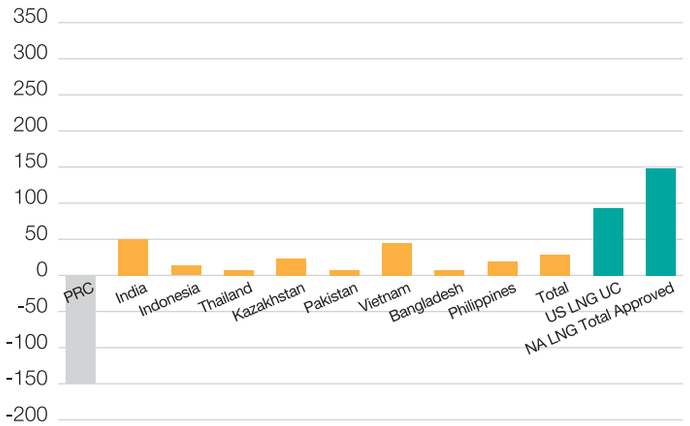
Source: background note for ADB IED 2016, updated analysis from: Millison. 2014. Energy Exploration, Exploitation, and Exports in the Indo-Pacific Region. In: David Michel and Ricky Passarelli (editors). 2014. Sea Change: Evolving Maritime Geopolitics in the Indo-Pacific Region, Stimson Center, Washington D.C.

The figure above is based on this table.

Projected coal-fired capacity additions through 2030 Scenario as of early 2016			
Country	**Capacity (GW)**	**Output (GWh/y)**	**GHGs (Million tons/y)**
PRC	-150	-1050000	-840
India	280	1960000	1568
Indonesia	33	228025	182.42
Thailand	10	70000	56
Kazakhstan	20	140000	112
Pakistan	5	35000	28
Vietnam	45	315000	252
Bangladesh	10	70000	56
Philippines	20	140000	112
TOTAL	**272.575**	**1908025**	**1526.42**

Total of < 300GW is consistent with IEA 2016 outlook of 2100 TWh/year increase in coal output to 2030.

"New Normal" Projection as of June 2017



GW = gigawatt, US LNG UC = United States Liquified Natural Gas under construction, NA LNG = all approved export projects in Canada and the United States. LNG exports from North America could cover about 400% of the projected net growth in coal-fired capacity.

The figure above is based on the table below.

NEW NORMAL Scenario - June 2017			
Updated projects for India and Indonesia			
Country	**Capacity (GW)**	**Output (GWh/y)**	**GHGs (Million tons/y)**
PRC	-150	-1050000	-840
India	50	350000	280
Indonesia	15	105000	84
Thailand	10	70000	56
Kazakhstan	20	140000	112
Pakistan	5	35000	28
Vietnam	45	315000	252
Bangladesh	10	70000	56
Philippines	20	140000	112
TOTAL	**25**	**175000**	**140**
US LNG Under construction	97		
NA LNG Total Approved	150		

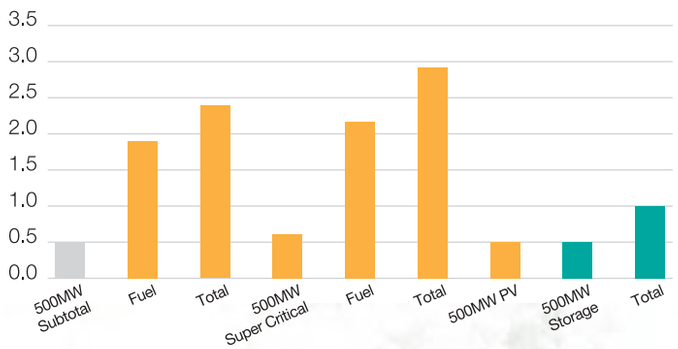
Total of 25GW is well below IEA 2016 outlook of 2100 TWh/year increase in coal output to 2030.

Global trends in RE system costs and Levelised Cost of Energy (LCOE) indicate that coal will continue to lose share. The only way for coal system costs and LCOEs to decline below those for utility-scale solar is if old plants in the PRC and the US are decommissioned, sold at salvage value, reconditioned, and exported to DMCs. In this instance, installed costs might be as low as $200,000/MW, about 1/5th the cost of new state of the art coal plants, but there are no media reports about this type of hardware transfer happening at scale.

Large-scale efficiency gains and other demand-side interventions could further reduce the need for new generation, and in any case could postpone some planned capacity expansion. E.g., research by University of Texas at Austin for the Electricity Reliability Council of Texas (ERCOT, the independent system operator for the Texas grid) noted that large scale penetration of solar energy would increase grid management costs by $10 million/year but result in $900 million / year wholesale cost savings (a simple 9:1 return). ERCOT has 7.7 million smart meters installed in Texas now. Installation of 7 million smart thermostats (e.g., the NEST thermostat) would cost about $2 billion but would avoid the need for 10-15GW of peaking capacity which would cost at least $1 Billion/GW; potential return of 5:1 to 7.5:1.

Policy-makers, regulators, and planners need to ensure that generation alternatives compare apples to apples. Comparison of net present values (NPV) artificially favor coal and gas because fuel cost is discounted and the life cycle cost appears lower than RE (e.g., geothermal, solar, and wind). With declining cost of storage it is possible to deliver firm solar and wind at competitive installed prices. NPVs should be calculated assuming that all fuel is paid for in advance. The graphic and table below show a simplified example (without discounting).

Apples to apples cost of coal vs solar + storage ($ billion)



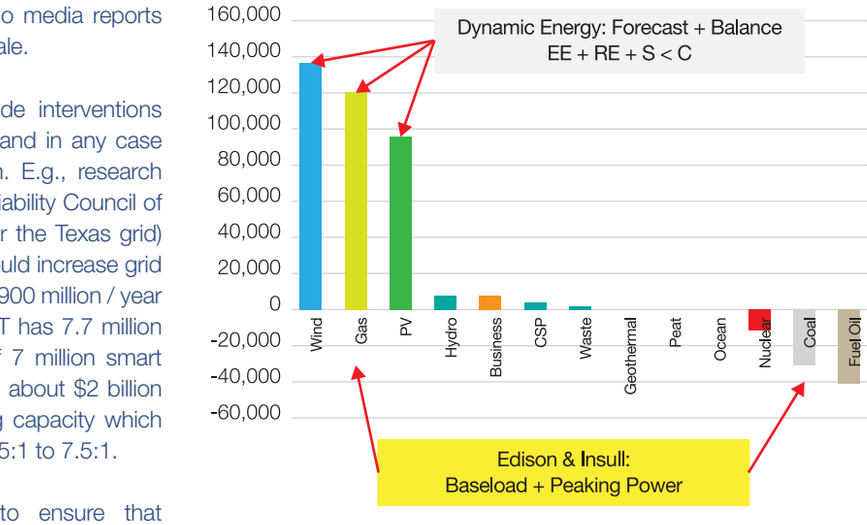
Assumptions for figure above.

500MW subcritical	$1 / Watt
Fuel	30 years, 1.25 M t/y @ $50/t
Total	$2.375 billion
500MW supercritical	$1.3 / Watt
Fuel	30 years, 1 M t/y @ $75/t
Total	$2.9 Billion
500MW PV	$1 / Watt
500MW storage	$1 / Watt
TOTAL	**$2 billion**

The Start of an Energy Transition

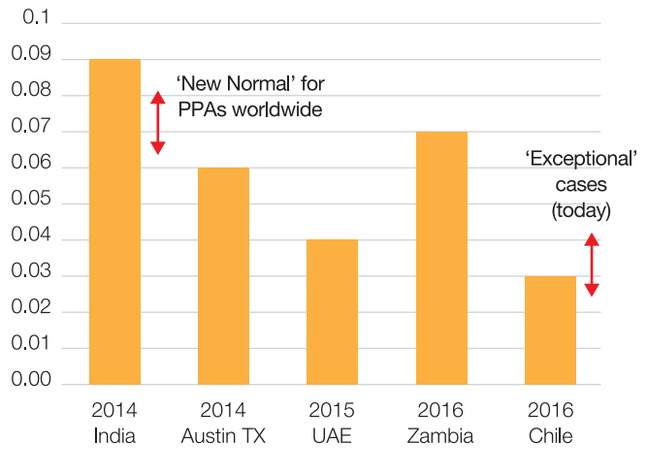
The transition from baseload + peaking to dynamic system has happened in the EU as illustrated below.

EU Net Capacity Addictions 1995-2015 (MW)



The impact of tendering on prices for large-scale solar projects is shown below.

Solar PV is already at or below coal parity



The outlook for dinosaur utilities that think power plants running on dinosaur poop are still necessary.

"... Malaysia intends to reduce its greenhouse gas (GHG) emissions intensity of GDP 45% by 2030 relative to the emissions intensity of GDP in 2005."

GREEN TECHNOLOGY APPLICATION FOR THE DEVELOPMENT OF LOW CARBON CITIES (GTALCC)

WHAT is GTALCC?

GTALCC is a 5-year project, facilitating the implementation of low carbon initiatives and to showcase a clear and integrated approach to low carbon urban development in Malaysia.

WHO is involved?

WHY GTALCC & HOW?

To support the implementation of low carbon cities program

Removing barriers to integrate low carbon urban planning and development

To generate GHG emission reductions of 346,442 ton CO_2eq by the end of project

MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER

UNDP

gef GLOBAL ENVIRONMENT FACILITY INVESTING IN OUR PLANET

seda Sustainable Energy Development Authority MALAYSIA

http://www.gtalcc.gov.my
gtalcc@seda.gov.my | 03-8870 5800

NEM
Net Energy Metering

"Solar Energy, Empowering the Consumers"

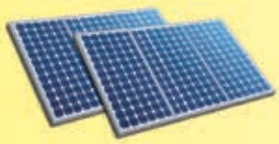
Concept of NEM

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

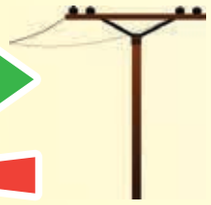
Energy used by your home from the electricity grid



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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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.

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Green Tech Malaysia

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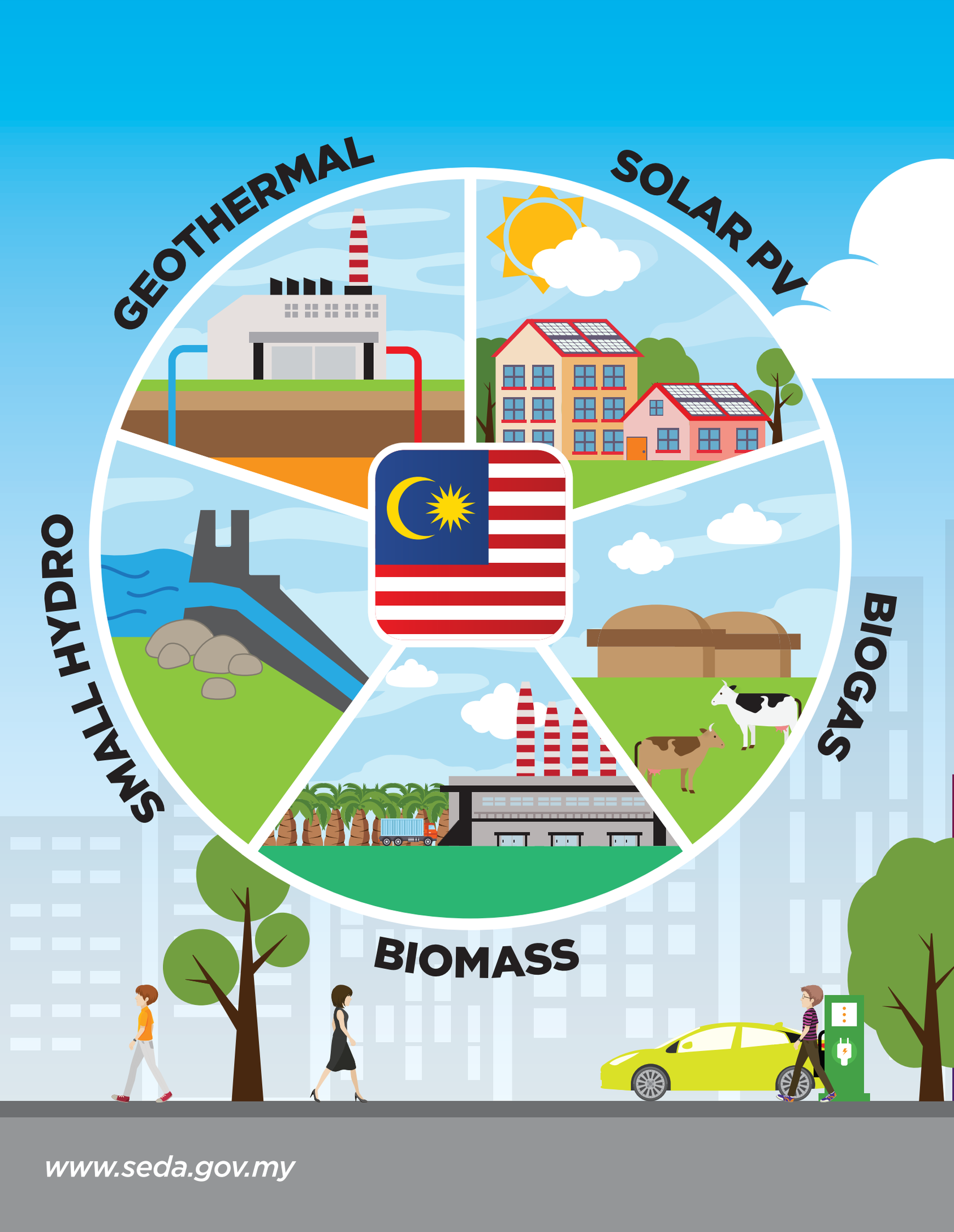

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We are big fans of nature, from sunrise to sunrise

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