



REMARKS FROM CHIEF OPERATION OFFICER **ABD MALIK MOHD JAAFAR**

Salam Merdeka!

Malaysia will mark its sixty years of nationhood this 31 August 2017. Over the span of six decades, our country has achieved significant economic and social progress. Malaysia's evolution from an agriculture to a manufacturing and service-based economy, and now towards a high-income nation by 2020 would not have materialized without the availability of secure and reliable electricity supply. The Malaysian Electricity Supply Industry (MESI) has been a fundamental infrastructure and driver of the country's growth.

Transformation of the Malaysian economy will also require significant improvements and reform in MESI. For this reason, the government via the Ministry of Energy, Green Technology and Water (KeTTHA) has embarked on the MESI Transformation Programme in 2010. The programme seeks to address industry issues such as governance, tariff, fuel and industry structure, as well as long term needs concerning reliability, transparency, efficiency and sustainability of the operations and delivery of electricity in Peninsular Malaysia.

MESI has gone through various stages of reform and has evolved from predominantly single entity to a multiplayer industry particularly in the generation sector, with the

introduction of Independent Power Producers (IPPs) in 1992.

Year 2012 marked a major historical milestone in MESI with the formation of Single Buyer (SB), a function that was once embedded under TNB but is now fully ring-fenced and operating at arm's length from the utility company.

As SB reaches its fifth year of operation, an extensive review and restructuring of its organisational structure have been recently undertaken. Central to the new organisational design is the creation of five key units and the appointment of two senior leaders to look into two major SB workstreams, i.e. operation and corporate functions. The new structure is also designed to support

operation beginning 1 June 2017. At present, several participants have expressed their interest to participate in NEDA. In addition to engagement sessions with relevant parties, ongoing enhancements of the SB website and Market Participant Interface (MPI) are also taking place, which will provide tremendous improvements in data visibility and reporting for the market players.

Lastly, to all Malaysians, we would like to wish you 'Selamat Hari Kebangsaan'. Let us all take this opportunity to reflect on our country's struggle towards independence and the continuous spirit to build a better nation. History can inspire us in overcoming the various challenges

"If we pull together and work together with the maximum of goodwill and harmony, there is no limit to what our people can achieve in the years to come." - Tunku Abdul Rahman Putra Al-Haj

SB's expanding functions, particularly in market operations and the development and management of new generation entrants. These changes ensure increased efficiency in managing MESI in the near and longer term.

The New Enhanced Dispatch Arrangement (NEDA) has also reached another milestone with the commencement of its full go-live

ahead in MESI, and we at SB is fully committed to support the government's efforts towards a reliable, competitive and progressive electricity supply industry. □

Abdul Malik Mohd Jaafar

**Chief Operation Officer
Single Buyer**

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Scan for online version

HISTORY OF

ELECTRICITY IN MALAYSIA



In conjunction with Malaysia's 60th Merdeka celebration, we make a recollection of how electricity first made its appearance in our country, and how it played a pivotal role in driving the country's growth

1897 ●

Entrepreneurs Loke Yew and Thamboosamy Pillai installed an electric generator to operate their mines in **Rawang, Selangor**. Rawang became the first town in Malaysia to receive electricity for public lighting.



● 1897

Railway stations in **Kuala Lumpur** received its first electricity supply

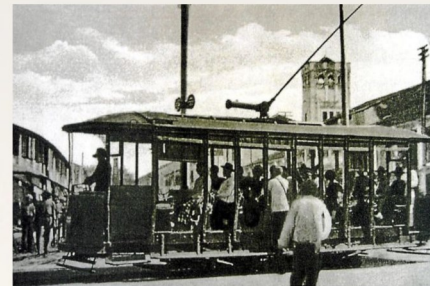


1903 ●

The first power station, i.e. **The Sempam Hydroelectric Power Station, Raub** was developed by the Raub Australian Gold Mining Company

● 1905

Electric trams made its debut in **Georgetown, Penang**



1905 - 1920 ●

This period saw an increasing number of towns with electricity: **Penang, Malacca, Johor Bharu, Seremban, Bukit Mertajam, Sungai Petani** and **Alor Star**

● 1927

Electricity Department of Federated Malay States was established. However in 1942, it was closed due to Japanese occupation



1943 ●

First interconnection at 22kV was established between **Johor Bharu and Seletar, Singapore**

● 1946

The Central Electricity Board (CEB) of the Federation of Malaya was established to meet rising electricity needs

1965 ●

CEB was renamed to **National Electricity Board (NEB)**

● 1990

In line with the Government's privatisation policy, **Tenaga Nasional Berhad (TNB)** was formed and remains as the main electricity supply provider in Peninsular Malaysia



1990 - NOW ●

On-going **evolution** of the Malaysian Electricity Supply Industry



Introduction to SB

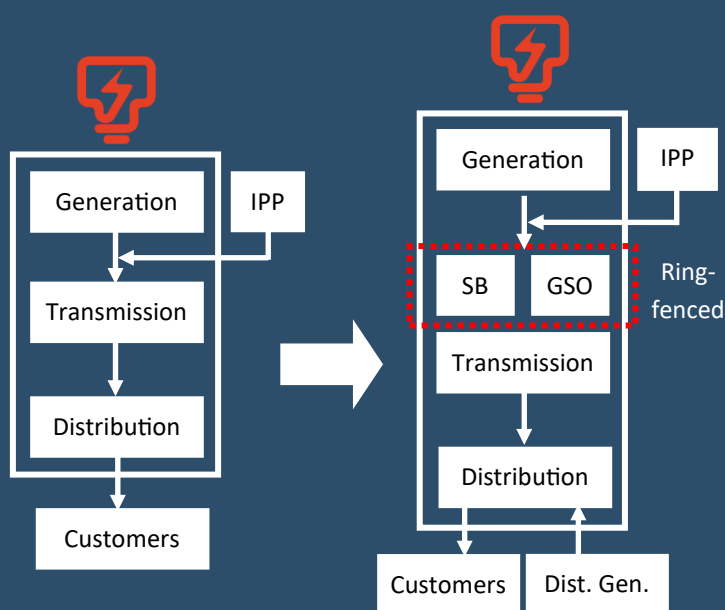
THE BEGINNING OF SB

In 2009, the Malaysian Cabinet endorsed a programme to transform MESI into a more reliable, transparent, efficient, and sustainable industry.

MyPOWER Corporation, a special purpose agency established by the government, was tasked to drive the MESI transformation initiatives.

The transformation programme entailed review of the MESI governance, structure, fuel supply and security, and tariff setting framework.

MyPOWER recommended establishing ring-fenced entities within TNB to increase efficiency and transparency in electricity procurement and dispatching. This led to the formation of SB and GSO in 2012 to meet the objectives.



MANAGED MARKET MODEL

Following the establishment of SB and GSO and the implementation of the Incentive Based Regulation (IBR) framework, MESI transitioned from a traditional vertically integrated structure into a managed market model structure.

As SB plays significant roles in MESI, SB's operations and functions are governed by various well-defined rules and regulations which are monitored by the industry regulator. These are important to ensure effective delivery of the MESI transformation agenda.

ROLES OF SB IN MESI

MANAGING PROCUREMENT OF ELECTRICITY

SB is responsible for the management of procurement of electricity and related services, which includes planning, procuring, scheduling and settlement as specified in the Electricity Supply (Amendment) Act 2015.



PLANNING

SB conducts system-wide load forecasting & capacity planning

PROCURING

SB assists entry of new generators, manages PPAs & fuel planning



SCHEDULING

SB conducts short & medium term generation scheduling & operates NEDA

SETTLEMENT

SB manages fuel & PPAs settlement, & manages regulatory reporting



ADVISORY

SB provides advisory services to stakeholders & conducts studies for industry development

FAST FACTS



SB was established on 1 September 2012



SB is staffed with 76 personnel from various professional backgrounds



SB manages energy transaction with generators with total generation capacities of 22,910MW



Seven languages are spoken by SB staff



SB NEW STRUCTURE TAKES SHAPE

The Single Buyer management team is comprised of individuals with strong strategic, technical and business management skills derived from their extensive experience in the power sector. With diverse backgrounds spanning system and network operations, planning, corporate strategy, legal and finance, they collectively bring a wealth of specialist expertise to their senior leadership responsibilities under Single Buyer and a deep understanding of the issues surrounding Peninsular Malaysia's future electricity needs.

CHARANJIT SINGH GILL

As the Head of Single Buyer, Charanjit leads the management of Single Buyer as a ring-fenced entity in accordance to the Electricity Supply Act. Charanjit's role is to promote efficiency and facilitate competition in the generation sector, thus instilling confidence in MESI via improved transparency.

ABU BAKAR AHMAD

Currently the Chief Corporate Officer of Single Buyer, Abu Bakar manages a broad range of corporate functions which include contract and resources management, as well as finance and enterprise management.

AKMARHAYU AB RAHIM

Akmarhayu is currently the General Manager, Contract and Resources Management. She is responsible in leading and conducting the procurement of new energy capacity, evaluation of project proposals and PPA negotiation. She also oversees the strategic areas of fuel security and supply.

SHAFII RASDI

Shafii's present role is General Manager, Finance and Enterprise Management. He is responsible for a diverse range of areas, i.e. finance, settlements, compliance, human resources, risk management and administrative services.

ABDUL MALIK MOHD JAAFAR

As the Chief Operation Officer of Single Buyer, Malik oversees the operational aspects of the organization. This covers a wide spectrum from short-term market operations up to long-term system planning, as well as technical advisory and industry development.

DR. NOR AZLAN MOSTAFA

In his present role as General Manager of System Planning, Dr. Nor Azlan is responsible in overseeing the long term planning functions i.e. load forecast and capacity planning.

ALFIFA FAUZAN

Alfifa is presently the General Manager, Market Operation and Assessment, and is responsible for short-term and medium-term scheduling. She is also leading and coordinating the development, management, operation and assessment of NEDA.

RAYMOND MICHAEL

Raymond's present role is the General Manager, Technical Advisory and Industry Development (TAID). He is responsible in providing top-tier technical expertise and advice on matters related to generation, transmission and industry development.

Workshop for GOVERNANCE REFORM of SB and GSO

25 JULY 2017



A Governance Reform Workshop was jointly organized by SB and GSO on 25th July 2017 in Bangsar. The main objectives of this half-day workshop were to share on the current changes in MESI and TNB, and also the activities conducted by SB and GSO in response to these changes. The workshop was also conducted to provide a platform for the staff to engage with the HR and Top Management and seek clarifications on matters related to these changes, particularly on SB and GSO becoming subsidiaries. The key takeaways from the event are;

- The changes in the MESI landscape are driven by four main trends, which are global economic shift, disruptive technologies, shareholders expectations and evolving industry regulations.
- Present and future outlook of MESI signifies the Government's seriousness in changing the industry and thus TNB, SB and GSO must evolve to remain relevant.
- The industry reform is a continuous process and the staff of SB and GSO should always be prepared and strive to be steps ahead by equipping themselves with cutting-edge knowledge on their area of expertise, remain vigilant on latest industry trends and be prepared for any restructuring exercises.

NEDA UPDATES

<https://mpi.singlebuyer.com.my>

NEDA commenced its full Go-Live operation beginning 1 June 2017. Since its commencement, several parties have expressed their interest to register as a NEDA participant. For the Price Takers category, SB has conducted discussions with NUR Power Sdn Bhd, Optimistic Organic Sdn Bhd and Perusahaan Sadur Timah Malaysia (PERSTIMA) Bhd to facilitate the registration process. SB also conducted a visit to PERSTIMA office in Pasir Gudang, Johor to further discuss the process of becoming a NEDA participant.

As of July 2017, Teknologi Tenaga Perlis Consortium became the first potential participant from the PPA/SLA category to submit its NEDA registration. As per the NEDA Rules, the registration shall be checked thoroughly prior to its operation in NEDA. The registration process is important to ensure all prerequisites, such as the Power System Studies and metering facilities, are fulfilled so that the commercial operation can take place without any major issues.

FORECAST VS. ACTUAL SMP & DEMAND

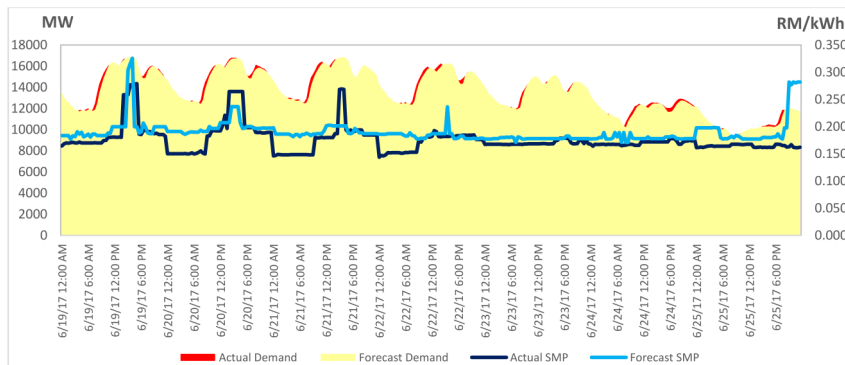


Figure 1: Half-hourly Trend of Forecast vs. Actual SMP & Demand

SB is also in discussion with TNB Distribution (TNBD) to set up a formal arrangement for Price Takers' settlement process.

As one of SB's initiatives to improve data visibility and market reporting, SB has recently started to publish a weekly report that provides an analysis of each week's NEDA operation. This report provides a comparison between the actual and forecasted System Marginal Prices (SMP) and peak demand. SB also plans to publish the key findings of NEDA Phase 2 Trial Run on the MPI in the near future. □

For more information, visit

<https://mpi.singlebuyer.com.my/>

FROM PHOTONS TO ELECTRONS

Different Types Of Solar Cells and Improvement in the Efficiency of Solar Cell



100MW PANDA SOLAR FARM, DATONG, CHINA

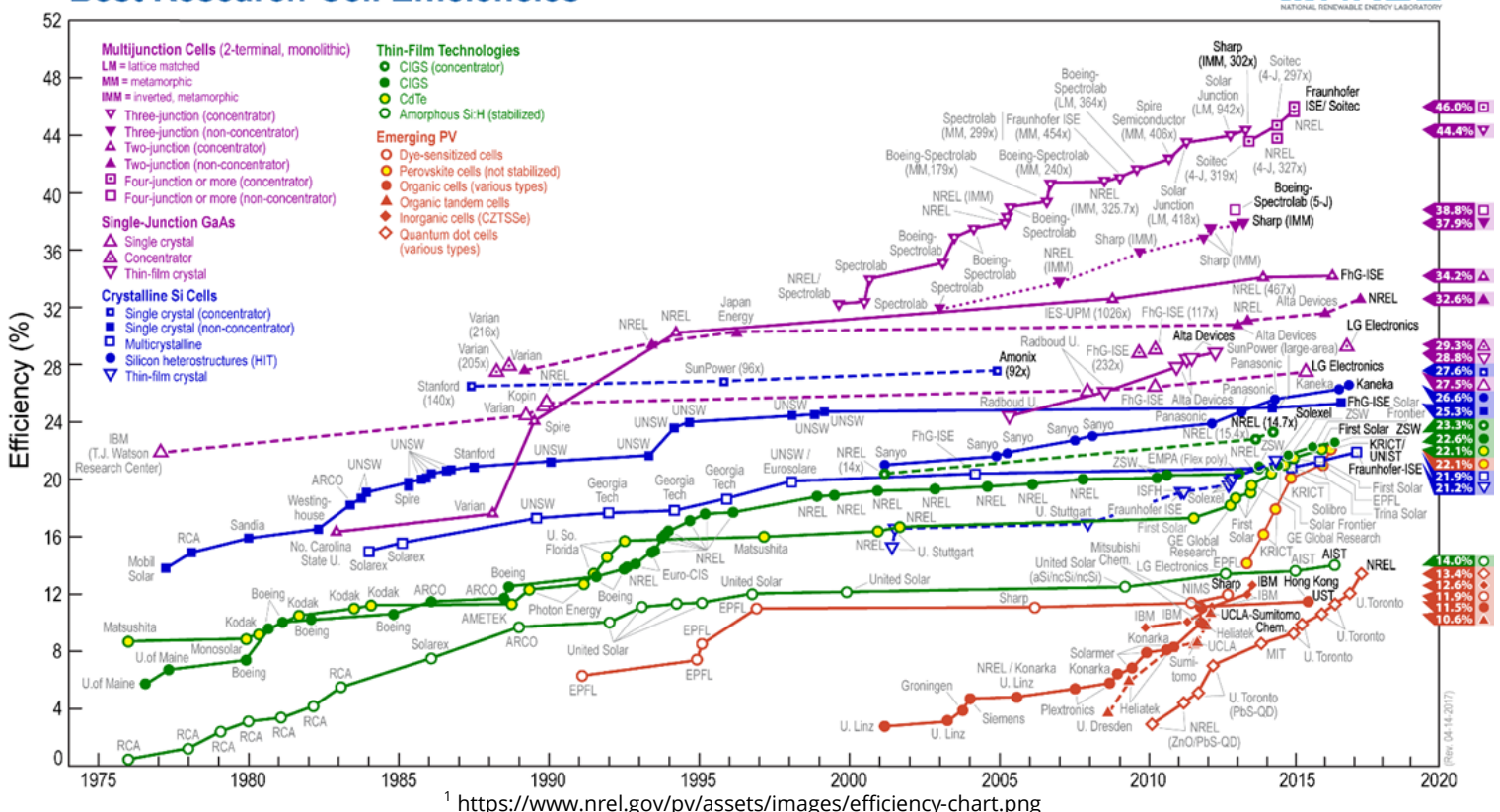
In the previous series, we have indulged into the theory and evolution of solar cells. We have briefly summarized that the solar cell efficiency has increased over time and today, the efficiency is about 20%. However, this efficiency is purely at the cell level and when the power is received at the Grid, the overall efficiency is only about 10% to 15% due to losses from the cables, inverters, transformers, etc.

Do you know that the National Renewable Energy Laboratory (NREL) of the US Department of Energy maintains a plot of compiled values of highest confirmed conversion efficiencies for research cells, from 1976 to the present?

The plot as shown in Figure 1 presents the efficiencies at solar cell level for a range of photovoltaic technologies. The plot shows four (4) distinct types of solar cells which are characterised by different colour codings as follows:

1. Multi-junction Cells (*purple*)
2. Crystalline Si Cells (*blue*)
3. Thin Film Technologies (*green*)
4. Emerging PV (*red*)

Best Research-Cell Efficiencies



The efficiency of solar cells has improved over the years with breakthrough in multi-junction cell technology. Multi-junction cells employ complex technology and are typically more expensive than other types of solar cells, thus are not considered for standard commercial operation. Due to their efficiency and complexity, the multi-junction cells are utilised for high end usage such as for space and terrestrial power applications.

About 90% of current solar PV deployment is based on crystalline silicon solar cells—a technology that has been commercial for decades and is still improving².

The crystalline silicon solar cells are further classified into two main categories i.e. monocrystalline and polycrystalline. These crystalline solar cells and thin film technologies are the most common type of solar cells offered for commercial and utility-scale installations.

Monocrystalline is the highest quality of solar cells. It is cut from a single cell of pure silicon, which allows them to more efficiently convert the sun's energy to electricity. Panel that uses Monocrystalline silicon cells appears completely smooth and black. **Polycrystalline** cells are made up of multiple silicon cells fused together. This makes them slightly less efficient than Monocrystalline cells, but more affordable as well. Typically, these kinds of solar panels appear bluish in colour. **Thin-film** cells make up the cheapest and least efficient solar panels. To create thin-film panels, manufacturers spray a layer of silicon onto a substrate. Thin-film solar panels may appear more flexible than other kinds³.

Can you guess which is which?



Figure 2: Most common types of solar cell³

Lastly, the emerging PV cells refer to solar cell technologies which are still at the research and development stage. They are lower in efficiency and not widely available commercially. One example is Dye Sensitized solar cells which can be used to produce electricity in a wide range of light conditions, i.e. indoors and outdoors, enabling the user to convert both artificial and natural light into energy to power a broad range of electronic devices⁴. □



Figure 3: Example of Dye Sensitized solar cells⁵

² <http://energy.mit.edu/news/solar-photovoltaic-technologies/>

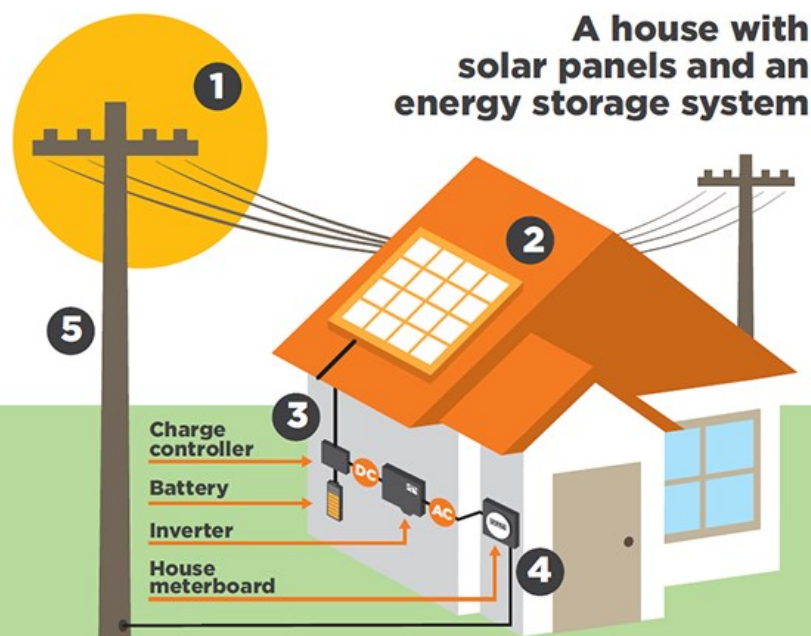
³ <http://www.california-solar.org/news/solar-tips/choosing-the-best-solar-panels/>

⁴ <http://gcell.com/dye-sensitized-solar-cells>

⁵ <https://www.ecofriend.com/everything-i-need-to-know-about-dye-sensitized-solar-cells.html>

NEXT ISSUE

INTEGRATION WITH ENERGY STORAGE SYSTEM



1. Sunlight
2. Solar photovoltaic roof panels
3. Battery connected directly to the stand alone system
4. Battery also connected to the electricity grid
5. Electricity grid

WATT'S HAPPENING



14-15 JUNE 2017: THE 6TH CONSULTATIVE MEETING OF TECHNICAL TASK FORCE ON LAO PDR-THAILAND-MALAYSIA (LTM) POWER INTEGRATION PROJECT, BANGSAR

A consultative meeting attended by SB, GSO, TNB, Electricity Generating Authority of Thailand (EGAT) and Électricité Du Laos was held in Bangsar to finalise the Energy Purchase and Wheeling Agreement (EPWA), Interconnection Operations Manual and supplemental letter to System Interconnection Agreement for LTM Interconnection. EPWA is targeted to be signed during the 35th ASEAN Ministers on Energy Meeting (AMEM) which will be held on 25 -29 September 2017 in Manila.



6, 16 & 22 JUNE 2017: SB'S RAMADHAN CHARITY EVENTS

On 6 June, SB contributed dates for Majlis Tadarus Al-Quran held at Masjid Ar-Rahah, Bangsar South. The contribution was hand-delivered to the Imam of Masjid Ar-Rahah.

On a separate event held on 16 June, SB handed some Hari Raya contributions to the late Zubli Quzairov's family.

SB also contributed Hari Raya money to the asnaf and SB cleaners on 22 June.



21-23 JUNE 2017: PLEXOS ADVANCED TRAINING AND USER GROUP MEETING, BARCELONA

SB sent three representatives to the PLEXOS Advanced Training and User Group Meeting held in Barcelona. The PLEXOS Advanced Training focused on the long-term planning activities which cover stochastic approach in maintenance and modelling of forced outage, battery storage integration and transmission.

The PLEXOS User Group Meeting provided the opportunity for PLEXOS users around Europe to share their experiences in utilizing the PLEXOS software, particularly in addressing new challenges in the power system such as renewable energy, storage technologies and interconnection.

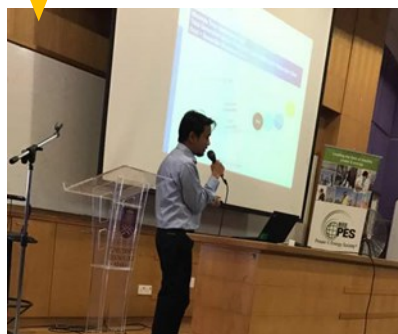
SB also presented their study on Large Scale Solar penetration and its impact towards long-term generation planning. After the presentation, SB received constructive feedback from the participants.



JUNE 2017

3 JULY 2017: VISIT BY UiTM DELEGATES TO SB, BANGSAR SOUTH

SB welcomed six UiTM delegates from the Faculty of Electrical Engineering to its office. The meeting was arranged to discuss on potential collaboration between SB and UiTM in the area of university-industry cooperation. The collaboration is proposed as an extension to SB's involvement in the "Industry to Class" programme offered in the Power System II subject. The most recent "Industry to Class" session was held on 24 May 2017 when En Zuhairi Hashim from Scheduling Unit was invited to talk on Scheduling and Economic Dispatch. The session was attended by almost eighty UiTM students, and was aimed to provide exposure and knowledge on the electricity industry.



6 JULY 2017: SB RAYA 2017, BANGSAR SOUTH

SB recently organised its Aidilfitri celebration with its staff. In conjunction with the celebration, SB also honoured Ir Dr Mohd Fuad Jamaluddin following his retirement in June 2017. Part of the programme agenda was also to discuss on SB's future direction in MESI.

13 JULY 2017: SITE VISIT TO PERSTIMA BHD, PASIR GUDANG

An engagement meeting with PERSTIMA Bhd was recently held at PERSTIMA's office in Pasir Gudang, Johor. SB was represented by NEDA unit, who facilitated PERSTIMA for the pre-registration process under Price Takers category. A preliminary assessment on the metering facility at PERSTIMA was also conducted during the site visit.



31 JULY 2017: ELECTRICITY MARKET TRAINING, BANGSAR

SB recently organised an in-house training on Electricity Market which was attended by participants from SB, GSO and Suruhanjaya Tenaga. The objective of this training is to provide an overview on electricity market design and operation in other countries, mainly Ontario. The training was conducted by Dr Puica Nitu who has tremendous experiences in the electricity industry.

JULY 2017



GENERAL MANAGER SYSTEM PLANNING

DR. NOR AZLAN MOSTAFA

In this edition, we speak to our newly joined colleague Dr. Nor Azlan Mostafa, General Manager - System Planning about the role of his team in SB and the importance of load forecast and capacity planning in Malaysia. SB is pleased to welcome Dr. Azlan.

WattsUp: We welcome you to SB. Can you tell us a brief background of yourself?

Dr. Azlan: I was born in Sungai Petani, Kedah and raised in Ipoh, Perak. I obtained a scholarship from Tenaga Nasional Berhad and graduated with a Bachelors Degree in Mechanical Engineering from the University of Warwick, United Kingdom in 1994. Then, I pursued a Masters in Advanced Mechanical Engineering at the same institution and graduated in 1996. Upon graduation, I was assigned to TNB Repair and Maintenance Sdn Bhd (TNB REMACO) as a Maintenance Engineer and subsequently Base Manager at Connaught Bridge Power Station. In 2003, TNB again sponsored me to pursue a PhD in Computational Fluid Dynamics at the University of Manchester, UK. Upon returning to Malaysia in 2008, I joined Universiti Tenaga Nasional (Uniten) as a Senior Lecturer and appointed as Head of Thermofluid Unit and Head of Nuclear Energy Centre. In 2011, I joined TNB Nuclear Energy Unit (NEU) and after six years, I joined SB in May 2017 to head the System Planning Department.

WattsUp: We understand that you were involved in the development of nuclear energy in Malaysia. Can you share with us more on that?

Dr. Azlan: In 2008, TNB formed NEU with the objective to look into the possibility of using nuclear power to generate electricity in Malaysia. I was involved in the initiative when I was in Uniten. Since Malaysia has stopped looking at

nuclear power since 1985, NEU's first task was to re-educate TNB and the government in nuclear technology. I was trained for one month in Busan, South Korea and a total of four months in Tokai and Tsuruga, Japan to study nuclear technology. I had the privilege to be involved in visits to nuclear energy countries such as France and USA to further my experience and knowledge. The initial commercial operation date (COD) for Malaysia's first nuclear power plant (NPP) was 2021, as planned in Malaysia's Economic Transformation Program in 2010. Malaysia Nuclear Power Corporation (MNPC) was formed in 2011 to spearhead the development of the NPP. However, the government has revised the COD to post 2035 after the unfortunate Fukushima disaster. This revision was done to ensure that the public are well aware of the issues surrounding nuclear power before it is implemented. NEU has been working very closely with MNPC in the nuclear power initiatives.

WattsUp: What made you decide to join SB? What do you like about working at SB?

Dr. Azlan: Since nuclear power implementation is a part of the long term energy mix consideration, it was a natural progression for me to move into System Planning. The department monitors and recommends the best possible future generation mix, be it nuclear, renewables or conventional plants. Coupled with the slowing down of NPP development initiatives and internal department restructuring, it was an opportunity to explore a new area of expertise and knowledge in my work career. I find that SB has a vibrant, young, and enthusiastic team of professionals with their boundless amount of energy that is so invigorating for me. These young talents are highly capable that it is a joy to work with them.

WattsUp: Can you explain the roles of your team and the importance of system planning at SB?

Dr. Azlan: System Planning is divided into two sections - Load Forecast and Capacity Planning. The Load Forecast team will look into the future electricity demand of the country, taking into account economic and socio-demographic factors, as well as emerging trends. Based on this predicted future demand, the Capacity Planning team will recommend the generation plant-up plan to ensure that the demand can be met according to certain reliability standards. The generation mix consideration will depend on competitive generation price, the security of supply and the government's energy policy. Both the Load Forecast and Capacity Planning functions are important to ensure that the Malaysian population and businesses receive high quality and stable electricity supply at competitive price. This will also attract foreign direct investments into the country that will improve Malaysia's economy and ensure jobs for the people.

WattsUp: Will the ever-changing energy landscape create any challenges to your team?

Dr. Azlan: Change is always a challenge and it is constant, meaning that change is inevitable. Therefore, we need to be aware of it and manage it well. One of the main future challenges for the energy landscape is the introduction of disruptive technologies into the system and the impact it will have. These include new sources of energy such as renewables and energy storage, as well as new usage of electricity such as electric vehicles. The shift towards renewables, especially solar and supported by energy storage, might result in less electricity usage from the grid. However, System Planning still needs to take into account the energy needs during unavailability of solar energy and battery storage in the system. Further, challenges from electric vehicles include predicting the level of usage by the population since it is still not popular on the road.

WattsUp: Apart from work, what do you enjoy doing?

Dr. Azlan: I enjoy reading and watching TV or movies whenever I have the time. I have interest in diverse genres of books such as science fiction, horror and fantasy to name a few. Amongst my favourite authors would include Tom Clancy, Stephen King and J.R.R. Tolkien. My recent read is the Throne of Glass series by Sarah J. Maas. Academy awards nominated, horror, action and comedies are my favourite kind of movies. The recent movies that I watched were John Wick 2 and Ghost in the Shell (I watched the anime as well). Lastly, I like to listen to dance music and ballads. I follow the latest music trends including by artists like Ed Sheeran, Justin Bieber, Sia, Chainsmokers, Katy Perry and Selena Gomez.



WattsUp: Any last words?

Dr. Azlan: I am happy to be in SB and I am ready to contribute. SB has an important role to play in Malaysia. Its operations and recommendations have a major impact on MESI. I look forward to delivering quality work and with a great team behind me, I am confident that I can fulfill my responsibilities. □

SB-ANS CREATIVE CORNER



SELAMAT MENYAMBUT HARI KEMERDEKAAN YANG KE 60

NEGARAKU

TELAH BANYAK KITA KECAPI **BERSAMA**
BERKONGSI SUKA DAN DUKA
KEPELBAGAIAAN BUKAN PEMISAH, MALAH **MENGUATKAN**
JALINAN
PERSAMAAN KITA LAH YANG **MENYATUKAN** NEGARA INI

KITA TAMPIL APABILA NEGARA TERCINTA MENGHADAPI
CABARAN, DAN KITA RAIKAN **KEJAYAAN** BERSAMA
INILAH **SEMANGAT** SEBENAR KITA – ANAK MALAYSIA
KITA YAKIN DENGAN MASA DEPAN NEGARA
KERANA HANYA ADA SATU... NEGARA MALAYSIA, BANGSA
MALAYSIA, **NEGARAKU**...

MARKET WATCH

Manjung 5
Commercial
Operation Date:

1 October 2017



UPCOMING EVENT

Generation System Planning
Familiarization 2.0 Seminar,
Penang

5 to 6 September 2017



WORDS OF WISDOM

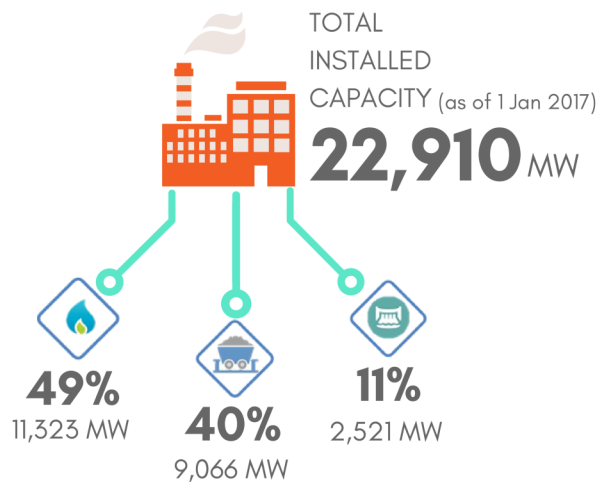
Your life does not get better
by chance, it gets better by
change.

- Jim Rohn -

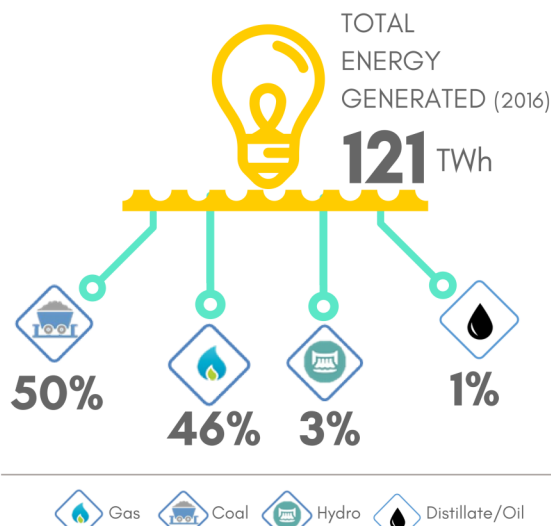
YOUR FEEDBACK MATTERS

We welcome any comments or
suggestions to improve our
newsletter. If you have any feedback
or content that you would like us to
include in the upcoming editions of
WattsUp, please email us at
sbet@singlebuyer.com.my

GENERATION LANDSCAPE

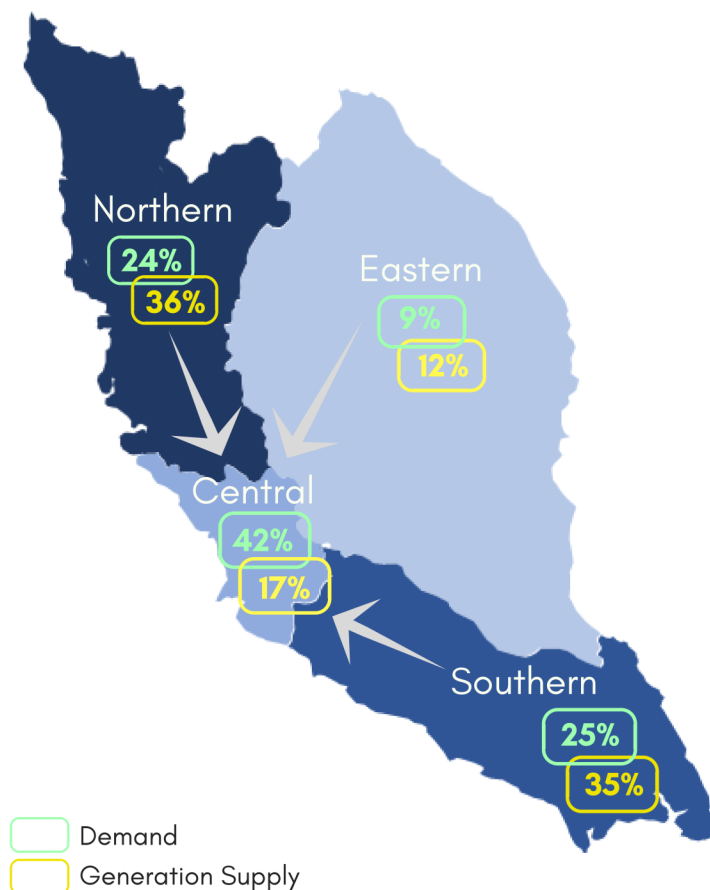


Although gas-fired capacity is more than coal-fired capacity, more energy is generated from coal due to its attractive price



DEMAND vs GENERATION SUPPLY BY REGION

Demand is highly concentrated in the Central region. Due to its generation supply deficit, the region relies heavily on power transfer from other areas to meet its demand



FACTORS INFLUENCING ENERGY MIX

Policy/Guideline

- During the period of 1970–2000, national policies such as National Depletion Policy and Four-Fuel Policy have driven the energy mix evolution from oil-dominant to gas-dominant
- The HHI criteria introduced in 2012 ensures a more diversified and distributed energy mix

Fuel Price

Coal has gained increasing share of generation due to its competitive price compared to gas

Renewable Energy (RE)

RE is fast becoming the current flavor of the power sector as Malaysia begins to adopt the green path and as the technology becomes more economically attractive

Emission Reduction Target

The commitment that Malaysia has made in 2015 during COP21 in Paris to reduce its GHG emissions intensity of GDP by 35% by 2030 relative to 2005's level to address climate change has a bearing on future planning of energy mix

Energy Mix Projection

