ISSUE 6
MAR18

SINGLE BUYER
WATT UP
Electrifying The Future

WATT'S INSIDE

REMARKS FROM CEO
CHARANJIT SINGH GILL

2018 marks the beginning of yet another challenging journey with the commencement of the second Regulatory Period (RP2) under the IBR framework that calls for more prudent management of capital and operational expenditure.

Time flies and we are already advancing into the second quarter of 2018. Beginning with the inaugural issue of WattsUp in April 2017, we are now proud to bring you the first anniversary edition of SB's newsletter.

The past one year saw WattsUp gaining steady recognition and becoming one of the key platforms to broadcast SB's activities that are critical to the industry. This year we continue to bring you the latest undertakings of SB with a fresh new layout and highly informative content, published on a quarterly basis to reflect the dynamic mindset of the people behind SB.

Many exciting events have happened in the last three months. NEDA remains as one of SB's primary focus as we intensify our engagement activities to attract participation. SB continues to enhance its ring-fencing initiatives with the signing of Service Level Agreement with TNB Finance. In supporting MESI initiatives, SB has also successfully completed two major projects, namely the Enhancement of Load Forecast Methodology and the Environment Friendly Energy Mix Study.

Watch out for more electrifying updates from SB as we navigate our way through the fast changing energy world.

Charanjit Singh Gill
Chief Executive Officer
Single Buyer

THE NEW ENHANCED DISPATCH ARRANGEMENT

NEDA

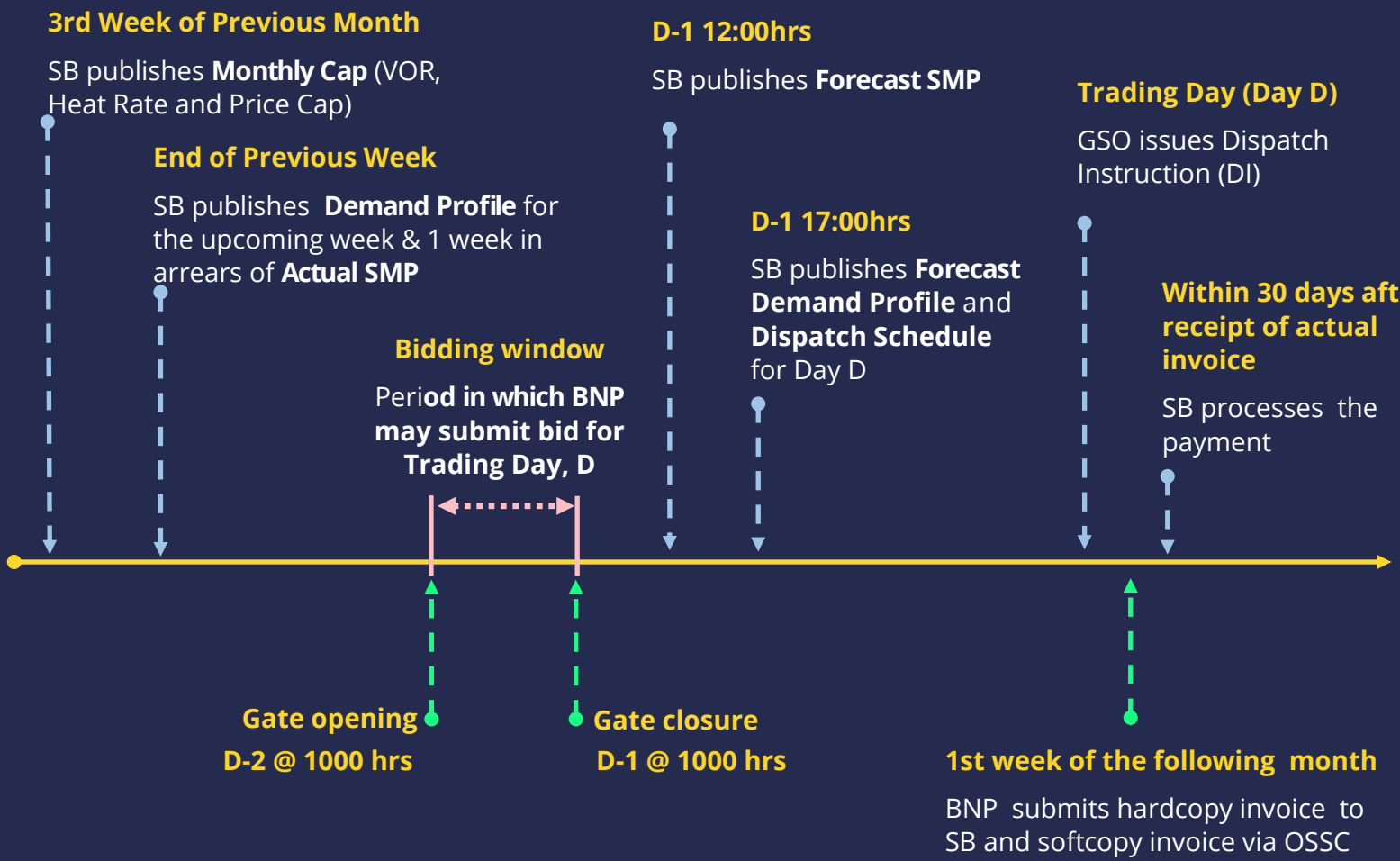
Summary of Timeline for Bidding NEDA Participants

Bidding NEDA Participants (BNP) are subject to Dispatch Instruction. They may submit their offers via the Market Participant Interface (MPI) during the Bidding Window for each Trading Day. There are 3 categories of BNP, each with different bidding mechanisms:

01 PPA/SLA generators may offer reduced Heat Rate and/or Variable Operating Rate (VOR) from their current PPA/SLA.

02 Ex –PPA/SLA generators may offer Heat Rate and/or VOR lower than the Monthly Cap.

03 Large Merchants may offer Price and Quantity pairs.



NEDA
ENGAGEMENT ACTIVITIES

01 PSS RESULT BRIEFING FOR PERSTIMA

9 January 2018, Kuala Lumpur | A briefing session on the Power System Study (PSS) result for Perstima was conducted at TNBD Jalan Timur. With the completion of the PSS study, Perstima can now proceed with the registration application to participate in NEDA.

02 DISCUSSION WITH SIEMENS MALAYSIA

10 January 2018, Bangsar | A meeting with SIEMENS Malaysia took place at SB's office to explore the possibility of power plants with excess capacity to sell energy under NEDA. SIEMENS is currently pursuing an energy efficiency project with TNB Generators and IPPs that could potentially yield additional capacities for the power plants on top of the contracted amount in the PPA and SLA.

03 VISIT TO PETRONAS CHEMICAL FERTILIZER

11 January 2018, Gurun | An engagement session was organized with Petronas Chemical Fertilizer to promote NEDA. Petronas Chemical Fertilizer is one of the potential players who indicated their interest to participate in NEDA. This session was also attended by representatives from ST.

04 MEETING WITH GAS MALAYSIA

23 January 2018, Subang | A discussion session was held between SB and Gas Malaysia Berhad to gain understanding on the distribution gas supply industry and the Gas Cost Pass Through (GCPT) mechanism. The discussion provided useful insight to understand the Price Taker's concerns that may affect participation in NEDA.

05 MEETING WITH OOSB

24 January 2018, Kemaman | An engagement session with a co-gen plant, Optimistic Organic Sdn. Bhd. (OOSB), manufacturer of Maleic anhydride, was conducted to promote NEDA. OOSB indicated its interest to participate and will initiate further discussion with its management. This meeting was also attended by ST.

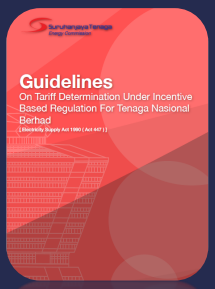
06 MEETING WITH PETRONAS REFINERY

7 February 2018, Kuala Lumpur | A discussion with Petronas Refinery was held to explore the possibility of the co-gen plant to participate in NEDA. Petronas Refinery is one of the potential players that shows interest in NEDA.

INDUSTRY REGULATORY FRAMEWORK

In the previous issues, we covered the general overview of MESI and Incentive Based Regulation (IBR). As we begin Regulatory Period 2 (RP2) in January 2018, we look further into details of IBR mechanism for the Peninsular Malaysia electricity supply industry.

IBR is governed by ST's **Guidelines On Tariff Determination Under Incentive Based Regulation For Tenaga Nasional Berhad [Electricity Supply Act 1990 (Act 447)]**.

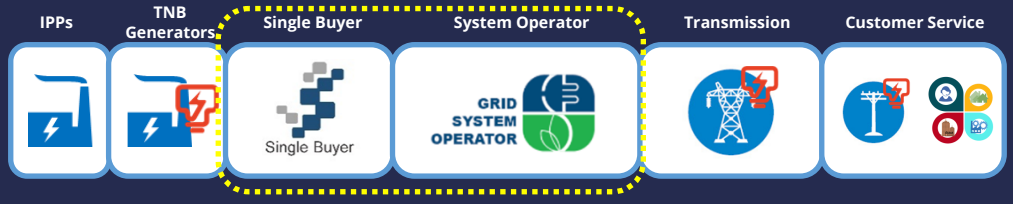


5 Main Sections

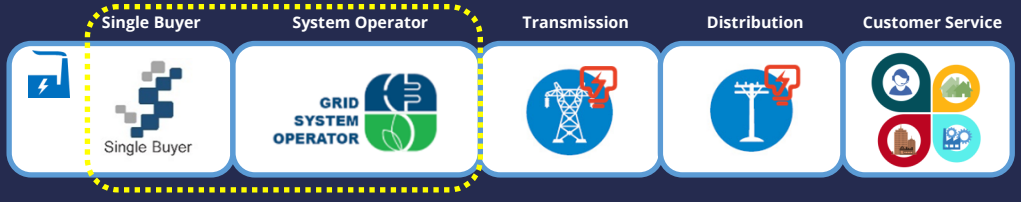
- **Citation & Commencement**
- **Purpose & Application of the Guidelines**
- **The Tariff Determination Framework**
- **Notice by the Commission**
- **Amendment & Variation**

This section outlines the tariff determination framework based on **Regulatory Implementation Guidelines** or (**RIG**s).

RP1: There are six "**Business Entities**" (**BEs**) involved in IBR, which serve as the building blocks in determining the tariff for electricity supply. Two of the BEs (SB and GSO) are ring-fenced.



RP2: Minor refinement[1] is made to segregate customer service into distribution and customer service.



Notes:

[1] Proposed Revised Regulatory Implementation Guidelines ("RRIG") for RP2 operation. Terminology for BEs may differ in the RRIGs.

SINGLE BUYER RING-FENCING FAQs

01 WHO IS SINGLE BUYER (SB)?

SB was established as a ring-fenced department of TNB in September 2012 as part of the '9+1' Malaysian Electricity Supply Industry (MESI) reform initiatives.

The status of SB as a ring-fenced entity was further enhanced when the Electricity Supply Act 1990 was amended in 2015 to formally recognise the function of the Single Buyer in MESI under the legislation. This ring-fencing arrangement is still being used to this day.

02 SO, WHAT IS RING-FENCING?

Generally, ring fencing is the **identification and isolation** of business activities, account, and/or governance within an integrated entity, **without being completely taken out of the company**.

It occurs when one part of the entity (the ring-fenced entity) is providing **exclusive/single-purpose** services like what SB is doing, which includes management of electricity procurement, planning, scheduling, settlement and other related services.

03 WHY IS RING-FENCING OF SB REQUIRED?

Ring-fencing is required to prevent discriminatory decisions and transfer of information by Single Buyer, which may cause conflict of interests and unfair advantage to any market player while still operating under the license of TNB.

Ring-fencing of SB is also necessary to facilitate effective competition and enhance transparency in the operations of the power system.

EPU VISIT TO SB

On 12 February 2018, SB welcomed six delegates from Economic Planning Unit (EPU), led by the Director General of EPU, Dato' Nik Azman Nik Abd Majid.

The visit was organised in conjunction with the completion of a study tasked by EPU to SB on the Environmental Friendly Energy Mix for Peninsular Malaysia and Sabah.

The two-hour visit began with an introduction and overview of SB by the Chief Operation Officer of SB, En Abdul Malik Mohd Jaafar. Following this, the findings of the study were presented and finally, the report of the study was formally handed-over to Dato' Nik Azman.

The energy mix study is an initiative to explore the options available to ensure the Government's commitment to progressively reduce the carbon footprint in the power sector is achievable.

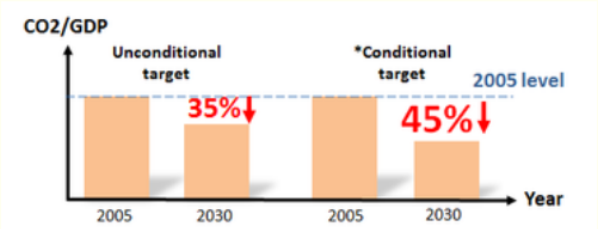
Highlights of
THE ENVIRONMENTAL FRIENDLY ENERGY MIX STUDY

BACKGROUND

The increasing dominance of coal in Peninsular Malaysia energy mix (due to its competitive price compared to gas) has given rise to environmental concerns, particularly on its high CO2 emissions

EMISSION TARGET

COP21, Paris (December 2015)



*Subject to receipt of climate finance, technology transfer and capacity building from developed countries

FINDINGS

Based on Single Buyer's 2017 Generation Development Plan;

	35%	45%
Peninsular Malaysia	✓	✗
Sabah	✓	✓

✓ Able to meet target by 2030 ✗ Unable to meet target by 2030

RECOMMENDATION

To achieve 45% carbon emission intensity reduction target by 2030, power sector in Peninsular Malaysia to consider:

- Imposing emission intensity criteria of 0.53–0.57 tonne CO2/MWh for long term generation planning
- Coal mix target of 36% - 47% beyond 2030
- Encouraging deployment of RE and battery storage
- Enhancement of Interconnection
- Rigorous implementation of Energy Efficiency (EE) and Demand Side Management (DSM) initiatives

FROM PHOTONS TO ELECTRONS

Major Components of Solar PV

This will be the sixth and last of the solar article series. In this final series, we revisit some salient points discussed in previous issues which describe the major components of a typical solar PV plant and its functions.

Figure 1 - Workers installing panels at the Babcock Solar Energy project in Punta Gorda, Florida. The project is one of eight new utility-scale solar farms in the state set to be completed by early 2018. FLORIDA POWER & LIGHT [1]

The solar PV modules are the main components of a solar PV plants. As an illustration, a 50MW solar PV plant would require more than 180,000 numbers of solar PV modules!

Undeniably, the actual numbers of solar PV modules is dependent on the rating of each solar PV cell. A typical solar PV module (about 17.6 square feet) in 1954 could only produce 20 watts but as technology advances, the same size of solar PV module could produce 265 watts in 2015 and more than 300 watts in 2018.

The mounting structure which supports and fixes the solar PV modules at an angle also plays an important role in maximizing the electrical output of the solar PV plants. The designer and developer of the solar PV plant need to define an optimal angle that capture as much sunlight as possible with minimum accumulation of particles such as water, dust, etc. that can obstruct light from reaching the solar PV cells.

Alternatively, the solar PV plant can be installed with solar tracking system and motors to enable the solar PV modules to move according to the direction of the sun.

Great numbers of solar PV modules comes with greater amount of cables!

Based on the design of the plant and rating of the inverters, the solar PV modules can be wired either in series, parallel or in combination of both. In a large solar PV plant, multiple solar modules are connected in series in a string to build the voltage up to proper levels for the inverter.

Multiple strings of solar modules are then combined together in parallel to multiply the string output currents to higher levels for input into the inverter. The output of multiple strings of PV modules for connection to the inverter is combined in the combiner box[3].

Figure 2 - Junction Box, also known as Combiner Box, which groups wiring from each solar PV module by blocks[2]

[1] *https://e360.yale.edu/features/northern-lights-utility-scale-solar-power-spreading-across-the-us*
[2] *http://solarcombinerbox.sell.everychina.com/p-99367662/showimage.html*
[8] *https://www.solarpowerworldonline.com/2013/03/how-to-evaluate-a-solar-combiner-box/*
[4] *http://www.pveurope.eu/News/Markets-Money/SMA-with-strong-international-utility-scale-PV-business-two-fab-closures-due-to-increased-price-pressure*
[5] *http://en.ofweek.com/news/Huawei-supplies-string-inverters-for-62-MW-UK-solar-project-27916*
[6] *http://www.arexsolar.com/power-plant/*

Inverter inverts the electricity produced by the solar PV

When the sunlight strikes solar PV cells, electricity flows in the circuit in the form of direct current (DC), which need to be converted by inverter to alternating current (AC) in order to be exported through the utility grid. There are basically two types of inverter; first is central inverter which is commonly used by large scale solar PV plant due to its relatively larger rating than the string inverter.

Central inverters are rated around 1.5MW to slightly more than 2.5MW while the string inverters are rated around 44kW and below. Hence, for a 50MW solar PV plant, only about 26 central inverters are needed as compared to 1250 string inverters. Physically, the size of the inverters is directly correlates with the rating of the inverter, hence the central inverter (which can be seen on top of this page) is much bigger than the string inverter as shown on the right (Figure 3).

Although string inverters are often seen in small installation of solar PV, string inverters are gaining momentum in the larger scale solar PV installation. For example, Huawei has installed more than 2,200 of its string inverters across the entire 62 MW portfolio in U.K., which offer benefits such as a higher energy yield, are free from DC fuses and DC combiner boxes, and do not require cooling fans, making them simpler to install and monitor[5].

Figure 3 - String Inverters[5]

Brain of the solar PV plant—Power Plant Controller (PPC)

As illustrated in Figure 4 below, the power output from the inverter will be step-up to a higher voltage according to Grid voltage and then transmitted to nearby substation for further transmission along the power lines.

The PPC communicates with the plant SCADA system (supervisory control and data acquisition; which gather and analyze data) which in turns interact with the Grid SCADA system. Based on input from the plant SCADA, the PPC control the overall output of the solar PV plants through the inverters and the plant's switchgear to ensure compliancy to the Grid requirements and stability of operations.

Nonetheless, even without the PPC, the inverters are able to produce output but with limitation in some control areas and interactivity with the Grid.

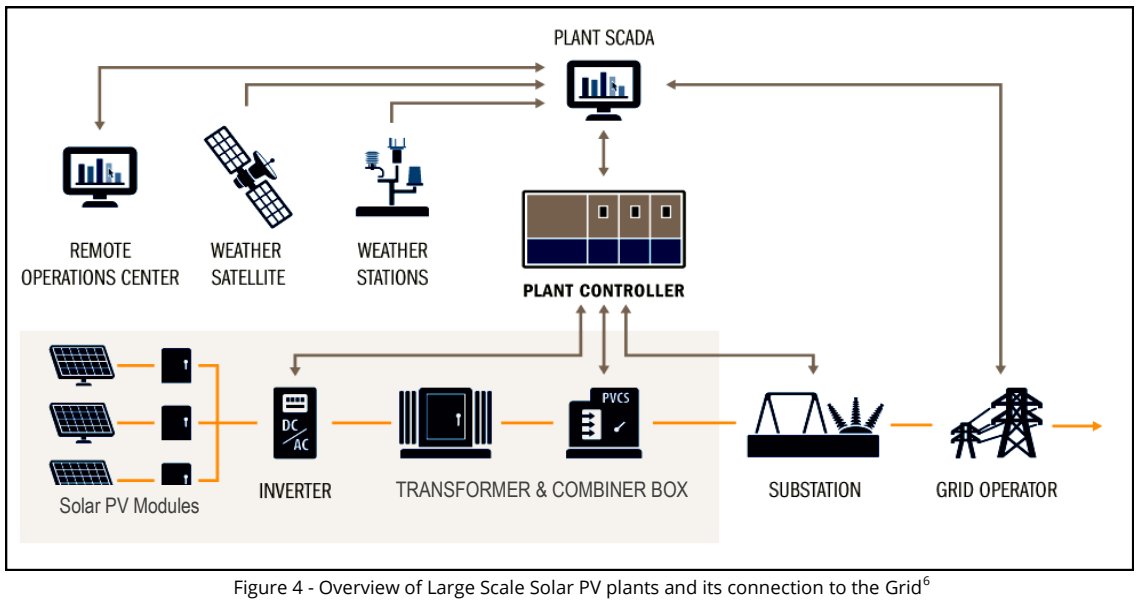


Figure 4 - Overview of Large Scale Solar PV plants and its connection to the Grid[6]

Figure 4 also summarizes the overall solar PV design and highlights major components in a solar PV plant.

To conclude, apart from the solar PV modules and the inverters, the balance of plant components are essentially similar to any other conventional power plants.

WATT'S HAPPENING

JANUARY - MARCH 2018

4 JAN — **Nuclear Energy Economics Workshop, Putrajaya**

System Planning Unit of SB presented the Electricity Demand and Supply Outlook during the Nuclear Energy Economics Workshop organised by the Malaysia Nuclear Power Corporation (MNPC). This workshop was intended to share the latest information on nuclear energy and to gain views on the use of nuclear as an alternative energy source for Malaysia in the future. This workshop was attended by the KSU and TKSU of KeTTHA, and representatives from ST, Ministry of Natural Resources and Environment and SB.

26 FEB – 2 MAR — **Advanced PLEXOS Training, Bangsar**

A 5-day Advanced PLEXOS Training by Energy Exemplar was conducted in Bangsar. This training was attended by 20 participants from various units within SB as well as the Grid System Operator. The training was focused on enhancing the existing simulation models to suit the changing landscape of the energy industry. Topics covered during the training include renewable energy, energy storage, stochastic modelling and NEDA.

6 MAR SB & GSO IBR RP2 Strategic Workshop, Putrajaya

SB, GSO and ST participated in the IBR RP2 (2018-2020) Strategic Workshop organised by TNB, which aims to present the results of the IBR RP2 submission which was finalised in December 2017. This workshop also served as a platform to discuss the implementation strategy and action plan for SB and GSO in RP2.

8 MAR Technical Visit to Pahlawan Power Station, Melaka

The purpose of this visit is to gain some insights into the operation of Pahlawan Power Station, particularly on the impact of cyclic operation to the plant performance. The visit was also aimed to enhance communication between all parties involved in the daily operation. This visit was participated by 11 SB officers and 3 representatives from ST.

20 MAR Service Level Agreement Exchange Ceremony between SB & TNB Finance, Bangsar

An exchange ceremony of the Service Level Agreement (SLA) between SB and TNB Finance was held recently to formalise the existing service relationship between both parties. In general, the SLA provides rights and obligations of both parties on finance related and it will be effective for 3 years.

HYBRID LOAD FORECASTING WORKSHOP

Concluding Workshop For The Load Forecast Enhancement Project

In June 2016, SB embarked on a project to enhance its long-term load forecasting methodology. This project was initiated by SB in response to challenges faced in load forecasting due to declining electricity demand, changing economic composition, emerging trends and fluctuating weather patterns.

This extensive project was broken up into three phases:

- Phase 1 focused on the enhancement of the existing econometrics model
- Phase 2 involved the development of the end-use forecasting model (which also includes conducting a customer end-use saturation survey)
- Phase 3 involved quantification of the impacts of renewable energy, electric vehicles, smart meters, Enhanced Time-of-Use tariff and high speed rail towards electricity demand. This phase also includes integration of the various models and scenario analysis.

The outcome of the project, which is the hybrid load forecasting model, was fully completed in December 2017.

To conclude and present the overall findings of this project, SB together with the project consultants (ie The Lantau Group (HK), The Brattle Group (US) and Applied Energy Group (US)) have recently organised a half-day workshop on 29 January 2018 in Bangsar.

The workshop was attended by 40 participants from ST, KeTTHA, EPU, GSO, TNB and SB.

LONG TERM LOAD FORECASTING

Process and Methodology

Single Buyer produces the long-term electricity sales, generation and peak demand outlook for Peninsular Malaysia 20 years into the future. These forecasts serve as the basis for power system planning, operations and resource planning and tariff review for IBR.

PROCESS

The load forecast, after approval by the Demand Forecast Committee (DFC[1]), is tabled at the Planning Working Group (PWG[2]) chaired by the CEO of ST for endorsement. Once approval from PWG is obtained, the load forecast is tabled for approval at the Committee for Planning, Development and Implementation for Electricity and Tariff (JPPPET) chaired by The Ministry of Energy, Green Technology and Water (KeTTHA). The load forecast is reviewed every six months to take into account the most recent demand data, economic developments, government policies and changes in trends.

METHODOLOGY

Single Buyer stays abreast of issues and best practices relating to load forecasting and continually incorporates new information and techniques into its forecasting process. Structural changes in the Malaysian economy, implementation of energy efficiency (EE) initiatives, emergence of renewable energy (RE) and changing customer behavior bring huge challenges upon load forecasting. To address these challenges, Single Buyer has recently developed a hybrid load forecasting model. This model combines the strength of the traditional econometrics method as well as the end-use model, while also incorporating the impact of emerging trends such as EE, RE and electric vehicles (EV).

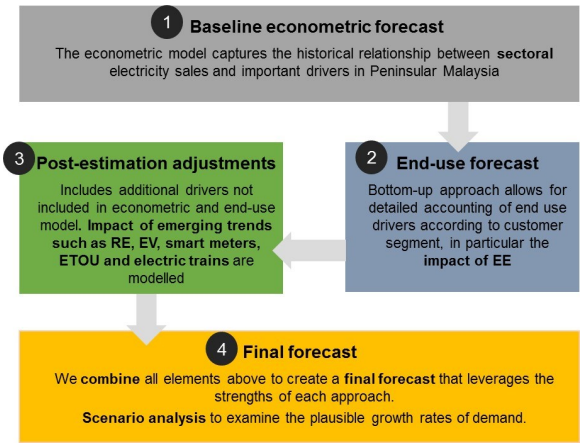


Figure 1: Overview of Single Buyer's Hybrid Load Forecasting Methodology

Baseline econometric forecast

A baseline forecast represents the 'true' amount of electricity that customers in Peninsular Malaysia need, without accounting for the effect of EE, RE and EV. The baseline forecast is derived using the econometrics method, which captures the historical relationship of sectoral electricity sales and its important drivers:

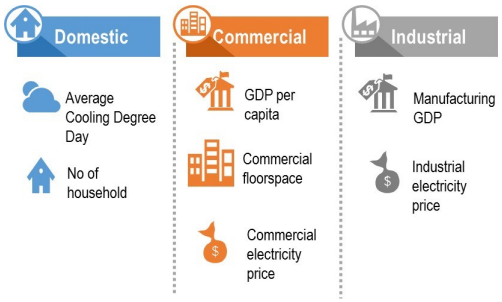


Figure 2: Sectoral drivers of Peninsular Malaysia's electricity sales

End-use forecast[3]

An end-use forecast decomposes customers' electricity usage into various sectors (e.g. commercial), segments (e.g. retail, office, warehouse) and end-uses (e.g. cooling, lighting). End-use models can reflect how electricity use is changing within sectors, particularly due to the impact of EE initiatives. While econometric models are tied to historical data, end-use models allow future events and emerging trends to be incorporated. Using the LoadMAP end-use modelling tool, the impact of EE initiatives such as energy audits, appliance efficiency standards and arrival of new technologies are incorporated into the load forecast.

Post estimation adjustments

The impact of emerging trends such as RE, EV, smart meters, enhanced time-of-use tariff (ETOU) and High Speed Rail are modelled independently as a post-estimation adjustment. These are quantified based on Government's policies, technical assumptions and inter-country comparison.

Final forecast

All three elements above are integrated to create a final forecast. Scenario analysis based on various assumptions of external drivers is developed to assess the plausible growth rates of electricity demand into the future.

[1] DFC's role is to provide independent and objective inputs and views on Malaysia's economic and energy demand growth. DFC is chaired by the Chairman of ST with members from various ministries, government agencies and private sectors.
[2] PWG's role is to deliberate and endorse the load forecast and generation development plan. PWG consists of members from the government and energy sector.
[3] Further details of the end-use model is described in the infographics on page 16 of this newsletter.

Google ENERGY TRIVIA

POWER CONSUMPTION

Google uses enough energy to continuously power **200,000** homes.

Over **1 billion** searches a day for a numerous number of download and queries

=

Equivalent to turning on a **60 Watt** light bulb for 3 hours.

Gives an average energy consumption about **180 Watt-hours** a month

Providing an active user **1 month** of Google services creates about the same amount of GHG emissions as driving a car **1 mile**.

On average, a Google data center uses **50%** less energy than a typical data center.

14 Google data centers across the globe

continuously draw almost **260 million watts**

=

0.227 Carbon intensity per megawatt-hour (MWh) of electricity

100% RENEWABLE ENERGY

While Google can still be drawing power from the grid, some of which will be from fossil fuel resources, Google purchases enough wind and solar energy to account for every megawatt-hour (MWh) of powering their data center and annual consumption of office operations.

Signed 20 agreements of **2.6 GW**

=

generating emissions savings equivalent to taking more than **1.2 million** cars off the road.

$2.5 billion in investment commitment

Google becomes the world's largest corporate purchaser of renewable energy.

0 NET EMISSION

Google emits **2.9 million** metric tonnes of carbon dioxide equivalent (tCO_2e) a year

but because of Google's renewable energy and partnership with more than **40** carbon offset projects to offset more than **16 million** tCO_2e, Google Carbon Footprint becomes **0**

Source: Google Environmental Report 2017

2ND LSS COMPETITIVE BIDDING EXERCISE

The shortlisted bidders of the second Large Scale Solar (LSS) competitive bidding exercise was announced by ST in December 2017 for connection at distribution and transmission network of Peninsular Malaysia and Sabah.

This exercise did not only attract overwhelming response from the private sector but also saw a reduction in offer prices in comparison to the first LSS competitive bidding exercise in 2016.

Key highlights of the second LSS competitive bidding:

- 41 companies and consortiums were shortlisted in December 2017.
- Totalling up to 562MW_{AC} of LSS capacity.
- The project size ranges between 1MW_{AC} to 30MW_{AC}.
- Arrangement is via 21-year LSS PPAs with TNB for Peninsular Malaysia and SESB for Sabah.
- Target for commercial operation in 2019 and 2020.

The announcement was followed by a briefing session organised by ST with all the shortlisted bidders on 14 December 2017 in Putrajaya. Representatives from ST, SB, TNB, and SESB presented on the requirements of the award and processes relating to finalisation of the LSS PPAs.

Subsequent to this event, on 30 January 2018, SB conducted a session with all the shortlisted bidders for transmission-connected projects. The session was intended to facilitate the bidders in project development, particularly on processes related to grid connection and grid code requirements. SB, GSO, TNB Grid Division, GSO and TNB Metering were the key presenters in this session.

Fairuz of SB giving presentation during the briefing on 30 January 2018

Panel of speakers during the briefing session organized by ST on 14 December 2017

WATT SAY YOU ?

In this special column, our colleagues share with you their favourite lunch spots that can be found within the vicinity of our office in Bangsar South.

Nor A'zzah

MAK ZAH CORNER AT KG. KERINCHI

Mak Zah Corner serves a full spread of authentic Malay *nasi campur* like mum's cooking. You can never go wrong with a plate of rice with fried chicken, *masak lemak* gravy, and *sambal belacan*. On top of that they also provide delivery services.

Rayyen

FOOD TRUCK AT PANTAI DALAM

The best *nasi ayam kunyit* which is only a 5 minute walk from our office! What makes it different from other *nasi ayam kunyit* vendors is that you can choose to mix the chicken with a wide selection of dishes such as beef, squid, quail and egg. its super spicy sambal is also extraordinary!

Fairuz

ROJAK BELLAMY

Rojak Bellamy needs no introduction. It is probably one of the best *rojak ayam* around the area and definitely a good place for a quick lunch. The fried chicken fresh from the *kuali* elevates the rojak into something special. Recommended to have it with a wholesome bowl of *cendol*.

MEET THE PEOPLE BEHIND SB

GENERAL MANAGER FINANCE & ENTERPRISE MANAGEMENT SHAFII RASDI

In this edition, we speak to our General Manager of Finance and Enterprise Management, Shafii Rasdi about his past work experience and roles of his team in SB.

WattsUp: Thank you for agreeing to share your stories. Can you tell us a brief background of yourself?
Shafii: I am an accountant by profession and I am a member of the Association of Chartered Certified Accountants (ACCA). I joined Lembaga Letrik Negara (LLN) on 1 April 1989 and I started my career as an accountant in the Distribution Division serving Kuala Lumpur south. I have since worked in various departments within TNB. In the year 2000, I was assigned as a senior finance manager where I played an instrumental role in the development of a coal-fired power plant in Manjung, Perak known as Project Manjung 123. I was then trusted to continue on with the development of Manjung 4 and Manjung 5 projects.

WattsUp: It seems that you played a significant role in the development of the coal-fired power plants in Manjung, Perak. Can you tell us more about it?
Shafii: I was instrumental in the implementation of the projects where my responsibilities include the selection of the contractors for the projects, issuance of Islamic bonds (Sukuk), tax exemption such as duty and sales tax, project insurance policies and logistics. I was also involved in the negotiation and finalisation of the security packages including the power purchase agreements, fuel supply and transport agreement, jetty terminal usage agreement, and operation and maintenance agreement. Some of the accounting works that I assisted in was in relation to the preparation and submission of statutory accounts and the financial year-end audit. I am very thankful for the vast and diverse experience I gained from the projects.

WattsUp: What made you decide to join SB? What do you like about working in SB?
Shafii: I spotted an advertisement on a vacancy at SB where the scope of work entails energy procurement. I strongly felt that my experience in the projects in Manjung would come in handy. The Incentive Based Regulations (IBR) and Imbalance Cost Pass Through (ICPT) offer me new challenges in understanding the fundamentals of MESI.

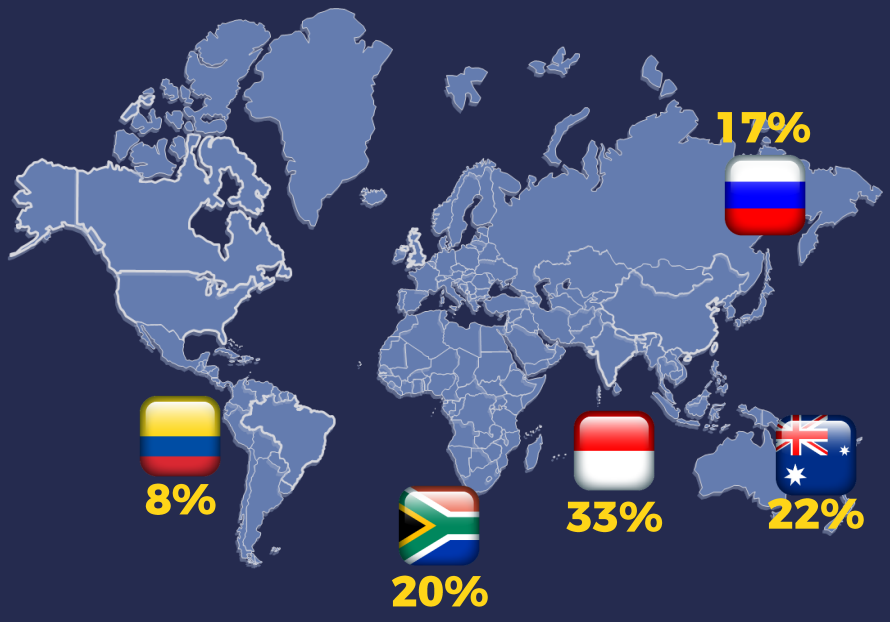
WattsUp: What are the roles of your team at Single Buyer?
Shafii: I am heading the Finance and Enterprise Management team in SB where it is divided into three sections- Settlement & Clearance, Finance & Reporting, and Enterprise Management. My team's roles include invoice verification and settlement for IPPs, ICPT preparation and submission, human resource and enterprise management.

WattsUp: Can you update us on the proposed governance reform for Single Buyer?
Shafii: As a ring-fenced entity under the Electricity Supply Act 1990, Single Buyer has been undergoing a few governance reform initiatives. These reform initiatives are conducted with the objectives to enhance transparency and accountability of Single Buyer in the MESI. Currently, we are awaiting the conclusion of the proposed governance reform studies by ST which are targeted to be completed in the near future.

WattsUp: Tell us a bit of what you enjoy doing in your leisure time.
Shafii: In my free time, I enjoy playing golf and once in a while, I go travelling.

TOP 5 COAL PRODUCERS

OUTLOOK OF TOP 5 COAL PRODUCERS UP TO YEAR 2022

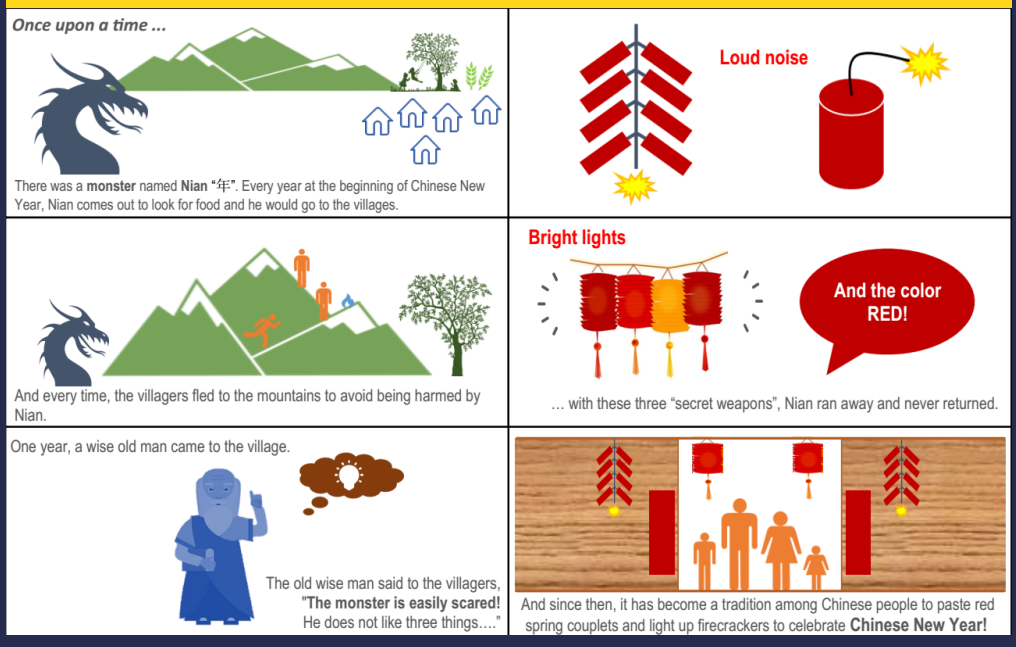


Country	Total Projected Production (million metric tonne)
Australia	1,435
Colombia	525
Indonesia	2,232
Russia	1,159
South Africa	1,320

1 million metric tonne = xxx 5 tonne lorry.

1 million metric tonne of coal can produce approximately 2,200kWh of electricity, equivalent to power up 275 houses a day with an average usage of 250kWh.

SB CORNER
THE NIAN MONSTER
A Chinese New Year Story



WORD OF WISDOM

The strong person is not the one who overpowers and drives his opponent to the ground, but the strong one is he who controls himself when he is angry.

- Prophet Muhammad SAW

CONTACT US

We welcome any comments or content that you would like us to include in the upcoming editions of WattsUp.

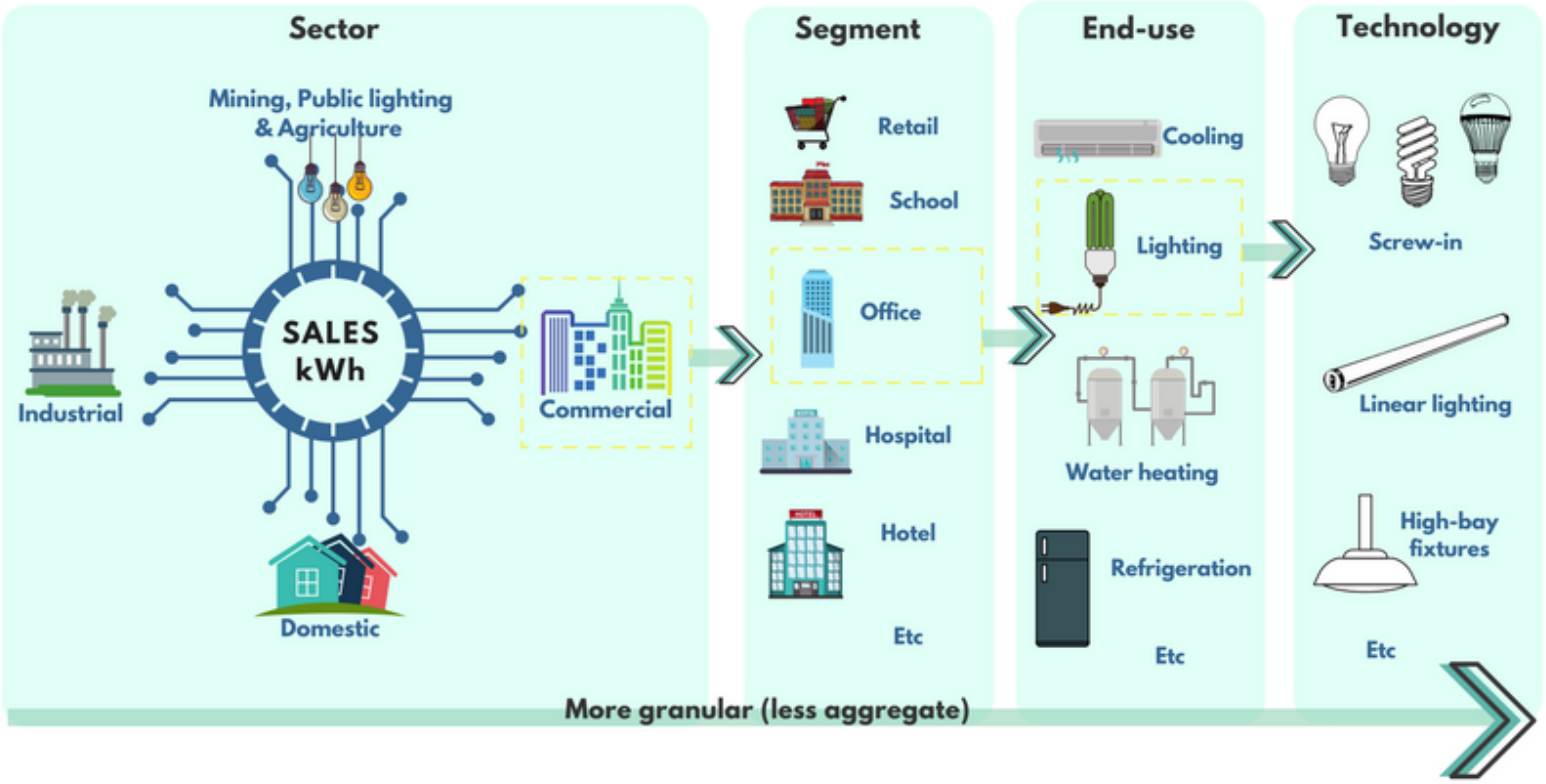
Please email us at sbet@singlebuyer.com.my

FUNDAMENTALS OF

END-USE FORECASTING

WHAT IS END-USE FORECASTING?

An end-use forecasting model builds the forecast from the bottom-up for each customer sector, segment, end use and technology. It uses a deterministic approach with an appliance-stock turnover model, and detailed specification of factors that affect future energy use.



WHY END-USE FORECASTING?

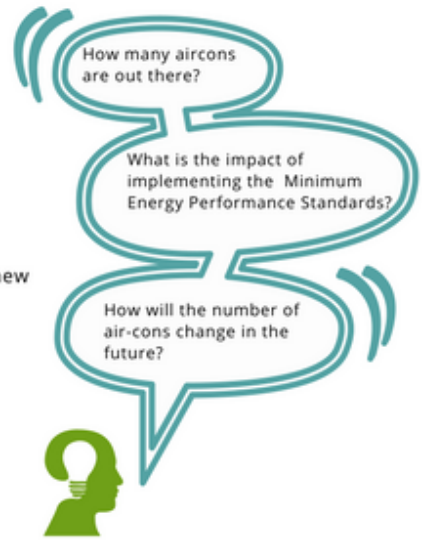
To utilize a complementary modeling approach to develop the load forecast from the bottom-up

To capture new trends and disruptions that may change electricity use, particularly the impact of Energy Efficiency

To perform scenario analysis

To estimate impact of new technologies

It allows us to "tell a story" about what is happening in the market place



FACTORS AFFECTING THE FORECAST

No of households, floorspace and economic growth

EE initiatives: Equipment standards and energy audits

New gadgets, technology and electricity usage

Lower energy use in new buildings and replaced equipments

Increasing appliance saturation

Increasing electricity price

PROS

- Model allows analyst to decompose energy usage.
- Model can easily incorporate new changes into its forecast.

CONS

- Model development is data intensive.
- Quantifying uncertainty of the forecast is difficult.