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Towards a World-Class Energy Sector

ENERGY MALAYSIA

Suruhanjaya Tenaga
Energy Commission

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A Brand New Energy Industry

RP2 Leading the Way for a Brighter Future

MEASURING THE ENERGY COMMISSION'S SUCCESS

Energy Malaysia highlights the achievements during a successful Regulatory Period 1.

ENHANCING SABAH'S SUPPLY

Energy Malaysia shines a spotlight on SAIDI 100 Lab, an initiative to improve Sabah's SAIDI and Sabah Electricity Supply Industry (SESI).

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Kick Starting Regulatory Period 2

The Malaysian energy industry is in transition, and this is best seen in the implementation of the Incentive-Based Regulation (IBR) mechanism as a means of improving the performance and service quality in electricity and gas supply and ensuring more efficient energy pricing. With the foundations for electricity IBR having been successfully set in Regulatory Period 1 (RP1), which ran from 2015 to 2017, we have since embarked on Regulatory Period 2 (RP2) where we will further enhance the IBR mechanism and improve efficiency, clarity and consumer awareness.

On a personal note, I am humbled and honoured to have been named the Chairman as we embark on RP2, as I was the CEO of the Energy Commission when we embarked on RP1 back in 2015. Of course, my role has changed, and instead of leading the execution of policy, I look forward to working with our current CEO Ir Azhar Omar and his team, and offering my support and guidance.

Definitely, the groundwork laid out by my predecessor Dato' Abdul Razak Abdul Majid has ensured that we go into this period in a strong position, so on behalf of everyone at the Energy Commission, we extend our sincere thanks to Dato' Abdul Razak for his excellent leadership and service.

The shift from RP1 to RP2 is a period of transition, and incidentally, the Energy Commission is also transitioning, from being a regulator to being an advocator and educator for the energy industry. But some things will not change. We will still be committed to balancing the needs of different stakeholders, namely the government, energy industry and consumers. We ensure a safe, secure and reliable electricity supply at affordable prices, safeguarding public interest and nurturing economic development and competitive markets in an environmentally sustainable fashion.

The Commission also strives to be transparent in determining electricity price and ensuring that electricity price is fair and affordable through the establishment of a cost-reflective tariff. We have also carried out several initiatives to create awareness and an understanding of how the mechanism works and how tariffs are calculated to further educate the public at large.

The Energy Commission welcomes all to work with us towards achieving a world-class energy sector performance for the nation. EM

Datuk Ir Ahmad Fauzi Hasan
Energy Commission, Malaysia

Internet of Energy to Conquer China's Electrical Grid

China State Grid Corporation is looking to advance its plans for an "Internet of Energy" by looking into block chain technology. The energy giant has detailed its exploration of a blockchain-powered system that it claims can store and track information on consumer's power consumption and share the data in a decentralised manner.

The idea behind the utility's Internet of Energy is to integrate more information about electricity consumption and generation onto the Internet to facilitate data tracking on web-enabled devices. The corporation is proposing a decentralised system that can pass newly generated data through a hash function and store the results on a tamper-proof blockchain. In addition, Bank of China, one of the four state-owned commercial banks, has also moved to patent a solution that it claims has the ability to solve the scaling issues that confront blockchains. – *Coindesk*

Malaysia Beats Singapore, UK in the Race of Electricity Reliability

According to World Bank's Doing Business Report 2018, Malaysia has made it into the top 10 for Getting Electricity.

The nation is ranked eighth out of 190 countries, besting even Singapore, Japan and the United Kingdom, demonstrating the reliability of the country's electrical supply. In the report, it states that it takes 31 days to get connected to the electrical grid in Malaysia, compared to 78 days across high-income economies.

The ranking was achieved through close cooperation between the nation's largest electricity utility supplier, Tenaga Nasional Bhd (TNB) and the Energy Commission. – *New Straits Times*

Source: AFP / JOE RAEDLE

Solar Power for New Homes

California has decided to take a giant leap by making a requirement that all new homes must have solar power. The initiative will take two years to be fully implemented, but it gained entry into the mainstream like never before. Though there were concerns that it might add thousands of dollars to the cost of home, state officials and clean-energy advocates say that the extra cost would be compensated in a form of lower energy bills. That prospect has won over even the construction industry, which has embraced solar capability as a selling point.

Several Californian cities require that some new buildings include solar power, or have made commitments to 100 per cent clean energy through various sources. California law requires at least 50 per cent of the state's electricity to come from non carbon-producing sources by 2030. Solar power has increasingly become a driver in the growth of the state's alternative energy production.

Next year, a new rate structure will be introduced whereby customers will be charged based on the time of day they use electricity. Therefore, homeowners with energy-efficiency features, especially a battery, which would allow the storage of energy when it is most efficiently used, could lead to a lower cost. – *The New York Times*

"I'm really happy to get this to the finish line. One big step for mankind."

– Andrew McAllister,
California Energy Commission.

Sarawak Gas Fields Under Sapura Energy

Under phase one of the SK408 production sharing contract (PSC), Sapura Energy logged its largest single-day price gain since its listing six years ago to finish a fifth higher to 64.5 sen after it announced it was proceeding with the development of the Gorek, Larak and Bakong gas fields off Sarawak. Sapura Energy said the development and production operator of the Larak and Bakong fields would be its wholly-owned subsidiary.

Sapura Exploration and Production (Sarawak) Inc (Sapura E&P), and Sarawak Shell will be the development and production operator of the Gorek field. Sapura Energy added that the fields under the SK408 gas field development project are part of the discoveries made by Sapura E&P in its 2014 drilling campaign. The fields will be developed as three separate well-head platforms tied back to the existing Sarawak Shell-operated F6 processing facility. – *The Edge*

"The SK408 gas fields will be Sapura E&P's second major upstream gas development project in East Malaysia, after the successful development of and commencement of production at the SK310 B15 gas field."

– Sapura Energy

Collaboration for Renewable Energy

Cypark Resources Bhd and German-based 21st Century Clean Energy GmbH & Co KG will be collaborating in energy storage projects and to expand business opportunities in renewable energy (RE) in Malaysia.

Cypark said its wholly-owned subsidiary Cypark RE Store Sdn Bhd had signed a Memorandum of Understanding (MoU) with 21st Century to formalise the cooperation. It further added that the MoU comes into effect on the date of signing and will remain effective for two years and may be extended for a further period as may be agreed in writing by both companies. The MoU entails cooperation in developing business and marketing strategies for potential clients for battery energy storage projects in all over Malaysia. – *The Edge*

OUT WITH THE OLD, IN WITH THE NEW

Welcoming Regulato

Malaysia's energy sector is in transition, and this is best reflected in the adoption of the Incentive-Based Regulation (IBR) framework in the electricity tariff determination. Having been introduced in 2014 (Trial Period), the roll-out of IBR for Regulatory Period 1 (RP1) continues from 2015 till 2017. Halfway through 2018, ***Energy Malaysia*** takes a look at the achievements of RP1 and the aims of Regulatory Period 2.

ry Period 2

Source: AFP

Looking Back to RP1

Last year, the Energy Commission evaluated the effectiveness of the IBR mechanism during RP1 in order to ensure affordable tariffs in Peninsular Malaysia. What makes IBR effective is that tariffs are calculated based on efficient cost (CAPEX and OPEX), return and other associated parameters.

RP1 has become the learning journey for both TNB and the Commission as the regulator. As the learning curve prior to implement IBR in RP1 is very steep, assistance and advice from consultants and industry experts were required. Also, the Regulatory Implementation Guidelines (RIGs) that was first published in 2012 for RP1 implementation is now being revised to add and amend the provisions, as well as to increase the clarity based on the lessons learnt in RP1 and the evolving landscape of the industry.

One huge achievement for the Commission is the increased awareness regarding IBR in the industry. With the unbundling of the TNB cost component, the Commission has become more transparent in its Regulatory Implementation Guidelines (RIGs).

Moving Towards RP2

The IBR mechanism has carried on to RP2 for the following three years from 2018-2020. In RP2, the Commission is looking to further enhance the mechanism and at the same time, improve clarity, efficiency and continue to enhance the consumers' awareness.

Additionally, the Commission keeps TNB in check with regards to their compliance with all regulatory and licence conditions. Comprehensive checks and balances are also to be carried out to ensure that the Commission will uphold the highest standards of governance during RP2.

There is a need to educate the public to fully understand the costs in the electricity supply chain which make up their electricity bill. The Energy Commission has taken several initiatives to create awareness on the subject matter. For example, they educated the public at large through various channels – website, advertisement and magazine articles. Engagement programmes with stakeholders have also been carried out to relieve them of their concerns regarding the implementation of RP2. All in all, the Commission has become more customer-centric in

Moving towards Regulatory Period 2 (RP2), the Commission is ensuring that the consumers are well aware of the tariff rates and how it is determined while simultaneously improving the security of supply and efficiency.

the hope of gaining more confidence from the public.

Taking one step further, the Energy Commission also organised forums for their stakeholders in which they share the best practices of other jurisdictions whilst simultaneously providing a platform for public to share their views.

As the regulated entity, TNB plays an important role to ensure the success of IBR and ICPT. Its Regulatory Economics and Planning Division (REAP) has been tasked and largely involved in the development of the overall IBR RP1 and RP2 proposals.

REAP is also responsible for the planning, coordinating as well as providing advice on directions and strategy to TNB with respect to regulatory submission while serving as the interface with ST for IBR-related matters. Post-tariff determination, REAP has to ensure that all Regulated Business Entities within TNB operate in a cost-efficient manner, invest prudently and efficiently in assets and achieve the performance targets whilst ensuring quality, reliability and efficiency of electricity supply to consumers.

Facing the Challenges

There are certain challenges faced that may impede the success of RP2 in terms of governance, transparency efficiency and reliability.

In terms of governance, Ir. Azhar Omar, the CEO of the Energy Commission said that the Commission's main role is to ensure TNB complies with all regulatory and license conditions, to have a comprehensive checks and balances to ensure that the Commission will uphold the highest standards of governance and to enhance the standard of reporting.

The Commission also strives to be transparent in determining the electricity price, ensuring that electricity price is fair and affordable and at the same time establish a cost-reflective tariff for an efficient and fair tariff design. Ultimately, they want to enhance the communication with the public and stakeholders.

Based on the policies and procedures stipulated in the RIGs, the Energy Commission is determined to improve the accuracy, efficiency and transparency of IBR process. They also strive to deliver efficient and reliable electricity supply at the lowest efficient cost.

TNB also faced some hurdles during RP1, such as the lower actual demand than what was forecasted. Back in 2012, TNB forecasted the demand growth of between 3.3% to 4.2% for the Trial (2014) and RP1 (2015-2017). However, the actual demand growth recorded was only from 1.7% to 1.9%, partly explained by the structural changes in the Malaysian economy which is shifting from manufacturing/ industrial to a service-based economy as the country moves towards becoming a high-income nation. Another reason for this slowdown in electricity growth is due to the increased penetration of Renewable Energy (RE) and awareness on energy efficiency (EE) . Therefore, many planned development projects linked to electricity demand were revised. The allowed revenue that has been factored in the base tariff calculation from projects that did not materialise in RP1 were returned to the customers via a deduction in the allowed revenue for RP2. In RP2, the forecast for demand growth has been revised to a range of 1.8% to 2.0% to reflect the above factors, including the growing trend of Electric Vehicles (EVs) in Malaysia.

The implementation of IBR and ICPT was not without challenges from investors' confidence point of view. One instance worth highlighting was the temporary slump in TNB's share price during the first ICPT implementation in March 2015, as investors were still uncertain on the IBR implementation and lack understanding on ICPT mechanism. Over the years and moving into RP2, investors have gradually gained confidence with the ICPT that is being implemented periodically (i.e. every 6 months) and have the assurance that fluctuations in fuel prices which are beyond utility's control will be addressed accordingly.

Implementing a new framework such as IBR and ICPT requires coordinated efforts of all stakeholders in the industry with policy guidance from the Government. In RP1, TNB had conducted many engagements, educational and awareness sessions as well as capacity building to

"The Commission's goals have always revolved around security, affordability and environmental sustainability. We want to become an effective regulator, be more consumer-centric to protect the consumer and consumer's interests while also making sure that sustainability is on the top of our list."

– Ir. Azhar Omar,
CEO of the Energy Commission

its stakeholders. TNB will continue to carry out these efforts during RP2 the keep abreast of the evolving economic regulations.

Joining Hands in a Learning Journey

Internally, TNB has experienced a lot of changes in its structure and processes. In RP1, TNB established a dedicated department to manage all IBR-related matters and redefined the departments/ divisions, based on the managed market model structure described in the RIGs which is linked to the components that make up the overall tariff. Additional reporting requirements to the Commission were also introduced and financial discipline was emphasised in order to ensure TNB operates within its allowable CAPEX and OPEX. In RP2, these processes will be continuously improved by introducing automation and managing changes effectively across TNB.

TNB has passed-through RM6.3 billion worth of ICPT rebate to consumers up to June 2018 under the IBR implementation. ICPT allows TNB to pass-through any variance in actual fuel and generation costs as compared to the base costs to the consumers. In RP2, ICPT will continue to be in place as stipulated in the RIGs. Several Regulated Business Entities (RBEs) under TNB that managed to deliver efficiency savings in their RP1 OPEX are incentivised with the Efficiency Carryover Scheme in their respective allowed revenue in RP2. This is in line with IBR approach that encourages the delivery of cost-efficient services.

TNB remains committed to increase its efficiency and productivity by achieving the target set by the Commission in RP2. TNB has performed well in the majority of the Performance Indicators (PI) during RP1. For a start, during RP1, the PIs were set only for monitoring purpose with no monetary incentive and penalty being imposed. Most of the PIs were geared towards ensuring compliance and measured key technical operational performance such as SAIDI and System Minutes. The parameters were set by the Commission in order to balance the stakeholders' expectation, associated investment required to achieve the targets as well as TNB's historical performance. These targets were also benchmarked against best practice or standard. For RP2, the monetary incentive or penalty mechanism will be applicable, in which TNB will be rewarded or penalised based on its operational performance. For RP2, along with the key technical PIs, new areas are also being measured and monitored such as safety, customer satisfaction, EE initiatives and RE connectivity.

Innovations in RP2

The highlight of the innovations is the implementation of Advanced Metering Infrastructure (AMI) which will see 1.5 million of Smart Meters to be installed in customer's premises in Klang Valley and Melaka. TNB and

"Malaysia is the second country in Asia to implement IBR after Philippines. During RP1, the framework was new to everybody so we focused more on engaging, increasing awareness and educating. For RP2, we are looking forward to more savings, more innovations and more consumer participation."

– Ir. Joon Ibrahim,
General Manager (Regulatory Economics)
Regulatory Economics and Planning Division, TNB

the Energy Commission are looking forward to complete the installation of 1.5 million of Smart Meters as planned and to prepare for the following phase of installation in the next RP. AMI will provide a new environment for greater involvement from the customers. It will enable TNB to improve its services by empowering the customers to better control their electricity consumption and production.

According to Ir. Joon Ibrahim, the General Manager of Regulatory Economics Department, with this, TNB is expecting more participation by the consumers in Distributed Generation (DG) using clean energy, smart homes and energy efficiency initiatives. TNB is also aiming to see more efficiency savings in its OPEX as a result of the investment in technologies coupled with other internal initiatives on increasing productivity and cost-saving. Meanwhile, CAPEX will be spent prudently according to the plans approved by the Commission. Project development will be regularly tracked and monitored while procurement process is improved to ensure timely completion within the approved budget. The investment in modernising the grid is important to ensure high reliability and efficiency of supply to the customers despite the increasing penetration of Renewable Energy (RE) and Electric Vehicle (EV) into the system. In addition, this modern grid will open up opportunities to improve customer experience with fully digital touchpoints, higher billing accuracy, faster fault restoration time and integration to homes energy management system to further encourage energy efficiency.

This is also in line with the Government's National Green Agenda and the delivery of the next level of operational efficiency and reliability. Grid of the Future (GoTF), as TNB would like to call it, is the modern grid and smarter network that has robust capability for bidirectional flows of electricity, dynamic operations and self-healing. Apart from AMI as the key component, GoTF also comprises other projects such as Distribution Automation (DA), Mobility Solutions, Geospatial Information System (GIS), LED Streetlighting and Volt-Var Optimisation (VVO). Cumulatively, under the GoTF, these projects will increase the grid efficiency, reliability and resiliency, as well as providing seamless integration with the DG and the emergent technologies of energy storage and microgrid. The approved CAPEX under the IBR RP2 for these innovations amounts to RM2.7 billion.

For RP2, the Energy Commission's role stays the same – a regulator and an educator. Apart from enhancing their own governance, they also hope that every unit in the commission will be able to cross-function, becoming more efficient in their journey towards a better, more transparent system for Malaysia. EM

THE ENERGY SECTOR DURING RP2

WHAT HAPPENS NOW?

The industrial sector is looking forward to fully embrace the transition to further enhance the development of their respective businesses parallel to the Regulatory Period 2 (RP2).

Under the Incentive-Based Regulation (IBR) mechanism, the second phase of the regulatory period is not only affecting the energy sector, but also other industries. ***Energy Malaysia*** highlights the changes within industries and how their development is parallel to the transition of the energy supply industry.

The IBR mechanism has shifted the power utility regulatory framework paradigm from cost of service, which focuses on building electricity infrastructure at an affordable cost. The first regulatory period (RP1) was a learning period to set up a better regulatory framework, which in turn would benefit consumers in terms of price and quality of service.

As part of RP1, Tenaga Nasional Berhad (TNB) adopted a system to ensure a fair rate of return, while the government developed a transparent economic regulatory regime for TNB. This mechanism provides a systematic way to incentivise or penalise the power utility based on a set of performance indicators. Through this, consumers are assured reliable electricity at prices that are on par to the standard and quality of service they receive.

"The removal of subsidies would allow the ICPT to perform as expected in RP2 as this will contribute to the development of renewable and energy efficient technology in the energy industry in Malaysia."

– Professor Dr. Nofri Yenita Dahlan
Associate Professor of Universiti Teknologi Mara

For a Better Regulatory Period

Although the implementation of RP1 was successful, there is still room for enhancements. According to Associate Professor Dr. Nofri Yenita Dahlan, Senior Lecturer of Electrical Engineering at Universiti Teknologi Mara (UiTM), hiccups in the implementation of IBR in RP1 should be reviewed and strategic regulatory process should be developed in RP2.

One unusual scenario seen in RP1 was where a negative peak demand growth was recorded for the first time in the history although economic development was healthy. Dr. Nofri opined that an accurate demand forecast influences electricity system planning hence the setting of the new base tariff. Therefore, it is vital to establish a mechanism to accurately forecast consumer demand integrating the impact of energy efficiency and renewable energy.

Additionally, consumers are demanding more control and information regarding their energy consumption. Active participation from consumers can be increased through the implementation of smart meters, energy storage and energy consumption control solutions. Dr. Nofri noted that the role of consumers should not be limited to use of energy only, but it also should be extended to also produce, sell energy and provide reserve service to utility company.

Malaysia's electricity tariffs are among the lowest compared to other countries in the ASEAN region. With that said, efficient tariff designs could strongly affect and influence consumers' responses in using energy efficiently. Furthermore, removing subsidies would allow the Imbalance Cost Pass-Through (ICPT) to perform as expected in RP2 where consumers should also be sharing their commitment.

RP2 Enhancing Industries

In the industrial sector, Special Industrial Tariff (SiT) was gradually removed in RP1 and replaced with the more effective time based Enhanced Time of Use (ETOU) pricing. ETOU is expected to be improved in RP2 to offer a better tariff structure to industry and in support of Demand Side Management (DSM) programme in Malaysia.

ETOU pricing allows industrial consumers to manage their electrical consumption efficiently by using less electricity during peak hours. One major infrastructure development initiative which will be realised in RP2 is the installation of 1.5 million Smart Meters thus increasing the effectiveness of ETOU and DSM programme.

Furthermore, the IBR mechanism in RP2 offers additional support for Green Generation Project where up to 200 MW of Solar Photovoltaic (PV) generation will be traded under the Single Buyer Operation (SBO). Industries could benefit from this support by becoming producer or offering their rooftops for the solar PV installations.

In addition to that, RM 1 billion has been allocated for awareness and education programme on Smart Meters, ETOU and DSM implementation, energy efficiency project and the Malaysian Electricity Supply Industry (MESI) structural training for SBO and Grid System Operator (GSO).

For the upcoming three years, the energy sector is gearing itself to fully embrace the second regulatory period. The industrial sector is eager to see the changes that they can make the most of to improve and enhance their respective businesses. EM

Keeping Up with the KPIs

Key Performance Indicators (KPIs) are a great way to measure how effectively an organisation or company achieve their goals. In this case, ***Energy Malaysia*** takes a look at Suruhanjaya Tenaga (ST) set KPIs for Tenaga Nasional Berhad (TNB) to ensure the utility company operates efficiently and effectively, and at the same time that it is ready for Regulatory Period (RP) 2.

A Viable Benchmark

KPIs represent an integral part in the IBR framework. ST sets performances in which TNB has to meet in order to supply a continuous and reliable source of energy to the consumers. In order to benchmark the utility's Regulated Business Entities (RBEs), ST had introduced the incentive and penalties mechanism. RBEs are required to report their KPIs quarterly and annually to ST to ensure they are kept in check.

Any company's main goal is to achieve the most profit with the least amount of cost incurred. RBEs have incentives to reduce its costs. Reductions can come in the form of improving efficiency but also through lowering quality of service as well. KPIs can be used to ensure that the latter incentive will be avoided. ST would penalise entities for lowering the quality for gains while at the same time reward them for improving it.

Performance indicators set by ST was not meant as a form of punishment but as a framework that would encourage RBEs to pursue efficient means through operational performance.

These rewards and penalties are expressed as a percentage of the Annual Revenue Requirement (ARR) for RBEs to which the KPI applies. The reward or penalty mechanism incurred will rise linearly up to a cap.

TNB would send the proposal to ST on the RBEs' performance indicators (PIs) that will be focused on. ST will later analyse the proposal and decide whether the reward or penalty is fair. For example, the Single Buyer (SB) will be awarded an incentive if it is able to achieve accuracy in the day-ahead generation schedule. However, failing to do so, a penalty will then be imposed. TNB agrees to the mechanism as the performance is based on a large automated process with generator with minimal errors.

KPIs in Regulatory Period

Although the review period has only been going on for 3 years, TNB has met almost all of its targets. During RP1, four RBEs were monitored for their KPIs – Customer Services, Transmission, Single Buyer and Grid System Operator. There were a total of 14 PIs, all of them were set using the symmetrical PI mechanism only.

These rewards and penalties were expressed as percentage of the ARR of the RBEs to which the KPIs applied.

In Customer Services, the RBE managed to consistently record a below average System Average Interruption Duration Index (SAIDI) level of 55 minutes per customer for three years running. For the compliance to the Minimum Service Level (MSL) and Guaranteed Service Level (GSL), Customer Services has always managed to be in the incentive or neutral region. This shows that this regulated entity is keeping up with its standards or otherwise improving itself.

Transmission was divided into three parts – system minutes, system availability and project delivery index. All of the divisions target was met. One highlight was the Transmission achieved excellent performance in Project Delivery Index in which the score was

KPIs set for TNB by the Energy Commission ensure the steady supply of electricity to end users in Malaysia.

KEY PERFORMANCE INDICATORS (KPIS) ACHIEVED IN REGULATORY PERIOD 1 (2015–2017)

Customer Services

- SAIDI
- Average of MSL Compliance Performance
- Weighted Average GSL (3, 4, and 5)

- *CS managed to consistently record a SAIDI level of below 55 minutes/customer/year for three (3) years in a row.*
- *For the compliance to the Minimum Service Level (MSL) and Guaranteed Service Level (GSL), CS has always managed to be in the incentive or neutral region.*
- *Overall, this achievement translates into a sustained reliability standard and improved customer services.*

Transmission

- System Minutes
- System Availability
- Project Delivery Index

- *System Minutes was kept lower than the 1.5 minutes target.*
- *System Availability improved from 99.11% in 2014 (neutral band) to 99.77% in 2016 (incentive band).*
- *Transmission also achieved excellent performance in Project Delivery Index (PDI) in which the score was always in the incentive region for each year of assessment.*
- *The past investments in the transmission grid have paid off in terms of benefitting the customers through increased system reliability and availability.*

Grid System Operator

- System Average Cost
- Compliance to Timely Settlement of Generators' Invoices
- Non-Compliance to Malaysian Grid Code (MGC)
- Non-Compliance to Single Buyer Rules (SBR)

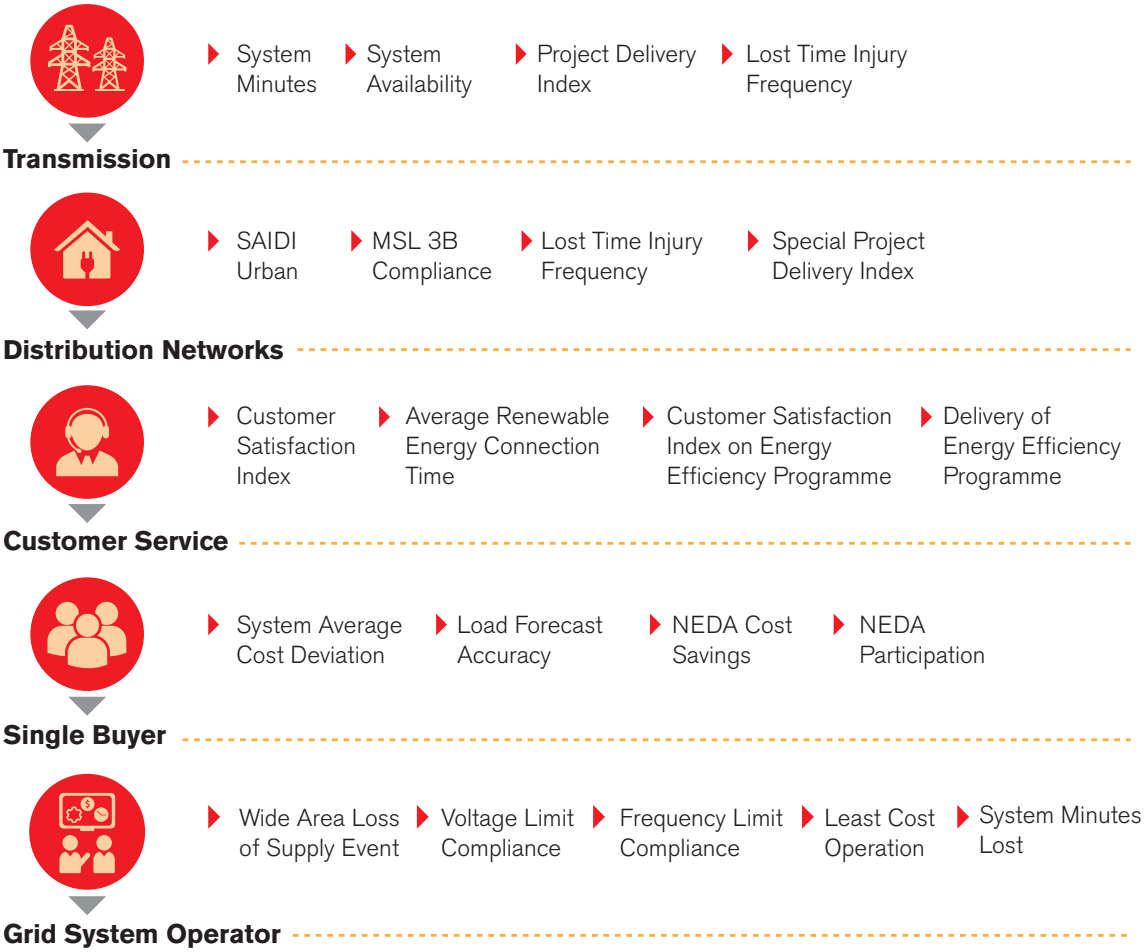
- *For the 3-year period under review, there was no occurrence of Wide Area Loss of Supply Event recorded.*
- *Likewise, GSO scored 100% for both Voltage Limit Compliance and Frequency Limit Compliance.*
- *In line with the least cost dispatch principle, the percentage Dispatch Adjustment had been minimal, below the approved upper bound cap.*

Single Buyer

- Wide Area Loss of Supply Event
- Security Limit Compliance: Voltage Limit Compliance (VLC)
- Security Limit Compliance: Frequency Limit Compliance (FLC)
- Dispatch Adjustment

- *The System Average Cost was in the incentive region for the entire 3-year period.*
- *SB also recorded 100% compliance to Timely Settlement of Generators' Invoices as well as zero Non-Compliance to MGC.*

TARGET KEY PERFORMANCE INDICATORS FOR REGULATORY PERIOD 2 (2018–2020)



always in the incentive region for each year of assessment.

For the Grid System Operator, there was no occurrence of wide area loss of supply event ever in the nation which was a huge achievement. Reports also shown that in line with the least cost dispatch principal, the percentage dispatch adjustment had been minimal, below the approved upper bound cap. Single Buyer also improved as well, recording 100% compliance to Timely Settlement of Generators Invoices.

This goes to show that the performance indicator framework is effective in measuring the performance of these RBEs. RBEs will strive for efficiencies in terms of operational performance, as RBEs retain efficiency gains for the current regulatory terms and carry forward the efficiency gains going into RP2.

Going into RP2

Despite the RBEs meeting almost all of their targets, ST is implementing a more stringent standards of measurements to further improve their performances. For RP2, 5 RBEs will be operating under IBR framework with the separation of Customer Services and Distribution Network.

The usual default mechanism used are usually asymmetrical by default. However for RP2, there are some instances where an asymmetrical mechanism is more appropriate. For example, consumers are already paying for tariff regardless in the improvement made through performance, therefore a penalty-only mechanism should be appropriate. This signifies that, consumers expect a certain level of performance that is in line with what is paid for by consumers.

KPI remains a key aspect to any organisation towards furthering their objectives. For ST, it is paramount that KPIs is used not only to keep the utility company in check but also to ensure a sustainable and continuous supply of electricity is delivered to its consumers. EM

BLACKOUT?

KNOW YOUR RIGHTS

WHAT IS GSL?

Guaranteed Service Levels or GSL are the required levels determined by ST to ensure the quality of TNB's delivery services.

Upon failure to comply, penalty will be imposed on TNB in the form of rebate to consumers for:

GSL 1: Number of unplanned interruptions experienced by a consumer.
GSL 2: Time taken to restore electricity supply following:

- Outage Caused by minor distribution network fault
- Major Incident on distribution supply network except natural disaster or weather-related incident.
- Major incident on grid or transmission system except natural disaster

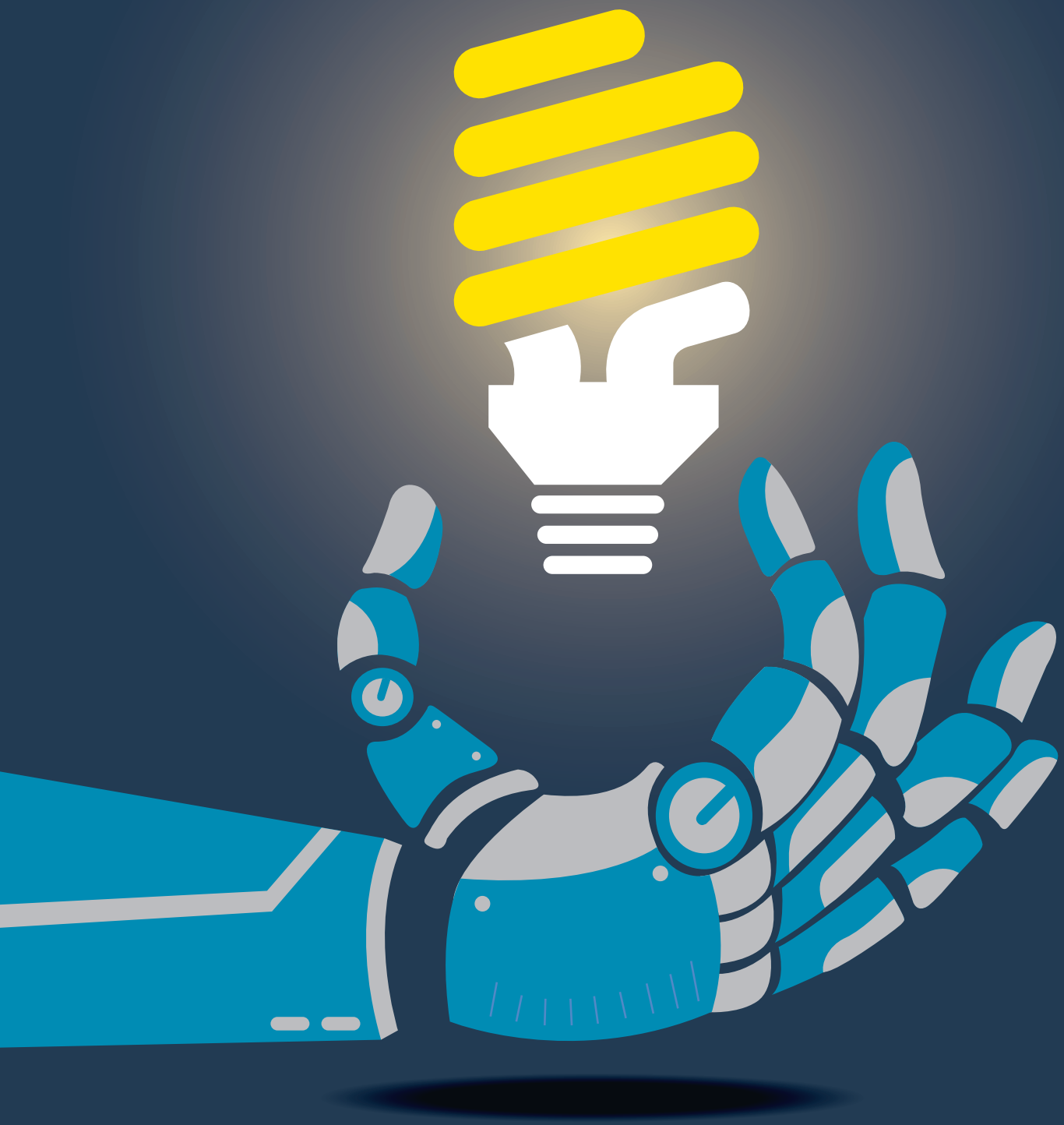
For further information, go to:

www.st.gov.my

Suruhanjaya Tenaga (Energy Commission of Malaysia)

Suruhanjaya Tenaga
Energy Commission

BE ENERGY SMART



A TECHNOLO

Artificial Intelligence

GICAL CHANGE

Artificial Intelligence, or more commonly known as AI has been taking over the world one technological upgrade at a time. The AI is a branch of computer science that deals with the ability of machines to learn, adapt and function like humans. This was, in fact, a bit of an incredible non-possibility before the advent of the Fourth Industrial Revolution. In relation to this, the energy sector is no stranger to the AI approach. Due to soaring competition and advancing technology, the energy sector is quite acquainted to quick changes in the many angles of this industry, especially in its efforts to stay on track.

The Game Changer

The use of AI in the energy sector has made rapid headway, especially in developed countries.

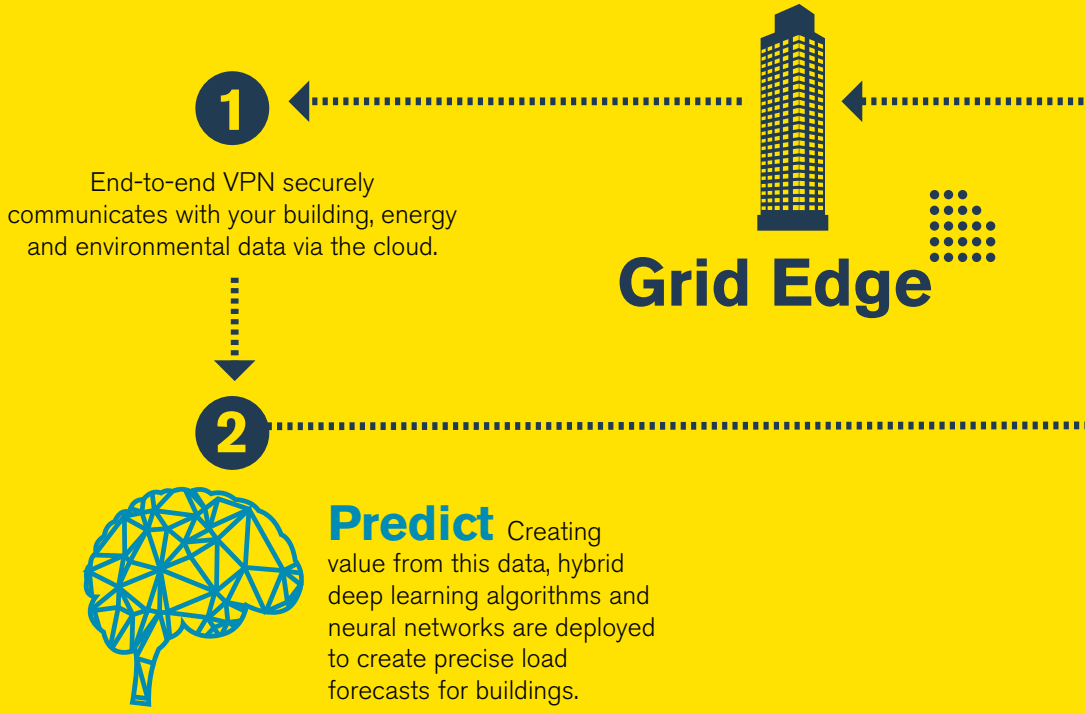
In the United States, Stem, a leading energy storage company that provides technologically innovative solutions for energy consumption, has newly developed an energy storage network called Athena, which harnesses the power of AI to chart customers' energy consumption. In addition, it can also aid in determining the constant shift in energy rate which is the price paid for energy consumption. This, in turn, ensures a much efficient use of energy.

Over in the UK, the software called Grid Edge uses AI to help with energy management. Once connected to a building, Grid Edge manages a system that analyses its energy data. The information collected is then transferred to a connected grid, which in turn plans out a strategy catered towards saving energy in that building. This approach allows consumers to be more in control of their energy consumption.

The Alphabet 'Nest', a smart thermostat that adjusts temperatures by analysing the daily habits of occupants at home to reduce energy consumption.

Apart from energy storage and management, AI is also gaining the interest of energy giants in terms of failure management. Due to lax regulations and inconsistent checking of equipment, accidents - sometimes fatal - in energy power plants are not unusual occurrences. A recent example would be the explosion that took place at the

How It Works

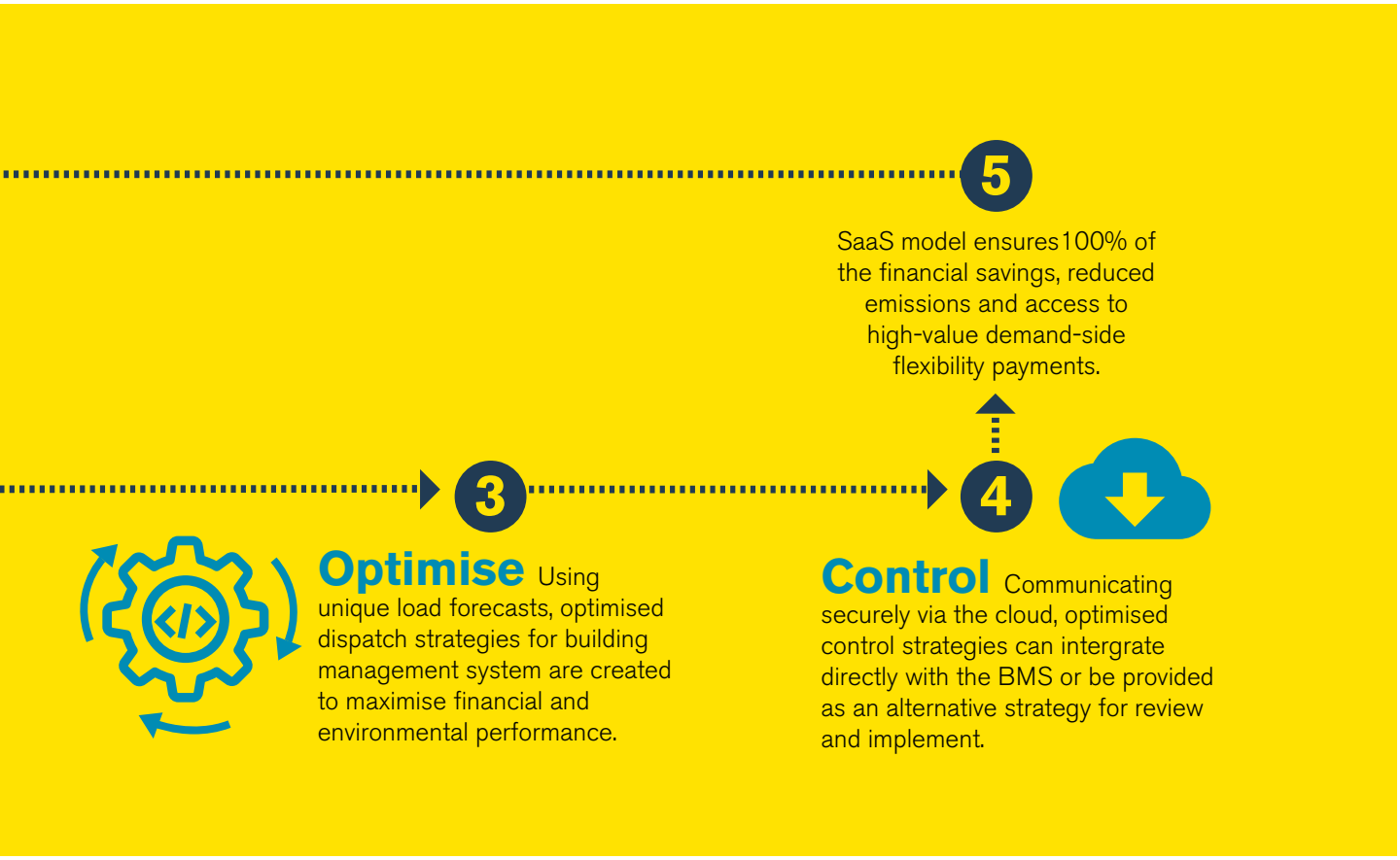


coal-fired power plant in India in November 2017. Unchecked blockages in a gas pipe caused about 32 lives. Experts believe that mishaps like this can easily be avoided by using AI to do the work that may be difficult or even dangerous for us.

By using AI, equipment faults can be detected in real time and fixed before any untoward incidents take place, thus saving time, expenses and, most importantly, lives. SparkCognition, a company based in Austin, Texas, provides such a service to coal-fired power plants. With a combination of applications, it is able to collect information to predict the high probability of equipment failures. The data collected will then be passed on to the right sources, ensuring problem rectification without due delays.

Energy consumption can also be optimised by utilising solutions offered by artificial intelligence companies. The smart thermostat, Alphabet's 'Nest' – a Google-affiliated AI initiative – is a home-level equipment that adjusts temperatures automatically by analysing the daily habits of home dwellers. By doing so, energy consumption is able to be reduced as unnecessary electricity usage plays no part anymore. Nest reports that this technology has helped reduce heating bills by up to 12%.

On a larger scale, Nnergix is a company in Spain that does energy forecasting. It is especially catered to weather-dependent renewable energy like wind and solar. Considering that weather is most often unpredictable, Nnergix has incorporated artificial intelligence for better forecasting accuracy. This will, in turn, help with efficiently balancing between supply and demand.



Source: http://www.gridedge.co.uk

Doing It the Malaysian Way

While Malaysia may not be on the fast track of AI development, it is certainly making its way along this path, at a slow but steady pace. For instance, the smart meters which will be implemented nationwide by 2021. Meter reading as a job will then be redundant as physically travelling to each house would not be necessary. Accurate reading will also be guaranteed, avoiding any human tampering. Smart grids are also being experimented, and are now in an initial-stage project. These grids will be able to control energy consumption in the nation, reducing energy usage and wastage dramatically.

As digitalisation and artificial intelligence go hand in hand, Cheah Wai Seng, Accenture's Managing Director of Resources who strongly supports the incorporation of digitalisation in the energy sector, reports that players in the energy industry such as Tenaga Nasional Berhad (TNB) – to name the largest energy corporation – are investing in technologies that will be able to step up the game. Artificial intelligence also spells operational efficiency, definitely a profitable prospect in the Malaysia energy sector. EM

SAIDI 100 LAB: *POWERING UP SABAH*

For years, the Sabah Electricity Supply Industry has been facing various challenges that impede its reliable supply of electricity to end consumers. The government alongside the Energy Commission have been lending a helping hand with numerous initiatives such as SAIDI 100 Lab. ***Energy Malaysia*** shines the spotlight on SAIDI 100 Lab, which is powering up Sabah electricity supply industry.

Breaking Down the Crisis

The System Average Interruption Duration Index (SAIDI) is an index utilised to measure the reliability of the electricity supply in a certain state, territory or nation. This is done by calculating the average number of minutes of interruptions that each customer faces with the use of data such as time, duration per customer, extent and cause of supply disruption.

In Sabah, the Sabah Electricity Sdn Bhd (SESB) is responsible for its electricity supply. Although its SAIDI has been showing improvements over the past few years, it is still relatively high in comparison to Sarawak and Peninsular Malaysia, at 311 minutes per customer in 2016.

The Sabah Electricity Supply Industry has been facing various challenges and ST alongside SESB are determined to improve the SAIDI in Sabah through the SAIDI Sabah 100 Lab and TaskForce 150 (TF150).

As the electricity supply and demand continue to rise, the process of electricity being generated and distributed to end users will require continuous improvement, to ensure that the supply being delivered to the end users is reliable and of an acceptable quality.

Sabah Electricity Supply Industry (SESI) is also dealing with a lot of challenges that needs to be addressed to ensure the sustainability of the industry. Other than tariff not being cost-reflective, generation cost is also high with imbalanced and undiversified fuel mix. The current planned fuel mix for Sabah, which is not economically efficient, will continue to burden the industry.

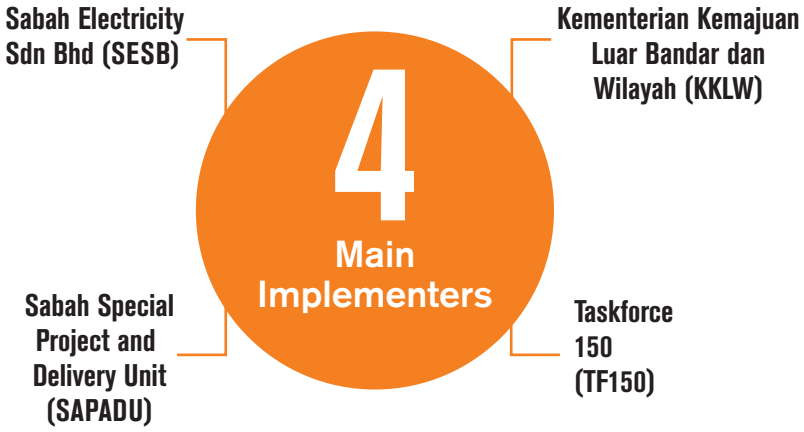
The formula used for SAIDI

$$= \frac{\sum \text{Customer Interruption Durations}}{\text{Total number of customers served}}$$

$$\text{SAIDI} = \frac{\sum U_i N_i}{N_T}$$

where N_i is the number of customers and U_i is the annual outage time for location i and N_T is the total number of customers served.

Source: Suruhanjaya Tenaga



Source: Suruhanjaya Tenaga

Having difficult financial status, SESB is largely reliant on subsidies and government grants to keep them afloat. A significant of funding has been provided to them by the government since their privatisation.

Another key issue for SESI is that there is no comprehensible electricity industry policy. As a result, there is no clear direction and moving forward of the industry which stalls the development of SESI as a whole.

Enter the SAIDI 100 Lab

SAIDI 100 Lab was incepted to address the dire issues at hand. It is a multi-disciplinary team with members comprising from both the public and private sector. For a period of 4 weeks, this elite team develop strategies and then, the strategies are translated into a detailed 3 phase implementation. This implementation allows the service provider to execute the plans and ultimately provides quality to the consumers.

Utilising the Big Fast Results (BFR) Methodology © developed by PEMANDU, the Lab has produced a report of more than 600 pages which covers 41 initiatives with more than 500 projects – in terms of generation, transmission, distribution and Sabah Electricity Supply Industry. Further, they have also identified 139 Key Performance Indicators (KPIs) which is to be achieved by 2020.

From 2010 to 2017, Sabah's SAIDI dropped by 64.95%, with the figure in 2017 standing at 240.9 minutes/consumer. While there is still room for improvement, it should be noted that the SAIDI is well under the threshold of 250 minutes/consumer which has been set for Sabah. Long term, the target set out by the Lab is to achieve 100 minutes per consumer by 2020.

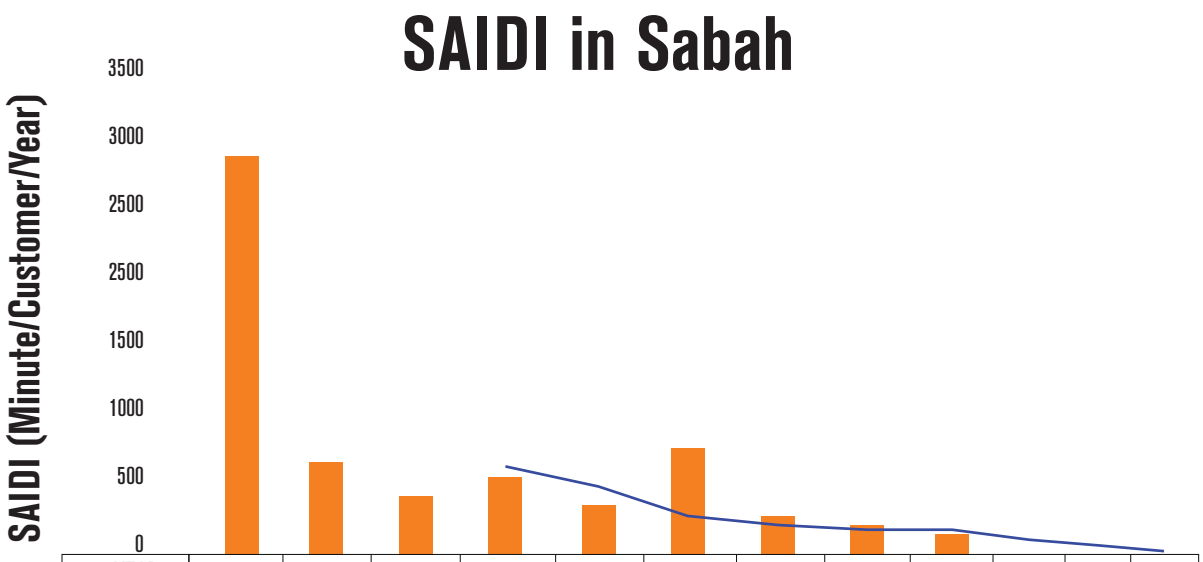
A Game Plan for the State

To achieve that, it is vital to introduce a structured pricing mechanism for electricity tariff setting in the form of the Incentive-based Regulation (IBR) mechanism. Under IBR, SESB will be

Sabah's electricity area is divided into three different sectors namely, Sector 1, Sector 2 and Sector 3. Of all these sectors, only Sector 2 achieved their SAIDI target for 2016.

Sector	Location	SAIDI Target	SAIDI Achieved
1	Kota Kinabalu, Labuan, Tawau, Sandakan	150	236.56
2	Tuaran, Ranau, Beaufort, Papar, Keningau, Kota Belud, Kudat, Kota Marudu, Semporna, Lahad Datu	400	380.48
3	Sipitang, Kuala Penyu, Tambunan, Tenom, Pitas, Kunak, Beluran, K. Kinabatangan, Telupid	230	436.05
	Total	250	311.01

Source: Suruhanjaya Tenaga



YEAR	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SAIDI	2868	687.39	494.64	556.86	423.99	777.26	379.26	311.01	240.9			
Target				650	450	350	280	250	250	200	150	100

Source: Suruhanjaya Tenaga

able to recover its operating costs in addition to attracting capital to fund the future expansion of electricity supply. The right tariff rates for SESB must also be planned in order to reflect the cost of supply based on embedded and marginal cost of supplying electricity in Sabah.

As such, the government has announced the IBR implementation in Sabah and the Federal Territory of Labuan for the setting of tariff. The implementation will commence by 1 July 2019 till 31 December 2020, inclusive of 6 months of trial period and 2 years as the first regulatory period.

Additionally, the TaskForce 150 (TF150) programme undertaken by Tenaga Nasional Berhad (TNB) and SESB through their joint task force aims to reduce the SAIDI to 150 minutes per customer in the state by year 2018. This is part of the Federal Government's commitment to improve quality and sustainability of power supply in Sabah.

It is also hoped through this joint effort, they would be able to achieve the target by focusing on areas namely Kota Kinabalu, Labuan, Tawau, Sandakan, Kota Marudu, Kota Belud, Tuaran, Papar with a reduction of SAIDI by 100 minutes per customer at each area by June 2018.

TF150 was set up on Oct 17 with 45 experts from TNB and 15 from SESB despatched to the focus areas to execute and fast track the upgrading projects. The program will be carried out in three phases. The first being the planning and preparation phase, followed by Phase 2 – implementation and execution, which is expected to be completed in within six months; and Phase 3 – monitoring and sustainability which would begin work from June 2017 to May 2018.

To continue improving Sabah's electricity supply, reliability, quality and coverage, there are many entities, both from the private and public sector involved. With many parties involved, effective coordination is key in ensuring that the objective is communicated well and partnership among parties can be established. However, effective coordination has proven to be very difficult which has resulted in many parties operating in silos without input from other parties.

Between these four parties, there are more than 300 electricity projects that are currently being implemented in Sabah. However, these projects fall under the purview of more than 40 stakeholders from both the State and Federal Government which includes the likes of Jabatan Tanah dan Ukur, Kementerian Kerajaan Tempatan dan Perumahan and Dewan Bandaraya Kota Kinabalu.

Ultimately, the main goal is to ensure that there is a reliable supply of electricity to consumers. To realise that goal, the Energy Commission is working hand in hand with SESB to ensure that the Sabah electricity supply industry is moving towards a better future for the benefit of the people. EM

STRENGTHE PROCESSES

NING AND OPERATIONS

The Energy Commission is undergoing a transition parallel to the second Regulatory Period and as such, many changes can be expected. ***Energy Malaysia*** interviews Abdul Razib Dawood, the newly appointed Chief Operating Officer (COO).

Q: Having had experience with ST as the Head of Electricity Market Operation Unit in the past, how do you see your experience in this organisation helping in your new role as Chief Operating Officer?

A: I report to the Chief Executive Officer (CEO). The COO is entrusted to oversee the day-to-day operations and focusing on the internal activities of ST's business if you like. This will free some of CEO's time to spend more in the strategic and longer-term challenges face by the organisation.

If you like, CEO has his "head up" to achieve success in the future, whereas COO has his "head down," focusing on the operational details necessary for success today.

My previous experience as the Head of Electricity Market Operations Unit is certainly helping me as I was tasked to monitor and ensure security and reliability of electricity generation and supply to consumers.

Q: MESI (Malaysia Electricity Supply Industry) and gas supply industry are currently going through a transition, in your opinion what should consumers expect from this transition?

A: As you are probably aware, ST always promotes reliable supply, competition and efficient operations for the long-term benefit of consumers. We balance that with industry viability and sustainability to continuously give quality of service. This transition would definitely benefit the consumers as their demand for more transparent and highly efficient industry will be met as we journey together through the transition period.

Q: Do you see today's consumers are becoming more sophisticated and how ST as regulator response to it?

A: Since 2014, the Government via ST has been practising transparency with regards to electricity tariff determination. Consumers could see the breakdown of the costs of electricity and fuel in the monthly electricity bill that they pay. However, I do agree that today's consumers demand more than that. Consumers want to take control of their electricity usage, the types of energy resources they buy, as well as the ability to co-generate their own electricity and sell the power back to the grid. Big corporations have pledged their energy sustainability as part of their business objectives. We, at ST see this consumer empowerment as part of our evolution in the regulatory framework. We encourage utilities to adapt and be agile in responding to this increasing demand from consumers and minimise risk of losing significant load. Going forward, we will have appropriate frameworks to address the changing energy landscape.

Q: What are other challenges that you could foresee?

A: Environment sustainability is a big challenge for energy sector. With the commitment on COP21 signed in Paris, various programmes have been initiated towards meeting the carbon emission reduction target. The response to our solar energy biddings so far has been very encouraging. We can see a clear alignment in sustainability objectives and its journey between the Government, policymaker, regulator, utilities and consumers.

About 15 years ago, we predicted that the Distributed Energy Generation (DER) would slowly displace the centralised generation. Now it is happening. And fast too. Together with RE, it will continue to grow exponentially driven by rapidly changing technology and expanding consumers' choices. No doubt that this has a dramatic impact to traditional utilities to consumers' relationships. Technically and operationally, we are fully aware of the increased complexity of the two-way flow of distributed system, intermittency, RE resources spread and digitised grid network. New technology comes with new innovative solution which we will use to modernise our grid system.

As we embrace these challenges, we are very well aware of it profound impact on regulatory policy. The utility industry is vital for the nation economic growth. Ultimately, the fundamental objectives are to provide a safe, reliable and affordable service to consumers.

"The Energy Commission advocates for digitalisation within the energy supply industry. We can't stop technology from taking over. So, we must embrace it and as a regulator, we will have to manage it well."

– Abdul Razib Dawood
Chief Operating Officer (COO),
Energy Commission

Q: We have seen industries merged in other parts of the world, for example, oil and gas company to become new entrant of power industry. Do you see this happening in our country?

A: It has happened here in a significant way when PETRONAS Gas commissioned the 300MW gas combined cycle IPP in Kimanis Sabah in 2014. Recently, another PETRONAS RAPID Pengerang Power Plant commissioned 600MW co-generation plant in Johor.

When the Government introduced the Third Party Access (TPA) on gas facilities and pipeline transmission, we welcome utilities like TNB to study possibility of bringing in imported LNG from overseas to local gas market. We hope this cross-industry movements and increased crossover investments between the electricity utility and O&G industries will bring positive competition and benefit to consumers in the long run. As an organisation, ST is equipped and well prepared in our role as the industry regulator for both electricity and piped gas to this newly evolved merged industry.

Q: How would you like to conclude this conversation?

A: Everyone in the "eco-system" of the energy sector has a role to play, be it policymaker, regulator, industry players and even consumers. We have proven ourselves when we dealt with balancing act between three competing objectives in energy trilemma of energy security, affordability and sustainability. Now we are facing with additional set of challenges which are de-carbonisation, de-centralisation and digitisation (3D). But nothing is insurmountable. EM

FORECASTING THE

The profession of economist is commonly heard of. But what about energy economist? One may ask what are energy economists and what do they do? In this section, ***Energy Malaysia*** takes a closer look at the roles and functions of an energy economist, the unsung hero of the energy industry. Wan Zaini Zakaria, Universiti Tenaga Nasional's (UNITEN) own energy economist gives insights on what it takes to be one.

Energy economist falls under the broader career category of economists. An energy economist's job scope includes conducting economic analysis related to energy demand and supply, energy market analysis, energy price and energy policy analysis. He or she also carries out analysis on environmental protection and use of the natural environment such as water, air, land and renewable energy resources.

To be an energy economist, one must possess a Bachelor's Degree of Economics (Energy) (Hons.). An interested candidate can pursue their degree from a Foundation level in the Arts or Science stream or even a Diploma level in either Business Studies or Engineering. He or she must be equipped with critical thinking, good analytical skills and an understanding of the energy markets.

ENERGY INDUSTRY

Role and Function

According to Wan Zaini, there are three principle roles of an energy economist. First, energy economist acts as an analyst in the area of energy-economy-environment (3E) studies. The person examines on topical issues in the area of sustainable energy development, climate change and nuclear power. Not only that, an energy economist also acts as a team member by working side by side on studies and analyses projects like energy reports.

As an example, energy economists at the Institute of Energy Policy & Research (IEPRe), UNITEN in collaboration with several local and international energy agencies have conducted studies on Energy Efficiency Implementation in Malaysia: Impacts of 2013 MEPS Appliances Regulation and Establishment of Standard Operating Procedures (SOP) for Energy Data Collection and Dissemination.

Additionally, an energy economist functions as an advisor by providing information to energy agencies whilst also working together with various energy agencies like Tenaga Nasional Berhad (TNB), Energy Commission and Ministry of Energy, Green Technology and Water (KeTTHA). He or she advises these agencies to ensure that they can work effectively towards meeting their national energy development goals and objectives.

Local energy economists work closely with TNB, the Energy Commission and

"Should energy sources become completely renewable, as with solar, wind or geothermal power, energy economists may no longer be needed or may move into another type of role."

– Wan Zaini Zakaria,
Energy Economist, Universiti Tenaga Nasional's (UNITEN)

KeTTHA on capacity building efforts in energy-economy modelling and techno-economic assessments. The staff at College of Energy Business and Economics (CEE), UNITEN works with counterparts from energy planning institutions involved in national energy and electricity planning studies such as studies of various energy report, world energy report and world bank, just to name a few.

The Problem Solvers

However, this profession comes with its own set of challenges. As an energy economist, Wan Zaini stated that it always comes down to the supply and demand of energy pertaining to the risk of a given supply source and the security of the supply source. He or she has to determine the availability of supply which is correlated to the nation's economic health. If supply gets harder to obtain, energy costs will go up. This in turn significantly impacts the economy with a ripple effect whereby every other segment of the economy is influenced negatively as well. The energy economist assists in studying these trends and foretells whether or not the trends will continue while also providing solutions.

As there is continuous transition within the energy industry, the need for renewable energy sources arises. Non-renewable energy sources then would become secondary and with this would alter the role of an energy economist. As such, the energy economist will help foretell the most efficient way of using a limited energy supply. In some cases, he or she will also control the way it's used so as to protect the environment as much as possible.

Nonetheless, energy economists today have a very important job to do economically, politically, socially and environmentally. They have the responsibility to forecast, study, analyse and provide viable solutions for an energy problem. It is a need that no doubt will not go away for at least the foreseeable future. EM

The Bachelor of Economics (Energy) (Hons.)

Paving the Future of Energy Industry

As energy resources fluctuate unpredictably in the industry, it is absolutely vital to have energy economists to analyse, foretell and solve problems within the energy industry. ***Energy Malaysia*** delves into the makings of an energy economist with insights from Dr. Nora Yusma Mohamed Yusoff, Head of Department and Senior Lecturer at Universiti Tenaga Nasional (UNITEN).

Recently introduced at UNITEN, the Bachelor of Economics (Energy) (Hons.) is a pioneering tertiary programme that has garnered the attention from students all over the nation and even on an international scale. It is the first university in Malaysia to offer this Bachelor course to cater to the demanding growth of energy economists in Malaysia.

Dr. Nora Yusma Mohamed Yusoff, Head of Department and Senior Lecturer at UNITEN explains requirements for potential students and the career prospects for students enrolled in this degree programme.

Programme Structure

PROGRAMME DURATION

- 3 years (9 semesters)

AMONG THE COURSES INCLUDED IN THE PROGRAMME ARE:

- Energy Economics
- Energy Management
- Energy Security
- Renewable Energy and Sustainability
- Energy Regulations and Policies
- Energy and Society
- Economics of International Oil & Gas
- Energy Audit & Reporting
- Green Energy and Environmental
- Low Carbon Economics
- International Energy Trade and Market
- Managerial Economics

JOB PROSPECTS

- Energy Economist
- Energy Auditor
- Environmental Consultant
- Environmental Auditor
- Green Industry Auditor
- Economic Specialist Officer
- Economic Researcher and Consultant
- Business Analyst
- Corporate Executive
- Lecturer

Source: UNITEN

The launch of this tertiary programme is in line with UNITEN's vision and mission which is to achieve its status as an energy university. This 3-year Bachelor's degree programme is designed to expose students to the specific aspects in economics discipline and energy sector. In doing so, it offers specialisation courses including energy economics, energy security, energy regulations and policies and renewable energy and sustainability, just to name a few.

According to Dr. Nora, prior to the establishment of this programme, UNITEN conducted various studies by referencing other countries to establish a benchmark for it. Further, Professor Ken Koyama, the Chair in Energy Economics of Energy Commission at UNITEN is the member of the consultative council of the curriculum development.

This Bachelor of Economics (Energy) (Hons.) course is specifically structured to equip students with a strong theoretical and practical knowledge in economics and energy. These qualities are prerequisites to students before they can embark on the real world of energy service sectors. Additionally, students can also continue to pursue their studies to obtain the Master's Degree in Energy Management or in other Master's Degree in Business Administration (MBA) programmes.

A graduate of this programme can start their career as an energy economist, economic researcher and consultant or even a lecturer if they wish to dabble in the academia field. For those who wish to focus on the enforcement aspect, they can pursue taking special training courses to hold positions as an energy manager, energy auditor or environmental auditor.

With this newly offered course, it promises top notch graduates specialised in energy economics with a wide array of job prospects awaiting them. These specialised graduates would be a valuable asset in the industry by greatly enhancing the industry knowledge and know-how. EM

Though it's still in its infancy stage, the Incentive-Based Regulation (IBR) system proved to be successful for Malaysia. The system has improved transparency, efficiency and a continuous supply of electricity to its consumers. Energy Malaysia takes a look at some of the European countries that has adopted IBR and the state of their energy industries.

Germany

One of Europe's powerhouses, Germany is the strongest economy on the continent, and the same can be said about its energy industry. The nation is the largest electricity market, with over 180GW of installed capacity. This was largely driven by the continuous expansion of renewables which has become one of the cornerstones of Germany's energy market turnaround. Another unique aspect of Germany's energy industry is that there are more than 900 Distribution System Operators (DSO) operating in Germany, all of them mostly run by the vertically integrated utilities.

In 2013, Germany switched from a cost-based to an incentive-based regulation system to enhance its energy supply.

There are three unbundling models within the system which are full ownership unbundling, Independent System Operator (ISO) and Independent Transmission Operator (ITO). Unbundling means there will be a separation of energy supply and generation from the operation of transmission networks. If there is a monopoly on transmission or distribution, it is highly likely that that particular company would obstruct competitors' access to the infrastructure. Therefore, these models are used to discourage vertically integrated utilities from

VIEWS FROM THE WEST

The UK, Germany and France have adopted the Incentive-Based Regulation (IBR) mechanism with the aim to promote transparency, efficiency and also in ensuring a security of supply.

discriminating against competitors in terms of access to, and investment in the grid.

Within the regulatory framework, electricity grid operators are not allowed to be involved in the electricity production. These grids are operated through separate entities. Through the unbundling, transparency is prioritised to guarantee the independence of companies responsible for operating said electricity grids.

However, the IBR mechanism used may be effective but it is still far from perfect. For one, there are too many DSOs to keep in check. This is why the German Energy Commission is continuously evaluating the incentive regulation together with the industry associations, the network operators, network users and political representatives involved. Additionally, the German regulators adapt the administrative procedures to new developments and proposes changes to the framework.

United Kingdom

The United Kingdom (UK) has also implemented a similar version of Malaysia's IBR. The mechanism was introduced to keep costs low for customers while at the same time encourage innovation within the energy sector such as gas distribution, electricity transmission and electricity distribution.

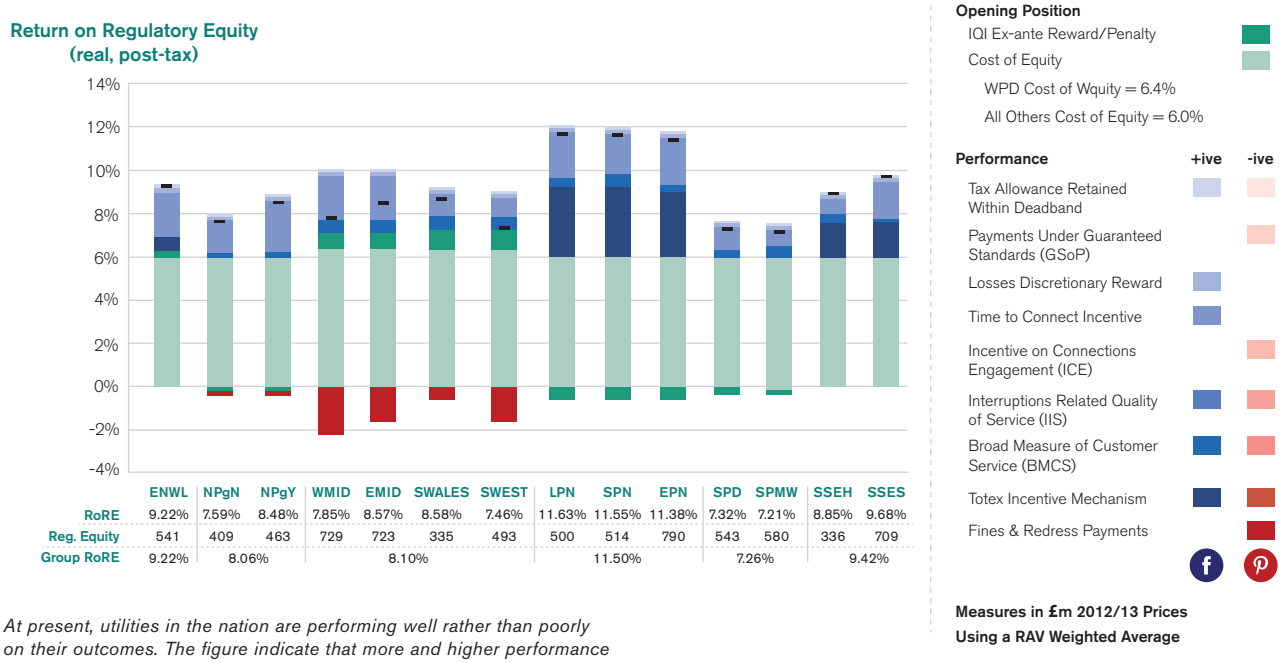
The new system that was implemented is called "Revenue set to deliver strong Incentives, Innovation and Outputs (RIIO)" and came into effect four years ago. RIIO has a regulatory period of eight years, with a review taking place every four years.

The lengthy timeframe is to ensure that utilities would have sufficient amount of time to innovate and deliver the desired outcomes which is reliable and efficient supply of electricity generation at an affordable price.

RIIO also has an incentive and performance mechanism for six of its outcome categories – safety, environment, customer satisfaction, connections, social obligations and reliability. This design feature is intended to motivate utilities to innovate to deliver what customers want from the utility system.

There is still much to learn for the UK to improve its performance-based regulation to meet the demands of its consumers. Take for example, that even though UK's Energy Commission has worked with industry players and stakeholders to define the outcome metrics, there were still some instances of ambiguity arising. As such, the Commission would ensure the

RIIO: PERFORMANCE-BASED REGULATION AT WORK



At present, utilities in the nation are performing well rather than poorly on their outcomes. The figure indicate that more and higher performance targets that could be set to benefit the utility and its consumers.

Source: www.greentechmedia.com

outcome-based performance is measured clearly and precisely to solve such issues.

Though the nation differs in its policies and priorities than many of the countries that implement it, its experience already provide some much needed lessons.

France

The electricity market in France mirrors that of the European Union although they differ through the IBR mechanism. The Energy Regulatory Commission (CRE) is the nation's energy regulators. CRE's main function is to guarantee non-discriminatory access to the grids for all plants, suppliers and producers through the IBR mechanism. That way, suppliers are able to purchase electricity at a fair price which would then be sold to the consumers.

The IBR mechanism used is characterised by a penalty/reward based system. This system was used because the French Transmission System Operators (TSO) benefited from a high allowed level of Weighted Average Cost of Capital (WACC). To keep the TSO in check, two regulatory independent bodies were created. The Regulations Committee of Disputes and Penalties settles disputes between grid users and distribution and transmission operators. It can also impose penalties in case there was any breach of agreement between them.

The system has improved the nation's industry by a long mile. Transmission companies will be kept in check which in turn, would not lead them from earning excessive rents while at the same time ensure that there is transparency and financial sustainability. Consumers too would enjoy these services at a low cost.

Much can be learned from nations that implement the IBR mechanism. Malaysia could implement some of them in the upcoming RP2. Though there is only one utility company, the Energy Commission can explore prolonging the regulatory period so as to ascertain and review the proposed targets and work on improving it. In conclusion, it is hope that this can boost the reliability and sustainability of the energy supply generation to its consumers. EM

AN IN-DEPTH VIEW OF RP1

As the nation undergoes Regulatory Period (RP) 2, ***Energy Malaysia*** takes a look at the takeaways from RP1 and how it will help enhance the nation's energy security for the next regulatory period.

Performance of TNB During RP1

Source: Suruhanjaya Tenaga

A System that Works

The Incentive-Based Regulation (IBR) system was introduced in 2014 among others to strengthen regulatory process of electricity tariff determination as well as to drive cost-efficiency in electricity generation, transmission and distribution, aiming to bring about long-term energy security and reliability of supply at affordable prices to consumers. Along the way, it also aims for better transparency from Tenaga Nasional Berhad (TNB), the utility company. It was given a trial run for year before being successfully implemented in the first regulatory period (2015-2017).

Some of the key features include a projected Capital Expenditure (CAPEX) and Operational Expenditure (OPEX). This would enable the Energy Commission to ensure that the base tariff, set at 38.53 sen/kWh would not be a burden to its consumers while at the same time allows TNB to achieve a reasonable profit.

ST will also set performance targets with incentive/penalty mechanism for the utility company. In general, if TNB provides a continuous and reliable supply of electricity generation to its consumers, it would be given an incentive. However, failure to do so would lead to a fine.

Key Component

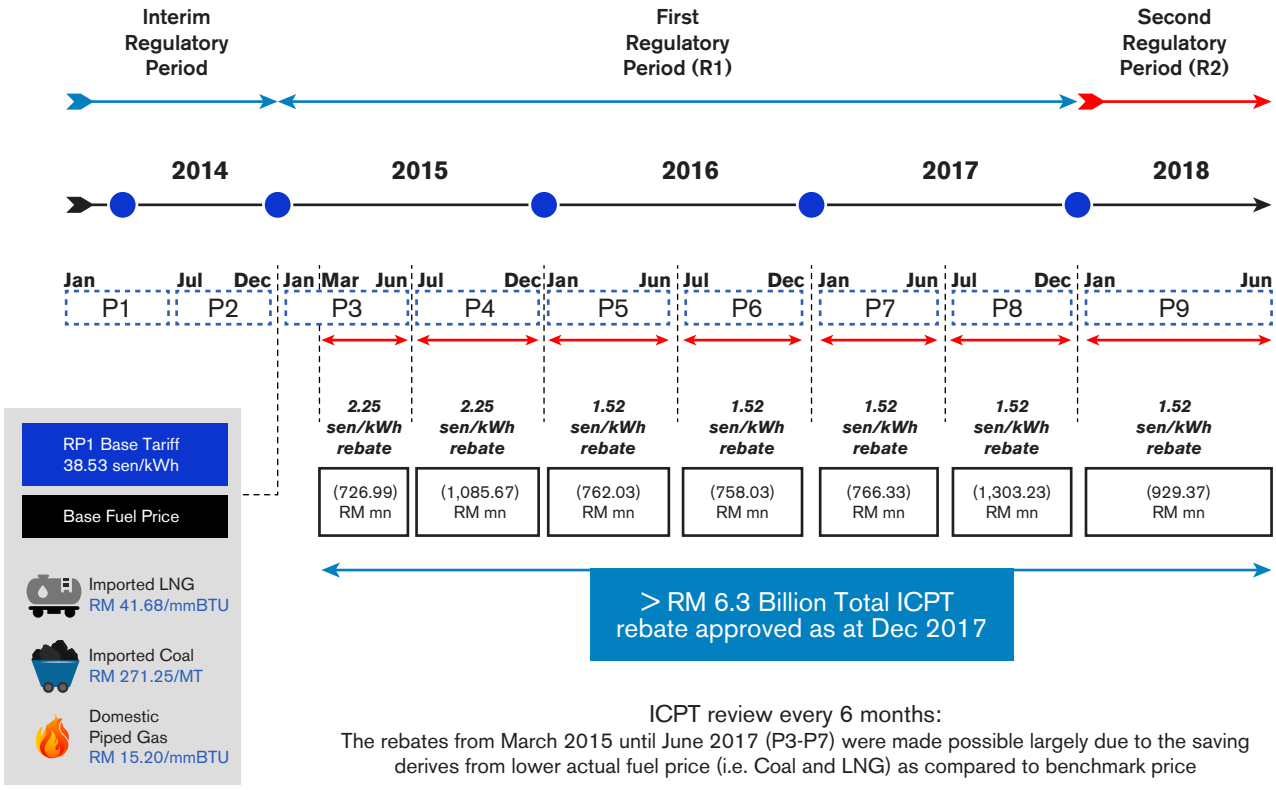
Another significant feature of the IBR system is the Imbalance Cost Pass-Through (ICPT) mechanism. This mechanism takes into account costs that are uncontrollable, for example, the price fluctuation of coal and liquified natural gas. This mechanism will then be reviewed every 6 months through the regulatory period, so that the government can impose a surcharge or a rebate to the consumers.

Throughout RP1, a total of RM 6.3 billion of rebates and subsidies were passed through to the end-customers. It was mainly due to the savings from the lower actual fuel prices as compared to the assumptions used during the base tariff setting that must be pass-through to consumers. At a certain point, the Government decided to provide subsidies by absorbing the surcharge costs by using the Electricity Industry Fund. This move was to ensure that consumers, especially those that are not well off are not burdened by the price of electricity.

Performance of TNB

The success of RP 1 can also be attributed by the performance of the utility company, TNB. During the three year period, TNB has successfully met most of its KPIs. One highlight being the System Average Interruption Duration Index (SAIDI). The utility

Rebates and Subsidies Passed Through



ICPT review every 6 months:
The rebates from March 2015 until June 2017 (P3-P7) were made possible largely due to the saving derives from lower actual fuel price (i.e. Coal and LNG) as compared to benchmark price

Source: Suruhanjaya Tenaga

company have kept an average of 50 minutes/customer in 2017 which is well below the target set for them.

The CAPEX and OPEX spent was also well below the approved spending. Under the Regulatory Implementation Guidelines, these underspent expenses will be treated under efficiency carry-over scheme for consumers benefit by returning half portion of it to consumers.

Single Buyer (SB) component makes up about 69.5% out of the base tariff which translates to 26.76 sen/kWh. If SB could be enhanced for efficiency and cost, then tariff would be lessened as well. This would also be beneficial to ST as it would enable the gauging of the necessary spending come RP 2.

TNB also managed to increase its consumer growth. It has increased from 7.9 million (2012) to 8.5 million (2017). Most of the increase comes from the commercial sector where TNB derive most of their revenue from.

The analysis shows that the electricity industry in Malaysia is a work in progress. There are more features being implemented in the electricity tariff for RP2. With that, electricity supply could be more reliable and efficient and this would lead to the success of the aspirations of the industry and the nation as a whole. EM

THE OUTLOOK FOR ENERGY: A View to 2040

The energy sector is in a constant state of flux as changing trends, innovations and geopolitical events shape its direction. It is therefore vital for stakeholders – who range from national entities to energy industry players – to keep their fingers on the pulse of things so as to keep track of where the sector is heading.

ExxonMobil Malaysia President Edward E. Graham presented the first part of the Outlook.

ExxonMobil USA Energy Advisor Lynne D. Taschner presented the second part of the Outlook.

This task is made easier through the publication of "The Outlook for Energy: A View to 2040" report. An annual initiative of ExxonMobil, the report showcases the energy giant's analyses of worldwide energy demand and supply, which it has formulated through the use of various data and studies.

While the report is used mainly by ExxonMobil to calculate its investment strategies, it is also a very useful tool for the energy industry as a whole. This is because the level and detail of research it contains helps enhance understanding of the issues affecting the global energy sector.

As such, the Malaysian Gas Association (MGA), in association with the Energy Commission, organised a talk on 14 March, where the report was presented to invited guests comprising Malaysian energy industry stakeholders. The welcome address was given by MGA President Hazli Shah Kassim, while

ExxonMobil Malaysia President Edward E. Graham and ExxonMobil USA Energy Advisor Lynne D. Taschner respectively presented parts 1 and 2 of the Outlook.

Among the trends discussed during the presentation was how electricity from renewable energy, in particular wind and solar power, will enjoy a 400 percent increase by 2040. This rapidly expanding source of energy is likely to triple by 2040 and at the same time reduce carbon emissions by 30 percent.

The Outlook also forecast that while use of liquid fuels in light or personal transportation will likely peak by 2030, oil will continue to be a major component of fuel for commercial transportation and the chemicals industry. As such, its place in the global energy mix will not be reduced too much despite an increase in the use of electric cars and more fuel-efficient options.

At the same time, natural gas usage is expected to increase at a faster rate than any other energy source. This is mainly due to its versatility and use as a reliable feedstock for electricity generation, which is less carbon-intensive than other conventional methods such as coal.

Malaysia is a net energy exporting nation with significant reserves of oil and natural gas, and which is looking to increase its use of renewable energy. As such, the information provided in "The Outlook for Energy: A View to 2040" are vital for the nation's energy sector stakeholders – in both the public and private sectors – to better plan for the future. EM

Malaysian Gas Association President Hazli Sham Kassim giving the welcome address at the presentation of "The Outlook for Energy: A View to 2040".

The presentation of "The Outlook for Energy: A View to 2040" was attended by policy makers, energy industry representatives, academics and other key players in the sector. Among the attendees were then Energy Commission Chairman Dato' Abdul Razak Abdul Majid (third from the left) and the Deputy Director-General (Sectoral) of the Economic Planning Unit/Energy Commission member Datuk Alauddin Anuar (second from the left).

One Step Closer to ENERGY REFORMS

Launched in October 2017, the governance reform of the Single Buyer (SB) and Grid System Operator (GSO), is an initiative by the Energy Commission to hive the two bodies from Tenaga Nasional Berhad (TNB). Presently, both entities are ring-fenced inside the wider TNB corporate structure, and while that ensures their autonomy, there is still a perceived conflict of interest.

Baevin Thiagarajah, a consultant from KPMG Deals Advisory presents the features of the governance reform of Single Buyer and Grid System Operator model.

Energy Commission Chairman Datuk Ir Ahmad Fauzi Hasan and CEO Ir Azhar Omar were among the stakeholders in attendance at the "MESI Governance Reform: Single Buyer and Grid System Operator" seminar held on 15 May.

Just like how Caesar's wife must be seen to be above suspicion, the Energy Commission is seeking to eliminate any notion that SB and/or GSO are biased towards their nominal parent company. The respond is to create an Independent Single Buyer (ISB) and Independent Grid System Operator (IGSO), so as to enable them to perform their duties more effectively. This is also part of the wider industry reform roadmap undertaken under the 9+1 initiatives in 2012.

Working together with KPMG Deals Advisory, who is also the consultant for the project, the Energy Commission invited views from various stakeholders. These included the Ministry of Energy, Green Technology and Water, the Ministry of Finance, the Economic Planning Unit, TNB, SB, GSO, investors including Khazanah Nasional, KWSP and KWAP, independent power producers, banks, insurance company and credit rating agencies.

In addition, a workshop was held in November 2017 where the aforementioned stakeholders discussed the factors driving the need for reforms and how to align them with the Malaysian Electricity Supply Industry's (MESI) objectives.

These views, proposed action plans, and KPMG's recommendations were then compiled and presented to stakeholders at the "MESI Governance Reform: Single Buyer and Grid System Operator" seminar held on 15 May 2018.

Among the topics discussed was on how disruptive forces such as electrification, decentralisation and digitalisation are shaping the industry, thus necessitating changes in the electricity supply industry. Other highlights included exploring the various governance models for the ISB and IGSO, and the ownership structure of such entities.

The "MESI Governance Reform: Single Buyer and Grid System Operator" seminar is a key highlight in the movement to create the ISB and IGSO. These in turn are critical parts in the reform of MESI, which will lead to a more competitive, effective and efficient electricity supply industry, bringing benefits to all. EM

IFGE 2018

Restructuring The Global Energy Landscape

Then Chairman of ST, Dato' Abdul Razak Abdul Majid and Ir. Azhar Omar, CEO of ST alongside the panel of international speakers and industry leaders during the closing ceremony of the successful IFGE 2018 forum.

Electricity and gas have played vital roles in providing the growing energy needs for almost every economic activity within the nation. This would raise important choices and opportunities for the energy industry to adapt to any change that might occur within the global energy landscape. In an attempt to address this issue, a forum was created in order to provide a platform for international experts and Malaysian industry players to discuss the state of the energy industry and it's implication towards the economy.

On 13 February 2018, the International Forum on Global Energy Landscape: Electricity and Gas Market Liberalisation and It's Implication to Malaysian Economy (IFGE 2018) was jointly organised by the Energy Commission and the Institute of Energy Policy and Research (IEPRe), University Tenaga Nasional. The forum was conducted after a rousing success from the first IFGE 2016 which was held two years ago.

IFGE had invited several international speakers and industry leaders to discuss the state of the electricity and gas industry on the implication towards the Malaysian economy.

Ir. Azhar Omar, the CEO of ST highlighting the evolution and reform initiatives carried out to liberalise the industry.

Notable speakers included Professor Dr. Ken Koyama, Chair in Energy Economics of Energy Commission UNITEN, Mr. James Allan, Director of Frontier Economics Pty Ltd, Mr. Rosman Hamzah, Secretary-General of Malaysian Gas Association and many more.

IFGE 2018 kicked off with an opening speech by Ir. Azhar Omar, the Chief Executive Officer of the Energy Commission. In his speech, he noted how the energy industry is evolving. There have been initiatives in liberalising the industry by creating more competitive markets, with the intention of managing the price. However, in most countries, the supply of electricity is a natural monopoly. This in turn, would require complex and costly systems of regulation so that industry players will operate on a level and competitive field which will allow consumers to enjoy secure and affordable supply of electricity.

As for Malaysia, Ir. Azhar said reforms have been made to encourage transparency, efficiency, affordability and reliability of the energy supply. Since 2016, the competitive bidding programme was introduced to develop the Large Scale Solar Photovoltaic Programme. These exercises were implemented in the government's efforts to lower the solar tariff rate which has been too dependent on the Feed in Tariff (FiT) rates, and unsustainable in the long run.

This year, the forum attempts to shine a light on the key global trends and forces that are likely to shape the energy markets over the next thirty years. There would also be discussions on the gas market. At present, the gas market would undergo the prospect of third party access in the near future, and other uncertain cross-border forces that emerged in resources as well as the energy supply chain.

Lively discussions and insightful presentations were made during the one-day event. The topics covered ranged from Sustainability and Technology Disruptions to European Experiences in Gas Market Liberalisation and Its Impact on the Market. The opinions and views from the invited speakers have opened doors to further research opportunities and partnerships with interested parties.

The forum provided the perfect platform to discuss the way forward for the nation in dealing with issues and the future of the energy industry. By bringing together heads of governments, policy makers, international speakers, regulators and industry players, the forum will raise awareness on the challenges faced by the global energy landscape. EM






Suruhanjaya Tenaga
Energy Commission

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Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY and USE OF ENERGY

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

The Energy Commission...

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

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

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

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

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

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

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

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