COMMUNICATING TO LARGE POWER CUSTOMERS

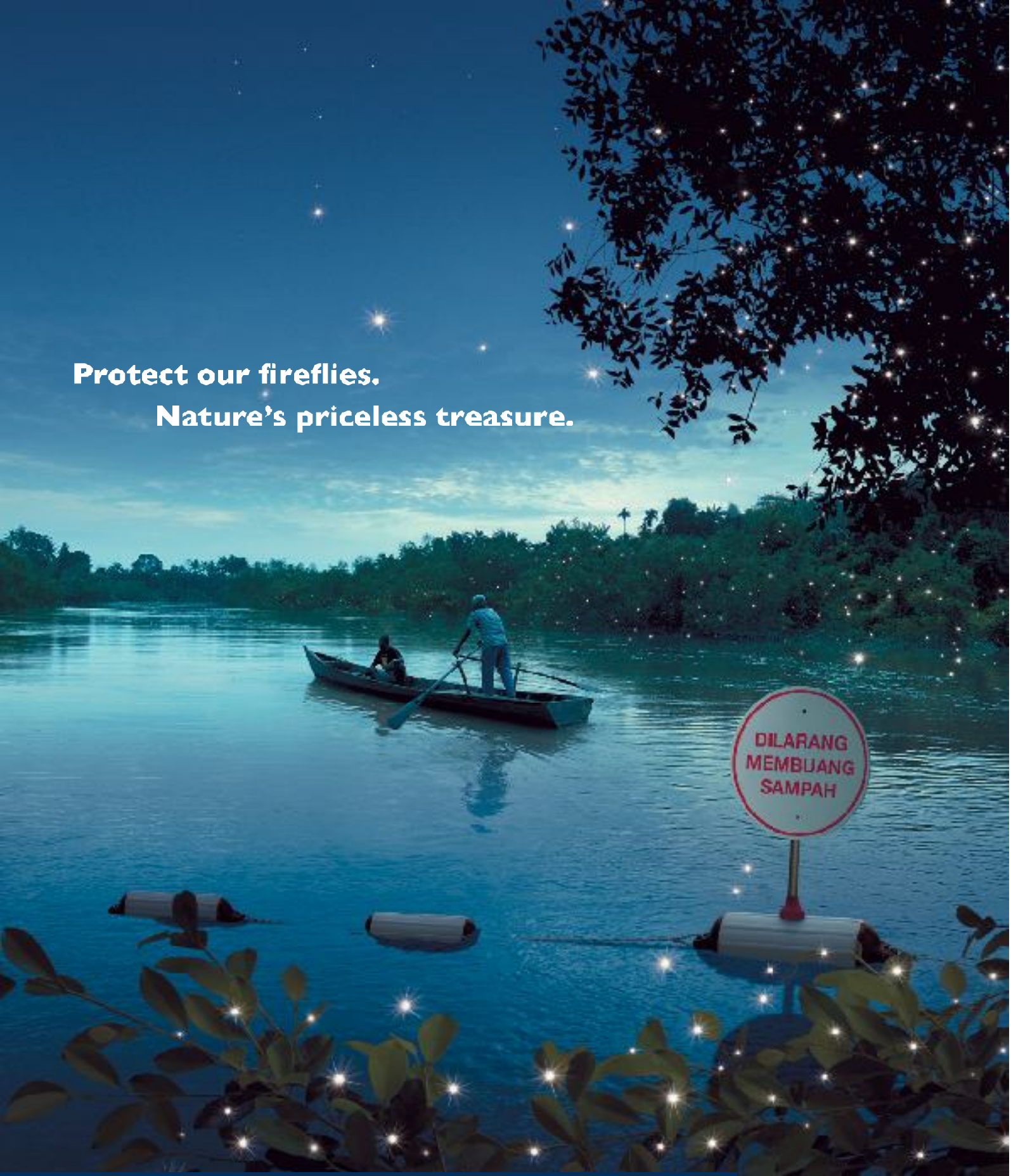
TENAGALINK

KDN : PP8515/01/2013(031995)

Powering the Nation

Tenaga Nasional Berhad Through The Years

Volume 1 | 2013



The firefly is symbolic of TNB's commitment to our customers and the country. TNB supports the conservation of the *Lampyridae* firefly colony found along riverbanks of Kampung Kuantan, Kuala Selangor. The area turns magical as the sun sets and the sky is enveloped in darkness. The fireflies will then flash their lights in unison, creating a spectacular light show only nature could provide.

A community project by

TENAGA NASIONAL
(200866-W)

It's easy with TNB e-Services
https://e-services.tnb.com.my

You can:

- Track your electricity consumption
- Monitor your tenants' billing information and their payment status
- View and print billing information (past and present bills)
- Pay your bills online*

Just log on to register with our e-Services portal. You can then start to make online bill payments, check your tenants' billing history and view detailed information about your TNB account.

Experience the convenience of TNB e-Services.

* Currently only available for Maybank Savings and Current account holders.

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For billing and account enquiries, call or fax
1300 88 5454

To report power outage or TNB street light malfunction, call or SMS **15454**

TENAGA NASIONAL
(200866-W)

Note: 1. Fixed line calls will be charged as local calls. 2. Mobile phone calls are subject to charges by service providers. 3. SMSes are free.

Tenaga Nasional Berhad (TNB) has come a long way from its days as *Lembaga Letrik Negara* (LLN), and we have grown from strength to strength, thanks to the support from our customers. As a utility company serving almost 8 million customers – from corporate consumers, to those in urban and often isolated rural areas – we have to provide a balanced service across this broad spectrum of the population.

" Our aim in publishing *TenagaLink* is to highlight all the major ways TNB is contributing to national development. "

Our aim in publishing *TenagaLink* is to highlight all the major ways TNB is contributing to national development – from electrification projects in rural areas through solar and renewable sources to hosting and supporting electrical exhibitions and events such as the recently concluded ELENEX 2013 – one of the foremost electrical exhibitions in the ASEAN region.

Renewable energy (RE) and energy efficiency have long been a priority to us, and we are fully committed to facilitating its growth in the country by using our resources and manpower to fulfil the country's target of 6% or 985MW of RE by 2015. TNB Energy Services – a wholly owned subsidiary of TNB – is actively involved in the production of renewable energy, while TNB's Distribution Division is the major purchaser, maintaining a significant role in the RE industry.

Solar panels, photovoltaic cell arrays and hybrid generators are some of the sources of efficient, renewable energy that we have implemented across the country on islands such as *Pulau Langkawi* and *Pulau Perhentian*, since 2001. *Universiti Tenaga Nasional* (UNITEN) – TNB's wholly owned university – has also recorded historic successes in the RE World Solar Cycle Challenge in Adelaide Australia, finishing first once and second on two occasions.

In our 64th year of operations, we look back at some of the principal milestones and achievements in TNB's history – from before the country's independence in 1957 to the setting up of the National Grid in 1964; from corporatisation and privatisation, to our current position as a partner in national development.

2013 is going to be a great year for TNB. We will continue to strive to not only meet, but exceed our customers' needs and wants and we will not spare any effort in accomplishing this goal. I take this opportunity to thank our staff for their dedication, hard-work and contribution as we maintain our promise to power the nation, create opportunities and provide first-class customer service with our constantly updated customer management systems implemented across the country. By powering the nation and providing unrivalled convenience, we are putting our customers first.

Datuk Ir. Baharin Din
Vice President (Distribution)
Tenaga Nasional Berhad

Click
to light up your life

Now you can apply for electricity supply through TNB's *e-Application*.
It is easy to create your own account and activate it with our step-by-step guide.

Apply online now!

You can:

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- Track your application status online
- Easily retrieve your records

For more information, log on to: **https://eapplication.tnb.com.my**

**Only available for new home owners, contractors and residential developers*

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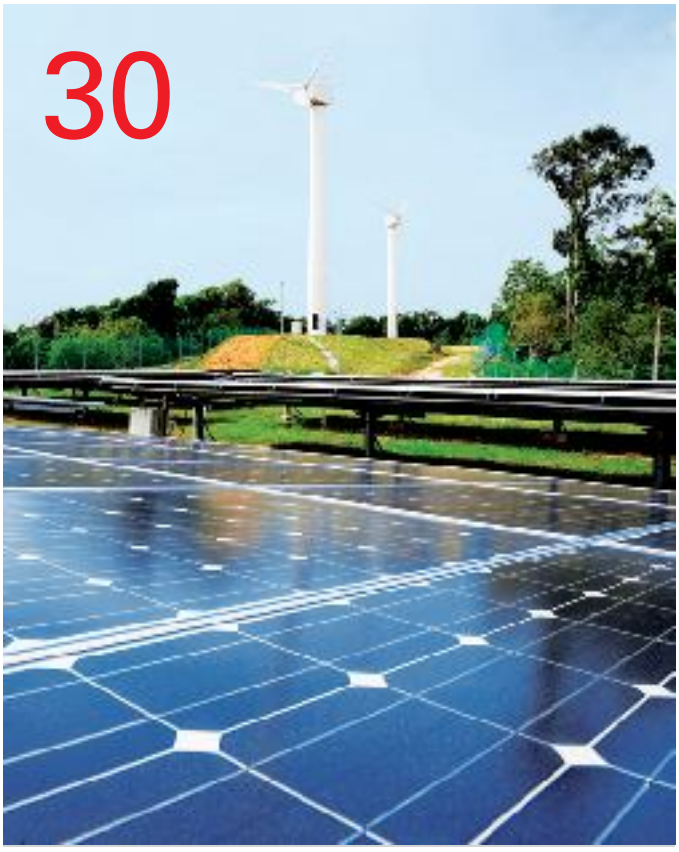

Three simple steps to keep your light shining.

Introducing a quick, easy way for you to inform us on any faulty street light.

Step 1

Identify

Majority of TNB poles are made from **concrete** and have **overhead cables**

Step 2

Locate

Let us know the location and **pole number*** if available

Step 3

Report

Call 15454 or
SMS <SL> to15454
Providing the pole number can expedite the response time

* *Old TNB poles may not carry the TNB logo and pole number.*

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PRUDENT POWER USAGE

Floating paper lanterns are traditionally released into the air in many parts of the world during the 60 minutes of electricity conservation. Earth Hour 2013 took place on the 23rd of March 2013 from 8.30pm to 9.30pm. Adelina Iskandar Vice President, Corporate Affairs and Communications of TNB urged customers to turn off all unutilised lights and electrical appliances to show support for the event.

Started in 2007 and observed in 152 countries, Earth Hour is an annual event organised by the World Wide Fund for Nature (WWF), encouraging households and businesses to turn off all non-essential lights for an hour to raise awareness about the need to act on climate change.

In an effort to extend awareness of the Earth Hour initiative and to urge customers to continue to apply judicious energy usage in their daily activities beyond the 60 minutes, Tenaga Nasional Berhad (TNB) provided booth space for the WWF at 28 of its *Pusat Khidmat Pelanggan* (PKP-Customer Service Centres) to collect pledges from the public throughout the month of March, encouraging them to participate in this year's campaign.

The theme for the campaign was titled *I Will If You Will* and this is the second time that TNB and WWF-Malaysia have collaborated to promote energy conservation and efficiency. The launch ceremony for the campaign was held at PKP Wisma TNB Kepong on the 22nd of March with Adelina Iskandar – Vice President, Corporate Affairs and Communications of TNB and WWF-Malaysia Executive Director and Chief Executive Officer, Dato' Dr. Dionysius Sharma officiating.

Dato' Dr. Sharma, praised TNB's involvement and called on Malaysians to demonstrate concern about climate change in their daily activities, such as switching off electrical appliances when not in use.

Adelina noted that TNB has supported the Earth Hour initiative since 2009 and urged Malaysians to not just pledge their support but actually execute it. She also stressed practicing a prudent use of electricity in daily activities such as using electrical appliances for house chores during off-peak hours.

Individuals, businesses, governments and communities were encouraged to switch off their lights for one hour on Saturday, 23rd March 2013 from 8:30pm to 9:30pm to show their support for an environmentally sustainable action.

FROM WASTE TO WORTH

Operational since 2004, the Worldwide Landfills Park in Air Hitam, Puchong is a collaborative project between Worldwide Holdings Berhad and Tenaga Nasional Berhad Energy Services (TNBES) and was recently recognised by the Malaysia Book of Records as the 'First Sanitary Landfill to produce a 2 megawatt Gas Power Plant'. The Park is opened to visitors, particularly students, organisations or agencies carrying out research on waste management and environmental studies.

The 42 hectare landfill, with its full capacity of 6.2 million metric tonnes of waste collected over ten years, was closed and rehabilitated in 2006 and currently generates 2MW of energy – enough to power 1000 homes – and it can maintain this for the next 16 years.

The gas found in the landfill is transferred through underground pipes into an energy converter to produce up to 2MW of energy monthly. The plant currently sells the electricity produced to TNB for 40 sen per kilowatt and it is subsequently channelled to the country's main national grid.

Speaking at a briefing session on the plant's operations to representatives of the Sustainable Energy Development Authority (SEDA), Zamri Abdul Rahman, Worldwide Holdings Environmental Division General Manager said that the company was looking into converting other landfills to becoming power producers, starting with the Jeram Sanitary Landfill by July 2013 and Tanjung 12 Sanitary Landfill in Kuala Langat by 2014.

SEDA Malaysia Board Member Dr Pola Singh said the three requirements needed for harnessing renewable energy are policy framework, a dedicated agency in charge of planning and implementation, and legislation, in this case the Renewable Energy Act 2011.

While landfills may be the cheapest waste disposal method available, with proper management and technology, millions of tonnes worth of waste can be re-engineered to become a renewable source of energy.

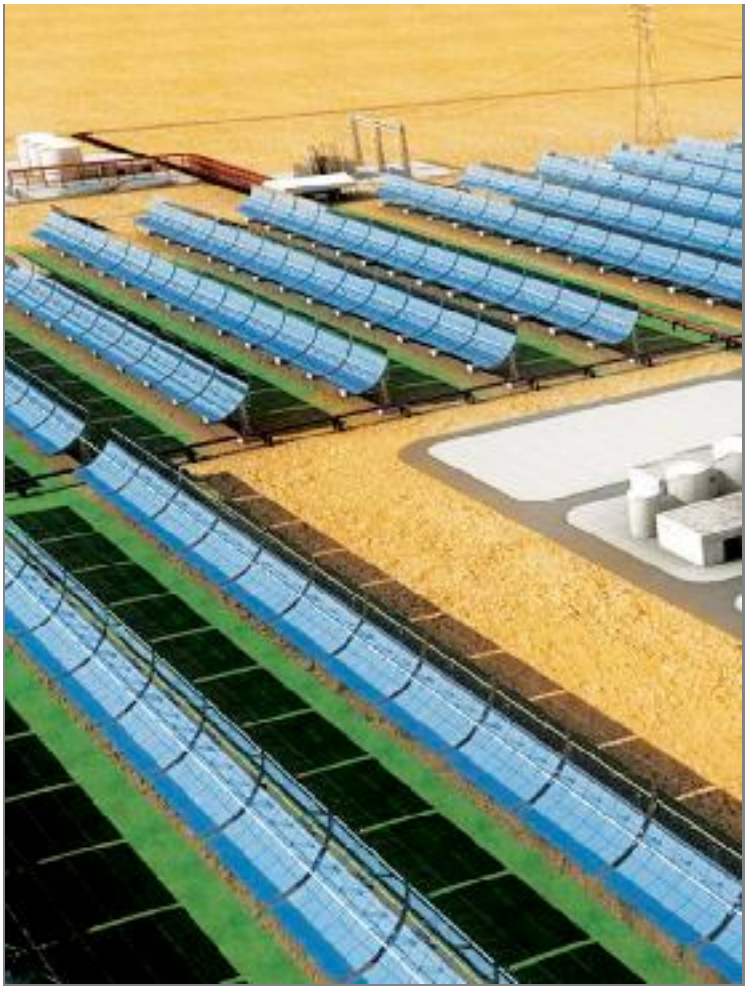
ABU DHABI'S SOLAR AMBITION

The world's largest Concentrated Solar Power (CSP) plant was launched in Abu Dhabi in the UAE on the 16th of March. The 100-megawatt Shams 1 uses a system of 250,000 mirrors, whereas many other solar plants use photovoltaic technology to harness solar power.

The parabolic mirrors focus sunlight onto oil filled pipes that heat water and produce steam that is used to drive a turbine. Being located in the middle of the desert, a dry-cooling system is used to keep water consumption down. The 192 rows of loops collect heat that drives turbines to generate power and save 175,000 tonnes of carbon dioxide every year, equivalent to taking 15,000 cars off the road or planting 1.5 million trees.

Shams, which is Arabic for "Sun" was built at a cost of about US$595 million. UAE energy giant Masdar owns 60% of the project, while France's Total and Spain's Abengoa Solar own 20% each. The power plant covers an area of 2.5 sq km located in Madinat Zayed, approximately 120 km southwest of Abu Dhabi.

Masdar oversees the plant and the Emirate plans to generate 7% of its energy needs from renewable sources by 2020. The company also produces 10% of the world's CSP and its energy portfolio represents 68% of renewable energy produced in the Gulf region.



Shams 1 is an example of how collaboration between companies can achieve large-scale, clean-energy solutions that help meet the world's growing energy demand.

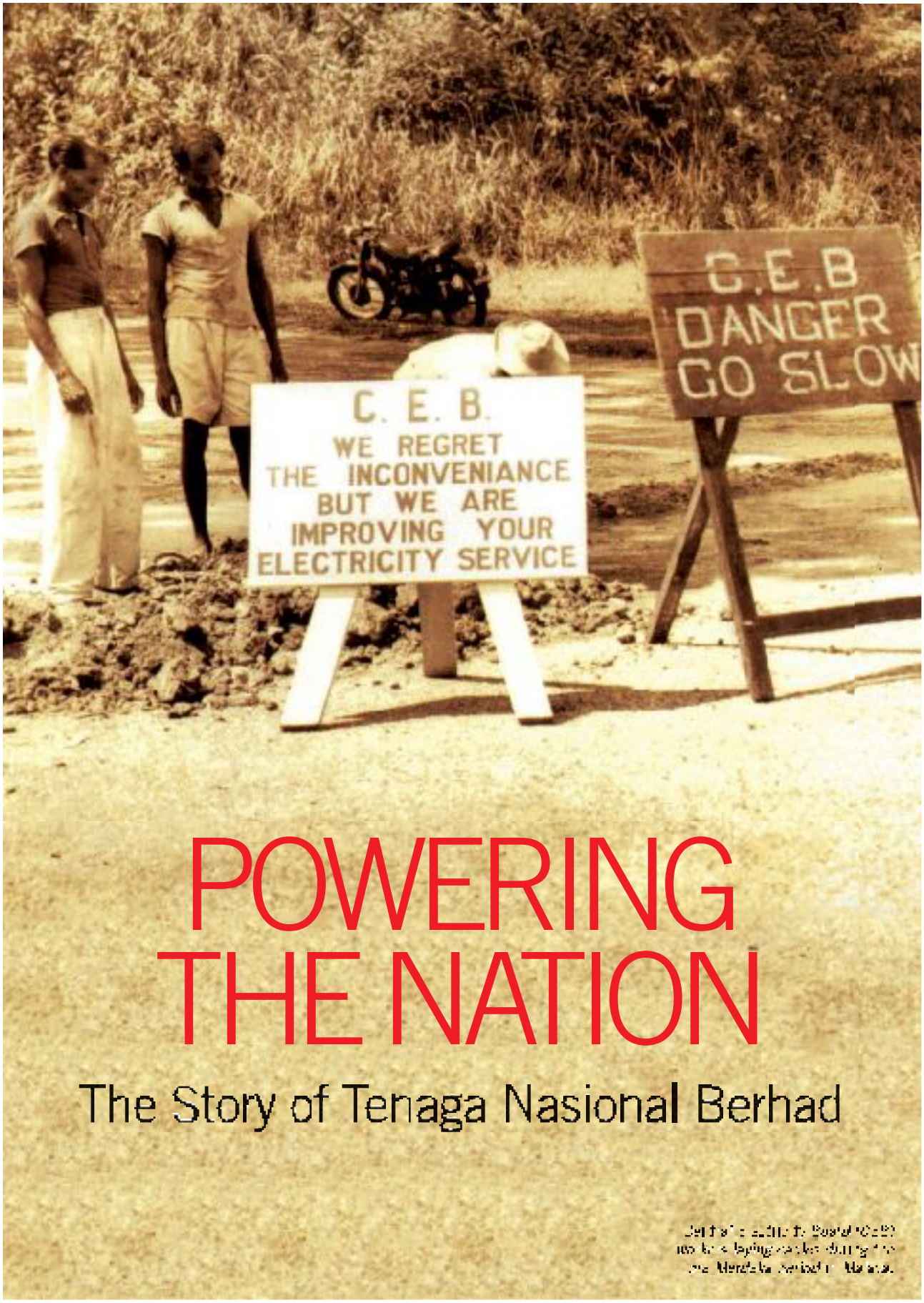
TNB INKS DEALS WITH THREE TRACK 2 IPPS

Tenaga Nasional Berhad (TNB) recently announced the signing of Supplementary Power Purchase Agreements and new Power Purchase Agreements (PPAs) with successful Track 2 bidders; Segari Energy Ventures (SEV), Genting Sanyen Power (GSP) and TNB Pasir Gudang Energy (TPGE) – a subsidiary of TNB, formerly known as Sultan Iskandar Power Station.

Track 2 is a restricted tender organised by the Energy Commission (EC) for the renewal of the operating licenses of first generation Independent Power Producers (IPPs) and TNB plants. The EC has awarded the extensions to these IPPs to secure generation capacity to meet growing demand from 2016 onwards at the lowest energy cost and with minimum completion risks. The selected IPPs will execute additional agreements reflecting the reduced capacity rates offered.

The reduced rates are effective from the 1st of March 2013 until the end of their initial PPA term, which is in 2016 for GSP and 2017 for both SEV and TPGE. TNB's Chairman, Tan Sri Leo Moggie described the agreements signed as a great milestone for the IPPs involved and also for TNB, stating, "I hope the execution of these agreements will further enhance and strengthen the relationship and bilateral cooperation between the parties involved and TNB, for the benefit of Malaysians."

Datuk Seri Ir. Azman Mohd, President/CEO TNB (left), Tan Sri Leo Moggie, Non-Executive Chairman TNB (centre) and Fazlur Rahman Zainuddin, Chief Financial Officer/Vice President (Group Finance).



POWERING THE NATION

The Story of Tenaga Nasional Berhad

POWERING BUSINESSES

In 2012, Malaysia's consumption of electricity was more than 3,400 kWh per person, while the nation's total usage was more than 90 billion kWh. This figure has been rising steadily through the years –a reflection of the country's progress – and it will definitely continue to increase as Malaysia continues on the path to becoming a fully developed nation. A steady supply of electricity is one of the key factors which has and will continue to contribute to the development of the country. This is the story of the organisation that has literally lit the way for Malaysia throughout the years – it is the story of Tenaga Nasional Berhad (TNB).

THE EARLY DAYS

TNB was intimately involved in providing electricity to the country even before Malaysia's independence in 1957. It all started in 1949, when the Central Electricity Board (CEB) – the precursor to TNB – was formed, creating for the first time a centralised body to manage and distribute electricity throughout the Malay Peninsula.

Many Malaysians today take for granted a steady electricity supply. However, it has not always been that way, as prior to the formation of the CEB, electricity in Peninsular Malaysia (then Malaya) was produced by various private entities – mostly rubber plantation or tin mine operators. In fact, the first electric generator in the country was installed

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As the main electricity provider in the country, Tenaga Nasional Berhad (TNB) has been playing a crucial role in driving the economy forward by ensuring that corporations in Malaysia receive the power that they need to carry out their operations. One such company is IGB REIT Management Sdn Bhd, whose CEO – Antony Barragry – speaks to TenagaLink on how TNB's services have been vital to the success of his company's flagship Mid Valley City development.

A mixed development located on the outskirts of centre of Kuala Lumpur, and sited in close proximity to the transportation hub of KL Sentral, Mid Valley City has a build-up area of 16 million sq ft. Within this space are 8 developments, comprising high-end residences, office blocks, retail and F&B outlets and two major shopping malls – Mid Valley Megamall and the Gardens Mall. Each day, Mid Valley City receives around 70,000 to 100,000 visitors, as well as close to 30,000 people who work in it.

"Because of the size and scope of our development, it is important for us to have a good relationship with TNB as ensuring quality electrical infrastructure is a must. That is why the first building which was built here in 1997 was a 120MW substation. This was to ensure that we would never need to worry about the availability of supply. The construction and establishment of the substation would not have been possible without the help of TNB," Mr Barragry revealed.

Presently, the energy requirements for Mid Valley City are separated into two phases, with Phase 1 comprising Mid Valley Megamall and the likes of Cititel Hotel and Boulevard Hotel as well as Menara IGB, among others. Phase 2 is made up of the Gardens Mall, Gardens Residence, and Gardens Hotel. Unsurprisingly, given Mid Valley City's reputation as a prime shopping and entertainment destination, power consumption is quite demanding.

"In 2012, our electricity demand in Phase 1 was 27MW, while it was 20MW in Phase 2. Since 1999, we have spent RM195 million on billings for the Megamall and that does not include tenants. As for the Gardens, our electricity costs have reached RM162 million since 2007. However, that also includes tenants," Antony Barragry explained.

In order to save energy costs, the Operations Team has introduced certain initiatives into Mid Valley City. For instance, the magnetic ballast fluorescent lamps were switched to electronic ballast fluorescent lamps. Also, less energy-hungry LED lamps are now used to light common areas as well as the front display of tenants' shops. Furthermore, management is maximising chilled water production for cooling by interconnecting both plants during night mode to avoid wastage.

"We cannot compromise on convenience, or the comfort and safety of our tenants and our visitors, so power consumption is necessary. Instead of trying to cut corners, we do our best to ensure that every light and air-conditioning unit operates at maximum efficiency," Mr Barragry said.

Concluding the interview, Antony Barragry expressed satisfaction with TNB for its consistency in providing them with help and expertise. He also revealed that Mid Valley City's electricity department has a hotline to TNB and if they have any issues regarding electricity or power supply, the problem is usually resolved within 30 minutes.

THE VIEW FROM THE TOP

Tan Sri Leo Moggie

A central figure in Malaysia's modern power generation sector, Tan Sri Leo Moggie mapped out the country's energy policy as Malaysia's Minister of Energy, Telecommunications and Posts for more than 20 years from 1978 to 1989 and then from 1995-2004. During his time in office, various initiatives were introduced, including fuel diversification, the shift from oil to gas as the main source of energy and the inclusion of renewables into the national mix.

Tasked with carrying out these objectives was none other than Tenaga Nasional Berhad (TNB) and its predecessor the National Electricity Board (NEB). Before and even after corporatisation and privatisation, TNB has had a close relationship with the Ministry and the Minister. It is therefore apt that after retiring from the government in 2004, Tan Sri Leo Moggie was named the Non-Executive Chairman of TNB, where he is continuing his service to the nation and the industry with which he has become synonymous.

SHAPING POWER GENERATION

Speaking to *TenagaLink* about his time as a Minister, Tan Sri Leo revealed that one of the first tasks he had to face when he took over as the country's first Minister of Energy in 1978 was to reduce Malaysia's dependency on fuel oil for electricity generation.

"As you may remember, there was a time when most of our power plants were fuelled by oil, and oil prices were spiking in the 1970s and that cost the country a lot of money. We realised that we needed to diversify and since Malaysia has a lot of gas, that became our new source of energy," he revealed.

Aside from being readily available, gas is also an ideal fuel source because gas power plants take less time to build and release less greenhouse emissions than oil. However, it also has drawbacks as was discovered in 1995 when the first national blackout occurred. Since gas is volatile, it can trip the system if there is a difference in frequency. This was what happened in one gas power station that year and it then cascaded to other stations in the network.

"It was a very important lesson not to be too reliant on one type of energy source. Initially, we had a four-fuels policy which comprised natural gas, fuel oil, coal and hydroelectricity. Then later we introduced renewables into the energy mix as part of the 8th Malaysia Plan."

IDENTIFYING THE DRIVING FORCE

Tan Sri Leo Moggie has also seen the rise in demand for power over the past three decades; owing to, he says, the rapid economic development. In 1978 for instance – the year he was named Minister – electricity consumption in Malaysia was slightly above 500 kWh. By the end of the 2012, it was more than 3,500 kWh.

"In the past, our main concern was to extend supply. However, consumer awareness level has also gone up. These days, more customers are expecting a higher quality of power supply as well as better service level. For example, when they call TNB to complain about a problem, they are not prepared to hear a 'We will look into it'. Instead they want to know the nature of the problem and how long it will take to resolve," Tan Sri Leo stated.

The increase in expectations is also driving TNB's customer service personnel to be more effective and sophisticated. It is also the catalyst behind the adoption of innovations such as modern communication tools to reach out to and receive feedback from customers.

These include e-billing where customers can receive their bills through electronic means like email or SMS. Also, whereas in the past, people had to go to the counter in a TNB office to apply for electricity supply, they only need to go online now and fill up a form on their computer using our e-Application platform.

A SOUNDING BOARD FOR IDEAS

As the Non-Executive Chairman of TNB, Tan Sri Leo Moggie's role is advisory, and here he draws upon his many years' experiences as Minister of Energy to act as a sounding board for new ideas. His intimate knowledge of how the industry works makes him the ideal mentor for those in the electricity producing sector.

"I am proud that we have an amazing family spirit in TNB and a strong sense of teamwork at all levels. Therefore, each initiative is the result of the discussions among the staff. Also, as the Chairman, I encourage them to always keep the customers in mind," Tan Sri Leo Moggie revealed.

Definitely, TNB's customer base of 8 million is the driving force behind the company's innovations. Tan Sri Leo Moggie stresses the importance of keeping customers as top priority. This means, he says, looking at the requirements of the customers and finding means to fulfil them.

For Tan Sri Leo, it is vital to embrace change in order to fit the consumers' expectations. Furthermore, it is also imperative to listen to the ground and find out what the market reaction is. For example, in the case of electricity billing, it is in response to feedback and reactions from consumers that TNB has introduced a new way of writing bills which are presented to consumers.

"We are doing this because we have received a lot of feedback saying that the present billing system is too confusing, especially with the inclusion of the 1% surcharge for the Renewable Energy Fund," Tan Sri Leo Moggie explained.

This surcharge is being collected for the Sustainable Energy Development Authority (SEDA), as a means to fund the Feed-in Tariff system, and TNB simply acts as the collector and not the beneficiary. One problem with the current bill format is that the way it is structured makes it seem as if TNB is collecting

the surcharge for its own use. The new bills were sent out to consumers within KL as a trial run, and will be rolled out across the country if there is positive feedback.

THE POWER OF A NAME

The name TNB has become indistinguishable from the power generation sector in Malaysia. It is a situation that has its pros and cons. For instance, during power outages in buildings, one of the first reactions is to call TNB. The problem with doing so though is that, quite often, these problems are caused more by internal wiring rather than any factor within TNB's control. Another is street lighting which sees TNB, more often than not, having to bear the brunt of consumer complaints, when it rightly comes under the jurisdiction of the Public Works Department (JKR) or the municipal council concerned. In this case, TNB's modus operandi is to channel these customer grievances to the agencies concerned.

Nevertheless, it is a type of flattery that Tan Sri Leo admits has a certain charm. "It is heartening to know that when it comes to electricity supply, TNB is the first thing that comes to people's minds."

Since becoming Chairman of TNB, Tan Sri Leo Moggie has seen the nation's premier power provider record considerable improvements. For instance, interruptions have been reduced from more than a thousand minutes/customer to below a hundred minutes/customer a year. However, TNB is not resting on its laurels, but is instead aiming to be on par with other developed nations such as Singapore, Australia and Hong Kong. One thing is for sure, with Tan Sri Leo Moggie as the Chairman, and with his love for the country and his passion for the energy sector, TNB is destined to set new benchmarks.

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Left: Malaysia's first Prime Minister *Tunku Abdul Rahman (second from left) with CEB scholars in London in 1961. Malayan engineering students were sent to the UK to study and learn skills as part of the Malayanisation programme to wean the young nation off its dependency on expatriate labour.*

in 1894 by business partners Loke Yew and Thamboosamy Pillay to enhance operations at their tin mines in Rawang, Selangor.

This started the ball rolling for electricity in Malaya, and in 1900, the Raub Australian Gold Mining Company built the Sempam Hydroelectric Power Station, the first in the country. Soon more power stations were built, such as the Ulu Gombak Hydroelectric Power Station which brought electricity to Kuala Lumpur in 1906. Within the next decade, other states in the Peninsula such as Perak, Kedah, Negeri Sembilan and Melaka received electricity supply.

As the Malayan economy boomed, fuelled by tin and rubber exports, mine and plantation owners became increasingly vocal in their call for more power. The main obstacle was that power generation and distribution was uncoordinated – the responsibility of different parties such as the British colonial administration and numerous private operators. A national electricity grid was needed to ensure steady supply and distribution to the whole of the Peninsula.

In fact, a national electricity grid was mulled as early as 1938,

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RURAL DEVELOPMENT

TNB's contribution to economic development cannot be denied, and perhaps one of its proudest achievements is how it has successfully rolled-out electricity to rural areas. In fact, today 99% of Peninsular Malaysia enjoys the benefits of grid electricity while in Sabah, that figure is 80% and rising. It is not for nothing that Malaysia has been praised by organisations such as the United Nations' Development Programme as a model for third world rural electrification.

Developing the rural areas of the country was one of the missions of the nation's 2nd Prime Minister Tun Abdul Razak, who in the wake of the May 13 riots realised that in order to equalise the income and wealth imbalance which led to the troubles, the rural folk must be given the same opportunities to advance in life as urban dwellers.

Of course, rural electrification was not easy and nor was it cheap. But the management and staff at the NEB realised that it was a necessity and a national duty. Thanks to their efforts, hardcore poverty in Malaysia has been reduced as farmers and those working in agro-based industries can now make use of mechanisation and other electric, time-saving and labour-saving innovations. This has contributed greatly to the uplifting of living standards in rural Malaysia.

TNB THROUGH THE YEARS

THE LEADERS

TENAGALINK salutes the men – the General Managers, Executive Chairmen, and CEOs – who have led TNB to where it is today.

General Managers/Deputy Chairmen/CEOs

Frank P. Egerton (General Manager, 1949-1953)

- First General Manager of the Central Electricity Board
- Prepared 10-year programme to develop the National Grid
- Oversaw early commissioning of Connaught Bridge Power Station

J. Sharples (General Manager,1953-1964)

- 2nd and last expatriate GM of the CEB
- Oversaw CEB's shift towards Malayanisation
- Saw the completion of Connaught Bridge and Cameron Highlands power station

Raja Tan Sri Zainal Raja Sulaiman (General Manager, 1964-1974)

- 1st Malaysian General Manager
- Oversaw the extension of the national grid and the supply to rural areas.
- Named 'Malaysia's Man of Electricity of the Century' in 2004

Tan Sri Abu Zarim Haji Omar (General Manager,1974-1984)

- Set up Institut Latihan Sultan Ahmad Shah (ILSAS) – the precursor to Universiti Tenaga Nasional
- Oversaw setting up of the National Load Despatch Centre (NLDC)
- Oversaw the star of construction of 150-metre high Kenyir dam which was then the largest hydroelectric scheme in Peninsular Malaysia.

Tan Sri Mohd Jalaluddin Zainuddin (General Manager,1984-1989)

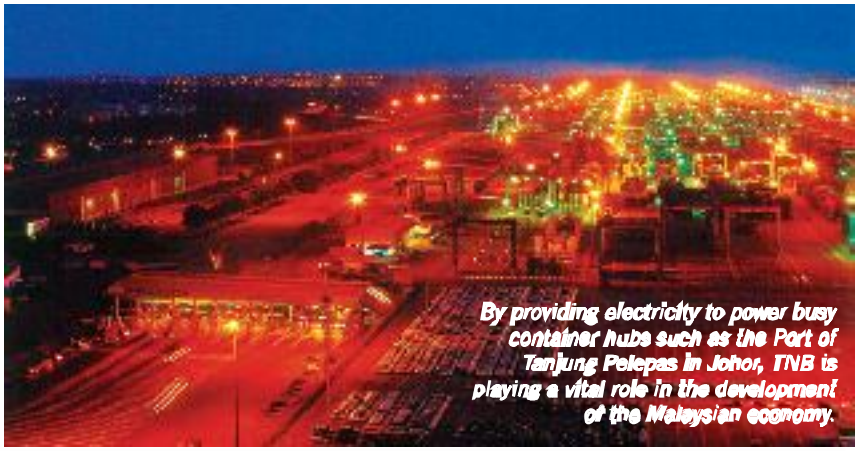
- First Director of Management Services and Development which spearheaded the use of IT in the National Electricity Board
- Last General Manager of NEB before corporatisation
- Oversaw completion of Kenyir Dam

Datuk Haji Ibak Abu Hussein (General Manager/CEO, 1989-1990)

- Oversaw the transition from NEB to TNB
- First CEO of TNB
- Maintained staff morale during the corporatisation exercise

Tan Sri Ani Arope (Chairman/Executive Chairman, 1990-1996)

- First Executive Chairman of TNB and first non-engineer to head the organisation
- Oversaw successful privatisation of TNB
- Oversaw signing of first Electricity Power Purchase Agreement (PPA) with Independent Power Producer (IPP), Yeoh Tiong Lay Corporation



By providing electricity to power busy container hubs such as the Port of Tanjung Pelepas in Johor, TNB is playing a vital role in the development of the Malaysian economy.

PROVIDING SECURITY

TNB and its predecessors have done more than just providing electricity. By ensuring a stable supply of power, it has contributed greatly to the security, economic growth and social progress of the nation. For instance, during the Emergency, New Villages were set up to separate civilians from communist guerrillas and starve the latter of food and other logistical support, as well as potential recruits.

These New Villages were fenced and surrounded by guard towers manned by sentries who monitored entry and exit into the compound. Needless to say, adequate lighting was a must in order for the guards to perform their duties and also to guarantee the safety of those in the New Villages. Thus power stations and generators, as well as transmission lines became frequent targets of communist sabotage, and this required CEB engineers to fix them.

These repairs were extremely dangerous, given that the repair team and the guards accompanying them were often attacked by the communists. By braving these risks and performing their tasks above and beyond the call of duty, CEB engineers helped bring about the success of the New Village programme, and the communists – starved of food and supplies – were forced to retreat to the Thai border.

The 1950s and 1960s were dangerous and trying periods in the nation's history, as seen in incidents such as the Emergency, the Malaysia-Indonesia Confrontation from 1963 to 1966 and the May 13 race riots in 1969. Incidentally, the last mentioned – which was one of the darkest days in Malaysia's history – was also where TNB (by then known as the NEB – National Electricity Board) shone.

Despite ethnic tensions at an all time high and a breakdown in civil society, NEB staff of all races and faiths banded together to ensure that the supply of electricity was not interrupted during that trying time for the country. It was an act which testified to the esprit de corps and unity of those who have been called to serve the nation by providing its people with power and this is a spirit that has continued today in TNB.

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although it was decided that one would not be needed for at least another 10 years. Then came the outbreak of the Second World War and the Japanese Occupation of Malaya – which lasted from 1942 to 1945. Many generators and power stations were destroyed or fell into disrepair during this time. When the British returned, the first task at hand was to rebuild the infrastructure and that would require a lot of electricity. It was time for centralisation and so the Central Electricity Board (CEB) was established on the 1st of September 1949, headed by its first General Manager – Frank Egerton.

The CEB took over the ownership and operation of 34 power stations in the country with a combined generation capacity of 39.88 MW, as well as the transmission and distribution system and a customer base of 45,495 people and staff of 2,466. Armed with these assets, it set about to fulfil three immediate tasks – complete the Connaught Bridge Power Station and the Cameron Highlands Hydroelectric Project and roll out a national electricity grid.

Phase 1 of the Connaught Bridge Power Station in Klang was completed by 1953 and inaugurated by the then British High Commissioner, Sir Gerald Templer. Incidentally, it was also the last power station in Malaya to be built exclusively with British money and British expertise. Malaya was on the road to independence and Malayans were now being called to play their part in building their nation.

CONNECTING THE GRID

Both the Connaught Power Station and the Cameron Highlands Hydroelectric Project were the cornerstones of the National Grid, which started in 1964 when the former was connected to the Bangsar Power Station, with the

line eventually being extended to Melaka. This formed the nucleus of what is today the central area network, and nearly 50 years since it started, the National Grid now connects the whole of Peninsular Malaysia.

The Grid is itself a marvel of engineering and undoubtedly one of the key factors which has contributed to Malaysia's economic growth. Presently, there are 420 transmission substations on the Grid, linked to each other by 11,000 km of transmission lines which operate at 132, 275 and 500 kV.

These substations receive electricity from power stations located in strategic areas in the Peninsular. The major ones are located in Paka in Terengganu, Temengor, Kenering, Bersia, and Batang Padang in Perak, Connaught Bridge, Kapar and Serdang in Selangor, Cameron Highlands in Pahang, Seberang Prai in Penang, Port Dickson in Negeri Sembilan, Melaka, Pergau in Kelantan and Pasir Gudang in Johor.

The Grid is also interconnected with the network of the Electricity Generating Authority of Thailand (EGAT) in the north and Singapore Power's network in the south, thus creating a rudimentary intra-ASEAN power grid. Furthermore, TNB also manages and operates the grid in Sabah owing to its takeover of Sabah Electricity Sdn Bhd (SESB), while Sarawak currently manages its own power supply and distribution network.

At the heart of the Grid is the National Load Despatch Centre (NLDC) which is located in Bangsar, Kuala Lumpur. At NLDC, data from power stations and substations is collected and then despatched to operators, who ensure that the supply of electricity is safe and reliable by performing tasks such

Continued on page 19

– Tan Sri Ahmad Tajuddin Ali (President/Executive Chairman, 1996-2000)
  - Former head of SIRIM responsible for transforming that particular organisation
  - Introduced measures to restructure TNB into 3 divisions – generation, transmission, and distribution – after 1996 national blackout
  - Reduced outages from 3,000 in 1996 to 66 in 2000.

– Datuk Fuad Jaafar (President/CEO, 2000-2001)
  - Practicing engineer who was responsible for helping link the National Grid in the 1970s and 1980s
  - Introduced culture of quality in TNB by establishing a Secretariat for Quality, and integrating Total Quality Management (TQM) and Quality Groups into the organisation
  - Introduced first customer service centre in TNB

– Dato' Pian Sukro (President/CEO, 2001-2004)
  - Spearheaded TNB's Transformation Plan which was unveiled in 2002
  - Coined phrase 'Awaken the tiger within TNB' to encourage staff to turn TNB into the best run company in Malaysia
  - Later appointed as Chairman of the Energy Commission

– Dato' Sri Che Khalib Mohamad Noh (President/CEO, 2004-2012)
  - First accountant to lead TNB
  - Oversaw TNB's implementation of the GLC Transformation Programme to increase efficiency in government-linked companies
  - Named CEO of the Year by *Business Times* in 2008

– Datuk Seri Ir. Azman Mohd (President and CEO, 2012-Present) – pictured below

PROVIDING CONVENIENCE

As the nation's electricity provider with a customer base of almost 8 million, Tenaga Nasional Berhad (TNB) has to meet the needs of the population which is made up of energy-hungry urban residents along with those living in less demanding rural areas. Because of such diversity in its clientele, customer service is an important part of TNB's operations, and this is entrusted to the Distribution Division.

Speaking to *TenagaLink*, Datuk Ir. Baharin Din – TNB's Vice President (Distribution) – revealed that several international performance indices are used to measure delivery rates and therefore gauge TNB's performance. For example, there is the System Average Interruption Duration Index (SAIDI), which assesses the average outage duration for each customer served.

Datuk Ir. Baharin was proud to note that TNB's SAIDI achievement of 60 minutes is on par with developed countries, and said, "The results from SAIDI shows that we have been performing extremely well over the last ten years, and there have been a lot of resources invested to improve the infrastructure and network."

He also revealed that the Distribution Division has put extra focus into improving and enhancing customer service as well as reinforcing the network system to ensure more efficient delivery of electricity. One of the initiatives introduced was to establish a centralised call centre to which all consumer complaints are channelled.

"This led to an improved Customer Satisfaction Index (CSI) from 68% five years ago to 72% last year. However, we are not resting on our laurels and our aim is to achieve 79% and higher in the next two years," Datuk Ir. Baharin Din affirmed.

Another example of innovative customer service at work is the provision of alternative bill payment methods such as E-pay, which is available 24 hours at over 2000 locations across the country, reducing response time to fixing street-lights from the current 48 hours to 12 hours and extending payment centre operating hours, which will allow customers to settle their bills after work.

Over the years, the number of TNB customers paying their bills over the counter has improved and the organisation aims to reduce this from 29% currently to 5% by the year 2020. Datuk Ir. Baharin Din explained that this will be done through making use of mobile phone and internet applications, which will appeal to the younger generation who currently constitute 30% to 40% of TNB's customer base.

In February this year, TNB introduced another initiative to improve productivity, customer satisfaction and increase revenue, as well as enhance the confidence of customers and stakeholders. Known as the Distribution Transformation Programme (DTP), Datuk Ir. Baharin Din explained that the DTP is part of the initiatives introduced by TNB's President & CEO, Datuk Seri Ir. Azman Mohd, to transform TNB into a regional champion in the energy sector.

Drawing parallels with the Government Transformation Programme (GTP), Datuk Ir. Baharin explained, "Just like how the GTP aims to improve public sector delivery services, the DTP seeks to improve TNB's response to its stakeholders."

He pointed out that the DTP has been earmarked to encompass areas such as asset management, customer service, material management, outsourcing, finance and organisation design.

"These will be managed and overseen by a newly created Transformation Department within the Distribution Division of TNB," Datuk Ir. Baharin Din explained. This department will roll out all the initiatives which have been identified, with the goal of "ensuring that our customer delivery system is the best in Malaysia."

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as maintaining the frequency and voltage, overseeing and managing restoration of power during outages and system faults.

There is no doubt that Malaysia's economic growth would have been highly improbable if not impossible without the National Grid. This complex web of transmission lines and distribution centres has created a network which provides the people of Peninsular Malaysia with electricity 24 hours a day, 7 days a week. In a developing economy like Malaysia, where businesses are springing up, and the pace of life increasing, so too will the demand for more power go up as well.

FOR THE PEOPLE, BY THE PEOPLE

It can be said that for those working in TNB, that strong commitment to customers not only comes from a sense of public duty – although it is definitely there – but also because the customers have always been the bosses. This was the case even during the time of the NEB, when the national electricity board was a government-run statutory body which was in turn beholden to the people of Malaysia – the *rakyat*.

Today, the people are literally the bosses, as the privatisation of TNB – which took place in 1990 and resulted in its name being changed from National Electricity Board to its present format – gave Malaysians the opportunity to have a stake in the main electricity supplier. Furthermore, thanks to privatisation, a new avenue of funding was opened up, thus allowing TNB to invest in equipment and technology.

That is not to say that privatisation, or rather the road to it, was easy. There were many doubts and anxieties about the process, not

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CONNECTING THE GRID

The distribution of electricity throughout Peninsular Malaysia is thanks to the existence of the National Grid. We highlight some key moments in its development.

1963
- A Grid Control Centre is set up at the Connaught Bridge Power Station to coordinate generation and control of the grid network of 66kV to 132kV.

1976
- The First Grid connection is made from the West Coast to the East Coast of Peninsular Malaysia, supplying Kuantan and Pekan in Pahang.

1981
- First Grid connection (132kV) to Hadyai, Thailand, from Bukit Keteri,Kedah, established.

1982
- Bilateral agreements are signed with the Electricity Generating Authority of Thailand (EGAT) and the Public Utilities Board (PUB) of Singapore for systematic and integrated connections between the Malaysia, Thailand and Singapore.

1985
- First undersea cable connection (230kV) to Singapore is established.

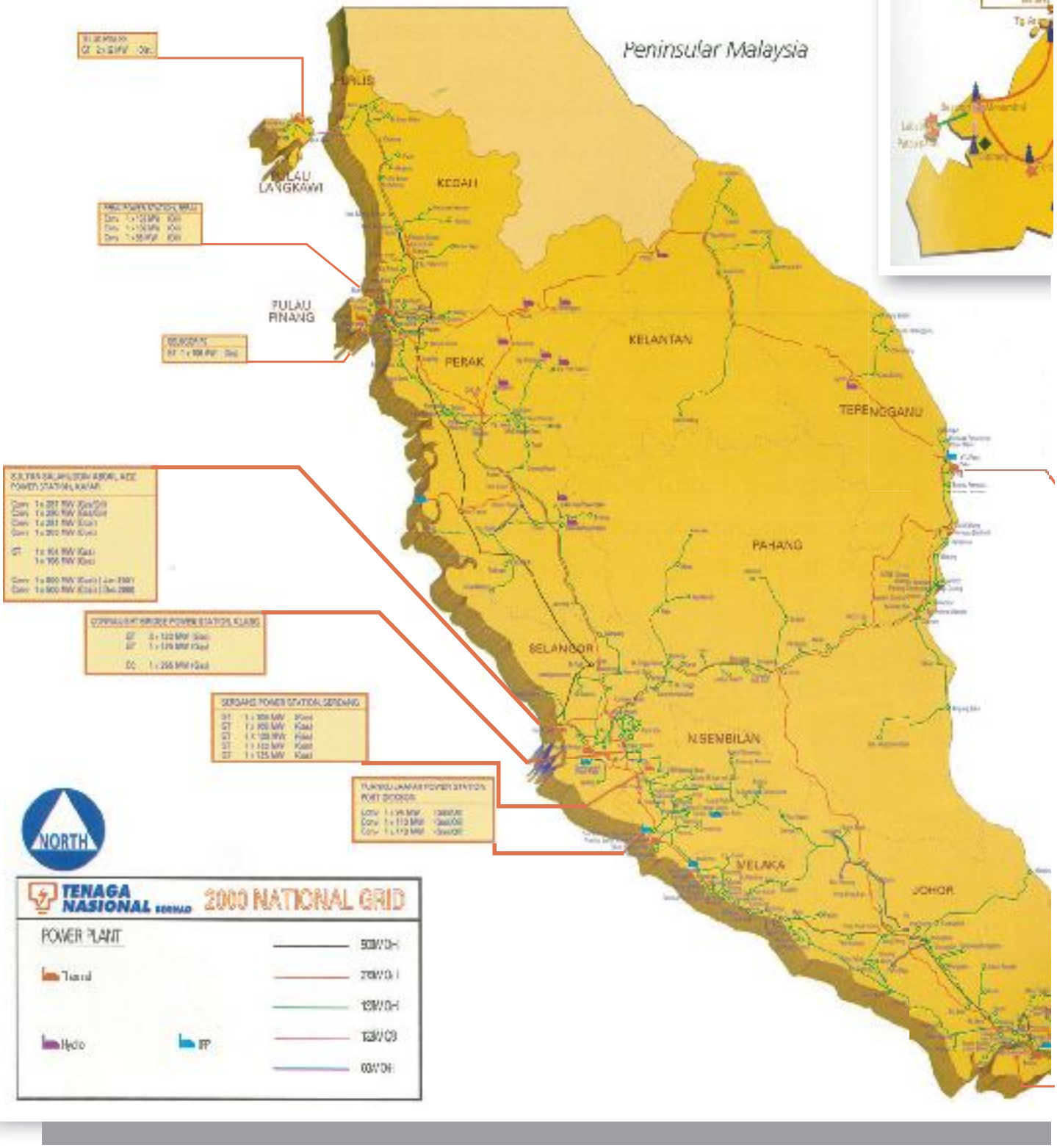
1996
- The National Grid is strengthened with a 500kV network which functions as the new backbone of the distribution grid in the wake of the second national black out.

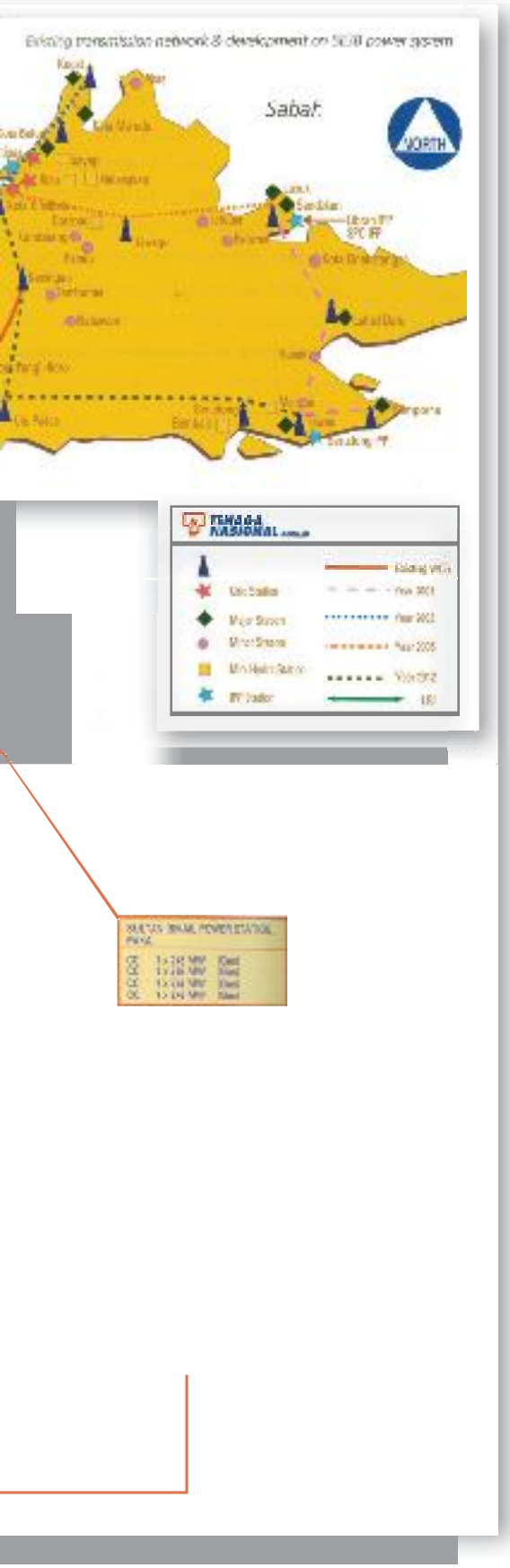
2007
- Tun Datuk Seri Panglima Haji Ahmadshah bin Abdullah, the Yang di Pertua Negeri of Sabah, launches the Sabah Grid

2009
- TNB signs agreement with Perusahaan Listrik Negara Indonesia (PLN) on the Sumatera-Peninsular Malaysia Interconnection, which forms part of the ASEAN Power Grid.

2010
- TNB signs a Memorandum of Understanding with Provincial Electricity Authority (PEA) Thailand on a 33kV Electricity Supply System from the Principal Distribution Substation (PPU) at Pengkalan Hulu, Perak, to Betong, Thailand.

The status of the National Grid in Peninsular Malaysia and Sabah as at the year-end.





MILESTONES AND ACHIEVEMENTS

Throughout the decades, TNB and its precursors have achieved many firsts in Malaysia's energy sector. TENAGALINK highlights some key moments:

–1949

- The Central Electricity Board (CEB) of the Federation of Malaya and is tasked with overseeing all electrical installations in the country.

–1965

- The CEB is renamed '*Lembaga Letrik Negara* (LLN)' *Tanah Melayu* (National Electricity Board or NEB) of Malaya.

–1966

- Prime Minister Tunku Abdul Rahman opens the NEB's headquarters in Jalan Bangsar, Kuala Lumpur.

- The NEB commissions the first computer system used by a government department in the country. This was an IBM 1440 mainframe with 800kb of memory.

–1979

- The National Load Despatch Centre (NLDC) is officially opened by Prime Minister Tun Hussein Onn.

–1984

- Paka Power Station, one of the first combined cycle plants in the world, begins receiving natural gas from Petronas.

–1992

- TNB shares debut on the KL Stock Exchange (KLSE) with a price of RM8 – this is a premium of RM3.50 above their minimum issue price of RM4.50.

- A nationwide power blackout in September, results in a 'fast track' plant up programme through the installation of additional gas turbines at various existing plants.

–1995

- Tenaga Nasional Repair and Maintenance Sdn. Bhd. (REMACO) is incorporated in order to provide cost-effective maintenance services for TNB's power plants.

TRAINING THE FUTURE

Today, all of TNB's engineers and managers are Malaysians, but it was not always that way. Prior to Merdeka, the staff force mainly comprised British expatriates, but with the onset of independence, the process of 'Malayanisation' was started to ensure that local expertise would be there to fill the gaps when the British withdrew.

For TNB – then in the form of CEB – this meant sending young engineers to the UK to learn the necessary skills. The first batch of shift engineers left in 1951 to train with the British Electrical Authority. Their names – Abu Zarim bin Haji Omar, Tengku Daud bin Tengku Besar Burhanuddin, and Tengku Yaacob Shah – have been recorded as pioneers in this field of Malayanisation.

Soon, more Malayan engineering students left for the UK, to study in establishments such as Birmingham University and Brighton Polytechnic. More than just learning technical skills, they were also given training in management. It was a sign that Malayans would be taking over.

Perhaps the most symbolic act came in 1964 when J. Sharples – who had taken over from Egerton as General Manager – retired after nine years at the helm. He was succeeded, not by another expatriate but by a Malaysian – Raja Tan Sri Zainal bin Raja Sulaiman – who himself was a pioneering staff at the NEB. Malayanisation or rather Malaysianisation was now complete.

Today, TNB continues to be involved in the training of future engineers and leaders. But now, instead of being sent to the UK, they learn the skills and talents at TNB's very own university – Universiti Tenaga Nasional (UNITEN) which was set up in 1997.

More than just being a venue for TNB to tap for human resources, UNITEN engineers have also found employment in many international corporations such as Schlumberger, Shell, Intel and Toshiba, as well as in IPPs such as Genting Sanyen and YTL Power. Furthermore, it is not just Malaysians who enrol in the programmes but foreigners as well. It is certainly significant that 60 years ago, Malaysians were going abroad to learn engineering, while today those from abroad are coming to Malaysia for the same purpose. Times have definitely changed.

Registration day at UNITEN, which has a student population of over 8,200.

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least of all was the uncertainty over employment. However, most of the staff were soon persuaded of the benefits of working for a private company.

No doubt, credit for this should go to two men – one of whom was Datuk Haji Ibak Abu Hussein – the then General Manager of the NEB – who had to handle the delicate and sometimes complicated process of switching from government to private control. The other is the then Energy Minister, Dato' Seri S. Samy Vellu – who was given that portfolio – mainly because of his experience in the successful privatisation of the telecommunications and highways construction sector, which he oversaw as Works Minister.

Investors also showed their confidence in TNB when it made its debut on the KLSE on the 29th of February 1992. The issue price of each share was RM4.50 and 60 million ordinary shares were released for tender. It was oversubscribed by 6.47 times – a staggering amount – considering the volume of shares released to the public. When the market opened, TNB's share price had already reached RM8 owing to this demand.

Below: *Prime Minister Datuk Seri Najib Tun Abdul Razak greeting TNB staff during his visit in March 2013.*

A MARK OF CONFIDENCE

Today, TNB is one of the top performers on the stock exchange, and in 2011/2012, it was second in terms of revenue generated. More than that, it has proven itself to be a first-class utility company and has overcome past hiccups, such as outages and two nationwide blackouts, to become a highly respectable player among Southeast Asian power companies.

Confidence in TNB was expressed by Prime Minister Datuk Seri Najib Tun Abdul Razak, during his visit to TNB headquarters on the 7th of March 2013. Dismissing speculation that TNB would be split into different entities, he said, "The government will ensure that TNB will remain as the premier power supplier and distributor in the country. We would like to see TNB grow as the leading regional player in power generation and distribution."

This confidence in TNB is not misplaced. After all, today, Malaysia is regarded as one of the prime destinations for investment and one of the key selling points that the Malaysian Investment Development Authority (MIDA) makes when presenting the merits of the country is its strong infrastructure. Not least of all is electricity supply. From a nation that was mainly rural during the time of independence in 1957 to one that is on the verge of becoming a developed nation, Malaysia has come far and TNB has been there all the way. Indeed TNB can be proud that it has fulfilled its promises to the Malaysian people and will no doubt continue to fulfil them in the future.

- The first of its kind wind turbine generator hybrid system is constructed and installed in Pulau Layang-Layang, Sabah, by TNB Research.

1996

- Putrajaya Power Station becomes the first power plant in Malaysia to be certified MS ISO 9000 compliant. All other TNB power stations have since been accredited.
- Putrajaya Power Station becomes the first power plant in Malaysia to be certified MS ISO 9000 compliant. All other TNB power stations have since been accredited.

1998

- TNB reaches agreement with the Sabah Electricity Board (SEB) to take over SEB's electricity business operations in the state and the Federal Territory of Labuan.

2004

- Jana Landfill Small Renewable Energy Programme (SREP) commences commercial operations. The plant was developed by TNB-Energy Services (TNBES) and is based on a Renewable Energy power purchase agreement (REPPA) signed in 2001.

2006

- TNB Corporate achieves MS ISO 9000 certification.
- TNB CareLine service is launched by then Minister of Energy, Water and Communications Tun Dr Lim Keng Yaik.
- TNB launches its 20-Year Strategic Plan, with the first 5-year phase revolving around achieving Service Excellence.

2008

- TNB receives the coveted Prime Minister's Industry Excellence Award for 2007 as well as the Quality Management Excellence Award (Category 4).

2009

- TNB is ranked the 575th biggest company in the world by Forbes Global 2000.
- The second nationwide blackout in August leads to the implementation of an 'islandisation' programme.

2011

- TNB receives the Gold Merit, the most prestigious accolade, at the National Award for Management Accounting (NAfMA) 2011, in recognition of its impressive accounting practices.

2012

- TNB launches its Call Management Centre (CMC).
- TNB Repair and Maintenance (TNB-REMACO) receives the Frost & Sullivan Malaysia 2012 Excellence Award in the Power Plant Service Provider Category.

SMART GRIDS AND GOING GREEN

ASEAN ELENEX & Industrial Automation Exhibition 2013

ASEAN ELENEX 2013 held from the 20th to 23rd of March 2013, at the KL Convention Centre, was a combination of the 10th International Exhibition of Transmission & Distribution and Electrical Engineering for the ASEAN region and the 7th International Exhibition on Industrial Automation. Organised by Malaysian Exhibition Services (MES), the event was hosted by Tenaga Nasional Berhad (TNB) while the International Congress of Electrical Distribution Networks – Congress International Des Reseaux Electriques De Distribution (CIRED) Malaysia – a branch of the CIRED International, a Non-Governmental Organisation (NGO) co-ordinated the seminars, conferences and talks. The exhibition was dedicated to promoting management of electrical and energy resources and supply through sharing of knowledge, experience and expertise.

Previous page: *The Tenaga Nasional Berhad (TNB) booth at the ELENEX 2013 exhibition.*

Right: *Declaring the exhibition officially open, from left to right - Datuk Ir. Baharin Din – CIRED Chairman, Tuan Mohd Elmi Anas – Director, Energy Management and Industrial Development, Dato' Loo Took Gee – Secretary General of the Ministry of Energy, Green Technology and Water, Datuk Seri Ir. Azman Mohd – President/Chief Executive Officer of TNB, and Tan Sri Datuk Asmat Kamaludin – MES Chairman.*

The exhibition began with welcome speeches by Tan Sri Asmat Kamaludin, Chairman of Malaysian Exhibition Services (MES), Datuk Ir. Baharin Din, CIRED Chairman and Vice President (Distribution) of TNB, and Dato' Loo Took Gee, the Secretary General of the Ministry of Energy, Green Technology and Water.

The 2013 ASEAN ELENEX showcased the latest electrical and electronic products from manufacturers and suppliers, and also featured a business to business (B2B) meet-up, while CIRED organised the seminars and conferences at the event. The underlying theme of this year's exhibition was renewable and sustainable energy in line with the country's plan to achieve 985MW of renewable energy by 2015, with a call for financing of more green energy projects by Malaysian banks.

An asset management conference for electrical utilities 2013 organised by CIRED Malaysia on the 20th of March 2013, titled 'Building Asset Management Capabilities: Towards Business Excellence and Smart Grid', discussed asset standards, the new ISO55000, procurement and management of technical infrastructure required to implement Information Communication Technology (ICT)-automated and enhanced public electrical networks. It also featured notable individuals in the Electrical Engineering field.

Regarding the relationship between CIRED Malaysia and ELENEX, Datuk Ir. Baharin Din, CIRED Chairman said, "The electrical industry is a billion-ringgit sector, and we have players – from the manufacturers to suppliers and all the way to the users. ELENEX is basically representing the manufacturer and supplier in the supply chain." He added that ELENEX and CIRED can co-exist perfectly because "ELENEX promotes the manufacturers, who form a part of the supply chain. CIRED also promotes and shares information and I see our involvement in this exhibition as a very good thing, for synergised energy."

Among the organisations present at the exhibition, Tenaga Nasional Berhad Energy Services (TNBES) – a subsidiary of TNB – showcased various completed renewable 'green' energy solutions including Solar Farm, Solar Hybrid System, Biomass and Biogas, Energy Efficiency Solution among others in several parts of the country.

"This is a good platform to create awareness and to expose technology and identify potential buyers and suppliers," Mohd Azhar Abdul Rahman, TNBES Head of Business Development said. "It is also a very good meeting point to keep abreast of the latest technology especially in renewable energy. On top of that, there is a session for Power Talks where the major players in the exhibition can keep themselves updated with the latest development, news and information."

EXCEEDING EXPECTATIONS

When there is a faulty street light or you are experiencing some technical difficulty with home or office electricity supply, who do you call to sort out the problem? Tenaga Nasional Berhad (TNB). TENAGALINK interviews Saiful Bahari Hashim, TNB Customer Relations Officer at Kawasan KL Pusat and takes a look at daily events in the life of the department at the receiving end of consumer complaint.

Above: *Saiful Bahari Hashim makes his rounds, ensuring everything is running smoothly.*

A typical day starts at 8:00am. As the officer in charge, Saiful calls a 15-minute meeting of the front-line staff – those in constant contact with customers – to discuss any customer issues at hand, possible resolutions and any areas of service that can be improved. "Customer complaints from the one-stop call-in centre are entered into a customer management system which I check everyday, determine what the complaint is about and then channel it to the right Unit to be resolved. After which I call the customer to give an update on the progress."

FIRST CALL

The counter service representatives are trained to listen to customers and focus on their complaints. Once the problem is understood, then the representative resolves it. Occasionally, assistance is needed from other Units at the Area Office, and the customer is placed on hold while the issue is taken care of. "All customer issues have to be followed up, until they have been resolved so feedback can be given to the customer," explained Saiful.

Just then the interview is interrupted as a call comes in from a home owner trying to discontinue his account for a building that still has a tenant. The tenant calls a few minutes afterwards and Saiful informs them that TNB is obligated to cancel an account if the owner requests it and that the tenant can start a new account.

COMPLAINT PROCEDURE AND HANDLING

"Typically, customers simply walk up to the service counter or cashiers and are attended to. In exceptional cases however, I have to step in and assist the customer," says Saiful, adding, "For example when a customer from Klang comes here, instead of contacting the KL Selatan customer centre that services the Klang area. We attend to the customer and I directly connect them to the Customer Relations Officer in their Area so they do not have to drive all the way here in the future."

IMPROVING SERVICE

With the accelerating growth of technology and the convenience of the World Wide Web, TNB aims to assist customers, providing

Above: *Saiful Bahari Hashim, TNB Customer Relation Officer resolves customer complaints via his mobile phone, allowing him to be accessible to customers even when he is out of the office.*

Next page: *The e-services kiosk at the customer service outlet educates customers on the merits and ease of accessing TNB online services from home or office.*

services including electronic payment, live chat options and customer account updates from a dedicated website. Currently, there are two eServices kiosks installed at KL Pusat Pusat Khidmat Pelanggan (PKP), to introduce walk-in customers to the online services. They are given a live demonstration of the website, its features and how to navigate around it. There is an electronic pad on each customer service representative's desk where customers can give their feedback.

TNB also organises regular training sessions for its frontliners such as the Customer Relationship Management training held on the 6th and 7th of April 2013.

KEEPING IN TOUCH

From time to time Saiful walks around the waiting area of the outlet, greeting customers, assisting where necessary and getting feedback regarding services. The flow of customers this early is slow, he says, usually picking up between 11:00am and 5:00pm.

The Customer Relations Officer position also requires Saiful to be out of the office and not just during regular office hours or work days. He visits customers and makes sure they are satisfied with the services they have requested. His mobile phone ensures he can be reached in or outside the office by customers, allowing him to provide an almost around-the-clock service.

Service recovery is an extra incentive by TNB to exceed customer expectations. Saiful recalled a weekend when he received a call from the Area Manager of Klang at around 8:00pm to attend to a broken down transformer at Jalan Ampang, investigate what the problem was and apologise to the affected customers.

PERFORMANCE MONITORING

Once a month, Saiful meets with the top management of KL Pusat and TNB Area Management to report on the performance of the outlet and how long it takes to resolve customer complaints.

Adding that the outlet moves ahead of the customers providing feedback and meeting all its promises, "Customers expect our services to be timely. For example, when a customer makes a report saying their bill is too high, we have to send a technician to check the meter. And we have to provide feedback to the customer indicating if the meter is the problem or not. If it is an internal problem with their home wiring or an electrical appliance, we will advise how they can fix it."

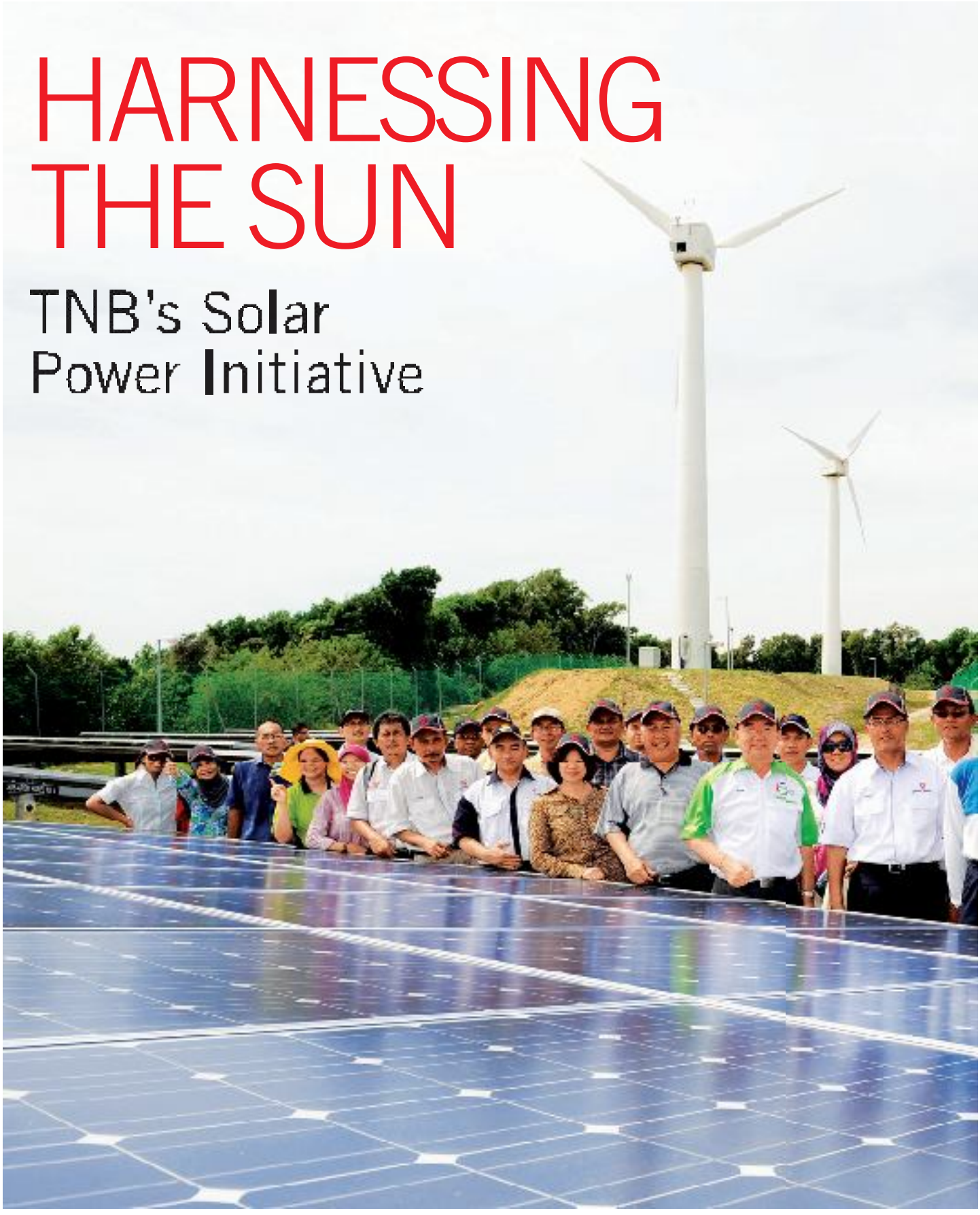
CUSTOMER FIRST

"At TNB, we put our customers as top priority and we aim to give our best service to the customers with no excuses. Our goal is not to meet but surpass customers' expectations. Recently we had a customer who needed to have a meter fixed in her home, which usually takes at least 72 hours. About 24 hours later, we had the meter fixed and working. The customer was overjoyed, because we had met the need and also done better by completing it in less than the estimated time," he shared.

"In the past year TNB achieved a System Average Interruption Duration Index (SAIDI) of around 60 minutes, comparable to advanced countries like Australia or the United Kingdom. This is an internationally recognised index used to gauge the reliability of electricity providers, measured in units of time. Although indexing is important for benchmarking service delivery and measuring improvements, what drives TNB are the customers and customer convenience. As Saiful Bahari Hashim emphasised, "Our core focus is on our customers and their satisfaction with our services."

HARNESSING THE SUN

TNB's Solar Power Initiative



In modern times, a stable supply of electricity is considered essential for a decent standard of living. However, delivering power through the main grid to remote rural areas and other isolated locations such as islands is often prohibitively expensive or otherwise unfeasible. Additionally, environmental concerns and economic implications of dependence on fuel imports – for instance Malaysia imported over 18 million short tonnes of coal in 2010, at an average price of US$88 (RM264) per ton – mean the use of traditional fossil fuel-based generation methods is discouraged. TENAGALINK examines the use of solar power as the one-stop solution to both problems in Malaysia.

PHOTOVOLTAIC BASICS

Solar energy for electricity generation can be categorised into two types: thermal, in which heat from the sun is used to drive a steam turbine, and photovoltaic (PV), where light falling on a photovoltaic cell is converted directly to electric energy. Of the two, PV is better known due to its widespread use. While solar thermal plants are used for central electricity generation for the grid, PV can be used on a much smaller scale, to which anyone who has used a solar-powered calculator can attest.

Although the physical concept of photovoltaic materials was first observed in 1839, it was only fairly recently that PV cells efficient enough for primary power generation were developed. Modern PV cells use a silicon semiconductor material, which releases free electrons that can flow through the material when struck by light. The solar cell is designed to allow the electrons to flow in only one direction, creating an electric current which can be used for power.

The market for PV energy is rapidly expanding, and it now has a total worldwide capacity of nearly 70,000MW at the end of 2011,

Previous page: *Datuk Peter Chin, then Minister of Energy, Green Technology and Water (KeTTHA) (10th from right) and KeTTHA secretary-general Dato' Loo Took Gee (15th from right) at the launch of the Solar Hybrid Station on Pulau Perhentian, Terengganu. The plant combines three different power generation technologies: wind, solar and diesel.*

Above: *Muscle power and solar power combine to achieve speeds of over 40 km/h with this solar-powered bicycle designed by UNITEN.*

Next page: *TNB solar hybrid projects at Perhentian Island, Terengganu and Dala Gerik, Perak.*

from just 7600MW in 2007. It is now the third most important renewable energy source (after hydro and wind power), in terms of globally installed capacity. Solar panels may be ground-mounted or built into the roof or walls of a building. Furthermore, they may even be integrated with farming or grazing activity. PV energy is therefore a viable source of electricity in remote areas where centralised electricity production is unfeasible.

HYBRID POWER

One disadvantage of solar power, whether thermal or PV, is its intermittency: it works much less effectively during cloudy days, and not at all in rain or at night. For Tenaga Nasional Berhad (TNB), the solution lies in hybrid plants, which combine solar power with battery banks and diesel generators to provide steady, 24/7 power generation. Compared to pure diesel generator systems, the Solar Hybrid System (SHS) offers improved reliability and lower maintenance costs, as well as reduced environmental impact.

TNB Energy Services (TNBES), a wholly-owned subsidiary of TNB, has extensively invested in solar power, and has built numerous hybrid plants in remote locations, bringing 24-hour power generation to many rural areas in Malaysia as part of the government's efforts to provide rural residents with adequate infrastructure and a standard of living comparable to their urban counterparts. Of particular note is the SHS for Remote Schools programme, which uses 70% less diesel than an equivalent stand-alone diesel system would, and is intended to replace the current 12 hours per day power supply.

ISLANDS IN THE SUN

The SHS system has been used extensively on islands, including major tourist destinations such as Pulau Langkawi and Pulau Perhentian. For instance, recent visitors to Gunung Machinchang, Langkawi will likely have experienced the TNB-provided solar power, as two SHS generation units are located at the middle and top cable car stations, having been built between 2001 and 2002.

Larger-scale projects include the SHS station at Pulau Kapas, Terengganu, which has a 100 kW PV array built in 2007 to supply seven resorts and chalets. In 2009, a larger 200 kW station was constructed on Pulau Banggi to supply the islands around Kudat, Sabah. The station provides enough 24-hour power for six villages and a small town, or a quarter of the island population.

Of particular note is the 2007 hybrid plant on Pulau Perhentian, also in Terengganu, which has two 100 kW wind turbines as well as diesel generators serving as backup for its 100 kW solar array. In addition to its environmental and economic benefits, the distinctive plant, with its twin towering wind turbines, has proved to be a tourist attraction in its own right.

SOCIO-ECONOMIC BENEFITS

The electrification of rural areas made possible by SHS installations has significant social and economic impact. For one, the rural populace has a greatly improved standard of living, able to enjoy conveniences such as television and refrigerators that urban dwellers generally take for granted. Schools have also benefitted from access to IT-based teaching methods that make learning both more effective and enjoyable.

Perhaps most important, however, are the economic opportunities for small and medium enterprises opened up by access to a steady electricity supply. Modern industry, particularly in the manufacturing and ICT sectors, is heavily reliant on electricity and even low-tech sectors such as fishing and agriculture can benefit greatly from electrification. For instance, electricity from the SHS near Mersing, Johor has allowed the local fishermen to use chillers to store their catch. Previously everything had to be sold or consumed on the same day it was caught; thanks to electricity, the fishermen's income has increased by over 150%.

BUILDING SOLAR POWER

The benefits of solar power in Malaysia are not limited to rural areas. In addition to its research efforts through *Universiti Tenaga Nasional* (UNITEN) and its work in the government's Small Renewable Energy Programme (SREP), TNB has conducted the Malaysian Building Integrated Photovoltaic (MBIPV) programme, intended to make BIPV more affordable and stimulate market growth. A chief advantage of BIPV over standalone PV systems is the elimination of the need for increased land use. Furthermore, integration of PV systems into the elements of a building such as window shading and roofing, also replaces conventional material usage and thus brings about savings that offset the cost of the BIPV installation, as well as offering aesthetic benefits. It is estimated that BIPV has the technical potential to generate 7.8 terawatt-hours (TWh) of electricity (equivalent to 21% of residential and commercial electricity demand in 2005), without requiring changes in land use or creating an adverse environmental impact.

To date, TNB has installed 136 BIPV systems totalling 1,966 kilowatts-peak (kWp), a direct result of its efforts to promote the technology among end-users, builders, manufacturers and financers. The MBIPV programme is offering many financial incentives to speed up adoption, chief among which is the feed-in tariff (FiT). Additionally, as the market expands, PV technology will become more affordable; an International Energy Agency (IEA)

UNITEN CHALLENGES

TNB has also made its name in international solar power challenges through its wholly-owned *Universiti Tenaga Nasional* (UNITEN). The UNITEN team has achieved historic successes in the World Solar Cycle Challenge, a solar-and-pedal-powered bicycle race that runs 1,526 km from Alice Springs to Adelaide in Australia. Finishing second twice and first once, UNITEN's accomplishments here have led them to participate in the World Solar Challenge, a similarly-themed 3,021km vehicle race from Darwin to Adelaide. Lessons from the design of solar-powered cars for the Challenge could be applied to the development of lighter, cheaper, more efficient solar cells for general usage.

In a similar vein, UNITEN also does research into solar power and other renewable energy sources through such bodies as the Centre for

Renewable Energy (CORE), the Centre for Sustainable Technology and Environment, and the Institute of Energy Policy & Research. In addition to research projects worth RM4m (US$1.2m), the CTE hosted the International Conference on Advances in Renewable Energy (ICARET) in 2010, a TNB-sponsored event which provided a platform for researchers, industrial leaders and other stakeholders to explore the latest developments in renewable energy.

study on PV growth in Germany and Japan indicated that PV system cost went down by 15% to 20% for for every doubling of the PV market size.

VALUE GENERATION

The development of BIPV in Malaysia thus offers economic benefits for all parties while also helping to preserve the environment. Companies looking to reduce their carbon footprint as part of their CSR efforts will be pleased to know that every kilowatt-hour (kWh) produced by a PV panel saves up to 0.45 kg of coal, resulting in CO_2 emission reductions of up to 1.24 kg. Over a year, a 10 kW solar system working the equivalent of four hours at full capacity every day could save up to 18 tonnes of carbon dioxide – equivalent in mass to nearly 19 Perodua Myvis.

On the financial side, the FiT allows electricity produced from renewable energy resources to be sold to TNB at a fixed premium price, allowing residential and commercial users to profit directly from their investment into BIPV. Rates in 2013 can be as high as RM1.13 (US$0.36) per kWh, with additional bonuses of up to RM0.50 (US$0.16) per kWh for BIPV systems integrated with the building's construction, particularly those that use locally manufactured components. The aforementioned 10 kW system could thus earn nearly RM24,000 (US$7,720) in a year through FiT, so even if the initial installation cost is RM150,000 (US$48,240), the system pays for itself in less than seven years – certainly a worthwhile investment.

With an increasing population in Malaysia, combined with increasing environmental stress brought about by human activity, it becomes necessary to increase electricity generation without harming the environment. As the supply of fossil fuels declines and energy demand rises, solar power will play an increasingly larger role in meeting energy needs. Efforts such as TNB's in developing and deploying solar power nationwide are laudable, for they allow all Malaysians to enjoy a comfortable standard of living while preserving nature.

AFRAID YOUR TENANTS AREN'T PAYING THEIR ELECTRICITY BILLS?

Two ways TNB can help you:

1. CHANGE OF TENANCY

You can change the name on the electricity bill of your rented premises to the tenant's name. The tenant will then be responsible for the payment of the electricity bill every month.

This will avoid the issue of disputed electricity bills and arrears. To change the name, please complete the Change of Tenancy Form* and bring it to the *Pusat Khidmat Pelanggan* (Customer Service Centre) where your account is registered together with the following items:

- One copy of your Identity Card
- One copy of your Sales & Purchase Agreement or Tenancy Agreement
- Deposit: two months' usage of electricity depending on the type of premises - to be paid by cash or cheque
- Stamp Duty RM10 x two pieces (one piece glued on the form and stamped at any *Pejabat Hasil* office. The other piece to be brought to the *Pusat Khidmat Pelanggan*)
- Processing fee of RM3.00

**Change of Tenancy Form can be obtained at any Pusat Khidmat Pelanggan*

2. BILL MONITORING

If you do not wish to change the name on the electricity bill to the tenant's name, you can still get a copy of the bill every month to monitor the status of payments from time to time.

This can be done by registering your rented premises through our e-Services at https://eservices.tnb.com.my. Bill copies can also be obtained by calling 1300 88 5454.

TNB CareLine - 5 Ways to Contact Us

www.tnb.com.my
Click on **ONE STOP ENGAGEMENT CENTRE**

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tnbcareline@tnb.com.my

For billing and account enquiries, call or fax
1300 88 5454

To report power outage or TNB street light malfunction, call or SMS **15454**

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Note: 1. Fixed line calls will be charged as local calls. 2. Mobile phone calls are subject to charges by service providers. 3. SMSes are free.

HEALING TIES

KPJ Healthcare Group

With 23 hospitals across Malaysia, KPJ Healthcare Group is the largest private medical services provider in the country. Attending to almost 3 million local and international patients annually, the Group is committed to pushing new frontiers in Information Technology (IT), geriatric care and establishing hospitals in more countries in the Asian region, while providing world-class services to its patients. TENAGALINK interviews the Managing Director of KPJ Healthcare, Haji Amiruddin Abdul Satar to get an insight into the Group's operations.

Having hospitals located across several states in the country poses several challenges which include logistics and maintaining a standardised service to patients across all the hospitals all the time. "We make sure patients have a great experience and treatment outcome in our hospitals," Haji Amiruddin said. But each case is often different from the next, requiring a unique approach.

BEYOND EXPECTATIONS

Haji Amiruddin added, "Our challenge is to deliver services that exceed expectations. Our patients come to us with some level of anticipation especially when they compare the services offered in our hospitals against government hospitals. They expect waiting times to be shorter; the experience should be a pleasant one."

An important factor in the process and operations of the Group's hospitals is safety. "We have equipment, medicines and drugs that if improperly used can cause harm." Haji Amiruddin explained.

Right: *KPJ Johor Specialist Hospital is one of the 23 hospitals in KPJ network of hospitals in Malaysia and was the first to open its doors to the public in May 1981.*

"Not only do patients and visitors rely on our expertise, they need the assurance that KPJ places a high priority on safe practices, as indeed do all our doctors, nurses and other staff."

This is why KPJ Hospitals continually strives to ensure hospital processes and people who control them are adequately trained to handle the equipment and deliver the best care to patients safely. This has also led to the development of a clinical government framework to ensure that each hospital has policies, guidelines and procedures that protect both the patients when they receive treatment in the hospitals and the providers of such treatment.

ADVANCING SERVICES

Haji Amiruddin added "On the home-front we have also recruited foreign staff – Iranians, Egyptians, Americans and Pakistanis – in an effort to know the culture and needs of our foreign patients whenever they come to our hospitals. We also have publications in foreign languages – Arabic, Mandarin, Japanese and Korean, to convey information about KPJ Healthcare and services available in our hospitals."

The Malaysian government has taken the initiative to promote the country as a healthcare hub through seminars, exhibitions and trade fairs in several countries in the ASEAN region, in most of which KPJ has participated to promote the country and its hospitals. The Group has also appointed several travel agents to represent it in various countries including Indonesia and the ASEAN region in general, and the Middle East and North Asia (MENA), spreading information about KPJ and its services and inviting patients to Malaysia to receive treatment.

Furthermore, the Group uses information technology (IT) to ensure smooth operations, utilising it in its Hospital Information Technology System (HITS) – which handles inventories, reporting and patient billing – and the KPJ Clinical Information System (KCIS), an IT system that has been in development over the last 5 years to manage clinical operations – scheduling, prescriptions and patient records.

DEPENDENCE ON POWER

A constant and steady supply of electricity plays a vital role in hospitals considering the medical procedures that have to be performed every day. "Many Malaysians rely on Tenaga Nasional Berhad (TNB) as the main supplier of electricity in the country," Haji Amiruddin said "They are also one of our major customers – we rely on them for electricity and they rely on us to provide quality healthcare services to their staff. Over the last 5 years, we have not had any incidents or disruptions of supply from TNB, and from our experience, their services have been excellent."

Although they have had no reason to use them in the past, KPJ hospitals are also equipped with back-up power generators and standard Unit Protective System (UPS) for operating theatres (OTs) and intensive care units (ICUs) to generate uninterrupted power. There are power generators in each ward on every level that can last several hours and take over the role of the UPS.

Moving forward, KPJ Healthcare Group intends to see a more integrated utilisation of IT in healthcare. "We are looking into accelerating its use in healthcare applications to improve our relationships with customers and patients, and enhance our efficiency." Haji Amiruddin Abdul Satar stated.

KPJ Healthcare remains committed to providing top-of-the-line facilities and the most modern services to Malaysians and international patients, through capacity building and maintaining its lead as the largest and preferred healthcare provider in the country.

KNOWLEDGE IS POWER

Bringing Electricity to Rural Schools

In the digital age, schoolchildren have a world of multimedia knowledge at their fingertips, able to tap into a limitless amount of data to fulfil their own limitless potential. However for the smart gadgets of our smart kids to function, a reliable electricity source is required. TENAGALINK explores how Tenaga Nasional Berhad is powering Malaysia's rural areas, empowering the imagination of school children and ensuring their bright futures are fulfilled.

Above: *Even schools deep in the hinterlands can enjoy the benefits of IT facilities, thanks to TNB's rural electrification projects.*

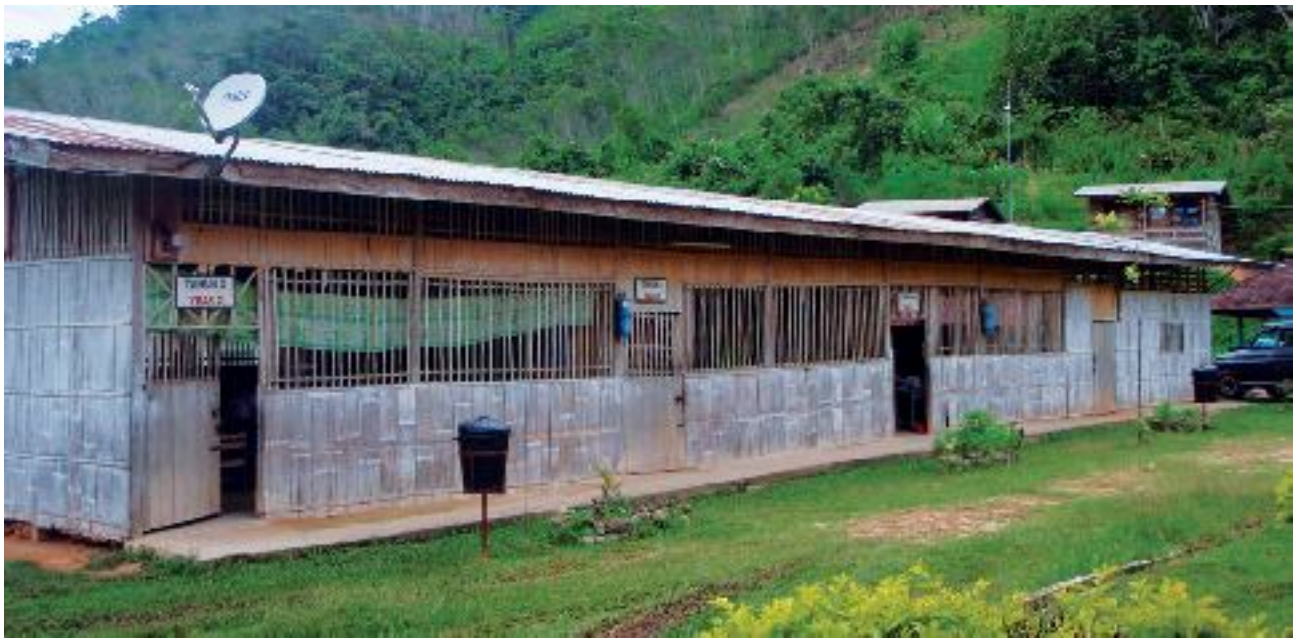
Next page: *The little satellite dish on the roof of this school building in SK Bakuku, Tenom, Sabah is a subtle indicator of the benefits of electricity supply in bringing modern multimedia technology to rural education.*

RURAL CHALLENGES

With its mission to 'Power the Nation', TNB is ensuring this is realised by providing electricity to all Malaysians – regardless of where they happen to live. It is, however, easier said than done, as running grid power to remote locations and small communities is a challenge. Another stark reality is that standalone diesel generators are expensive and vulnerable to fuel supply interruption due to weather and geographic conditions.

Figures from the Government Transformation Programme 2.0 Report confirm the consistent electricity supply gap between Peninsular and East Malaysia. By year-end 2012, 99.8% of residences in Peninsular Malaysia enjoyed 24-hour electricity, while those in Sabah and Sarawak hovered around the 85% mark. No doubt this affected the most precious institutions of the rural heartland – its schools.

The challenge is one that TNB meets head-on. Indeed schools are a matter close to the company's heart – as evidenced by the inspiring RM1.2 million Pintar scheme. This programme sees TNB work closely with 13 adopted rural primary schools to provide education programmes, field trips, motivational camps and exam



preparation courses for students who do not have sufficient access to modern facilities and information.

POWER TO THE PEOPLE

Thoroughly committed to providing a foundation for rural schools to flourish, TNB has brought power to them through the Rural School Electrification Project. Awarded to the company by the Ministry of Education in 2010, the Project saw RM98 million allocated to TNB for the company to provide 24-hour supply to 42 schools in remote areas. A mere two years later the goal was accomplished, and the Project has proven to be highly successful. TNB has provided power to 19 of the schools with a revolutionary solar hybrid system (SHS) that not only reduces costs and consumption, but is more reliable thanks to its multiple power sources. A further 19 were connected via the grid lines, while the remaining 4 schools have electricity supplied to them by standalone generator systems.

The installation figures are not the only measure of the impact of this project; there is also the effect the initiative is having on actual lives. Thanks to TNB, students in these schools are able to utilise a wealth of multimedia-based and interactive learning methods as well as explore the Internet. The quality of life of those we entrust to nurture young minds – the teachers – has also been enriched, with those living on the school grounds now able to make use of electric and electronic devices such as refrigerators, televisions and radios.

In a survey of 40 teachers and students at SK Penontomon in the Keningau district of Sabah, all respondents expressed positive reactions to the system installation – a true hallmark of the Project's resounding success.

A CURRENT AGENDA

There are still ways to go to bring electricity to rural or remote schools. The Ministry of Education and TNB are continuing to collaborate, and RM700 million has been earmarked for a new project to bring the solar-hybrid system to a further 179 rural schools in Sabah – in an effort spearheaded by TNB subsidiary Sabah Electricity Sdn Bhd. In such remote areas, logistics remain the main challenge to TNB achieving its goal. However with the expertise and knowledge they have acquired by engaging new and effective technology in the initial Project, TNB is confident that they will succeed.

For TNB, providing electricity to rural areas is more than mere Corporate Responsibility (CR). It is a passionate mission to bridge the gap between urban and rural society. The current generation of schoolchildren need the opportunity to access an ocean of knowledge and resources, and power in their schools allows them to do this. As the students have discovered, once the lights are on, their knowledge will never again be left in the dark.

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Why do we care?

Because their future is as important as our present

At Tenaga Nasional Berhad, we always strive to provide power to the Nation through world-class facilities that meet international environmental standards. We take great care in our operations to ensure that our future generations can continue to enjoy a clean environment. That is why we have built "green" power stations like the clean-coal powered *Sultan Azlan Shah* Power Station in Perak, Malaysia. We are also building a new power plant, adjacent to this power station, using the latest supercritical boiler technology. The plants feature anti-pollution measures and strict emission controls.

Tenaga Nasional Berhad - Powering a "green" nation.

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