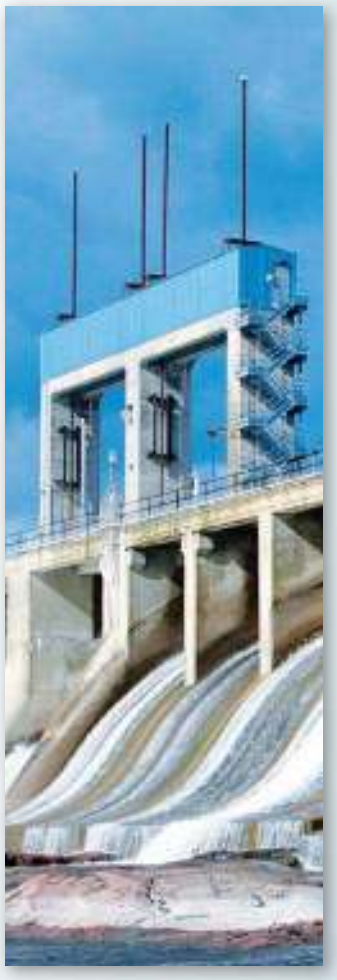
COMMUNICATING TO LARGE POWER CUSTOMERS

TENAGALINK

KDN : PP8515/01/2013(031995)



A Sustainable World

Safeguarding The Future With Renewables

Volume 2 | 2013

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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.

TENAGA NASIONAL BERHAD (200866-W)

A community project by

TENAGA NASIONAL

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

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 (200866-W)

TENAGA NASIONAL

Tenaga Nasional Berhad's (TNB) commitment to excellence through the years has been unwavering. As the largest electricity utility in Malaysia it is part of our quest to provide the nation with reliable, affordable and sustainable electricity. TNB has embarked on a 20-year transformation programme beginning in 2005, marking this long journey in four five-year phases. The second phase (for 2011-2015), called "Gemilang 2015 – Growth, Global, Green" places particular emphasis on green initiatives.

As part of our commitment to support the national green agenda and promote sustainability, TNB's contribution is evident through energy efficient (EE) top down practices throughout the organisation with our continual awareness initiatives. TNB has invested substantially and diligently perfomed efforts towards the EE cause and increase public awareness through advertorials, energy saving tips, the SAVE rebate programme, sharing the benefits of EE through paperless office environments and minimising environmental impact.

TNB's investment in Renewable Energy has also increased over the years and we are constantly exploring the many possibilities, capabilities and enhancement inherent in the progressing development of RE technology. With current installations of more than 2 MWp of solar, 10 MW Biomass and 1900 MW of hydro power generation, the company is moving in the right direction towards energy sustainability. Additionally, TNB lends full support to the Feed in Tariff (FiT) programme by the Sustainable Energy Development Authority (SEDA Malaysia) as part of realising the national mission to reduce carbon dioxide emissions by 40% by 2020.

Our contributions to nation building go beyond lighting up the nation. TNB is also in the forefront of promoting sustainability through the adoption of renewable sources of energy and we are committed to providing reliable and secure electricity supply to rural and urban areas by extending our grid lines. The provision of community enrichment and environmental conservation is no longer impossible in remote areas inaccessible by land through renewal energy innovations such as solar hybrid and mini-hydro stations.

Looking to the future of sustainable energy, Smart Grid technology teamed up with Demand Side Management (DSM) is the way forward; empowering customers towards better energy management. Realising this evolution, TNB, under our Sustainability Development, has initiated research, projects and studies on sets of interconnected and flexible DSM programmes for customers in the effort to have energy operated efficiently, reliable and to offer additional services to consumers to save money and reduce CO_2 emissions.

I am confident that we can achieve our renewable and sustainable energy goals by 2015, and continue to power the country by delivering enhanced services to all our stakeholders.

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

WE ARE PROUD
TO BE THE FIRST UTILITY
IN SOUTHEAST ASIA TO RECEIVE

ASSET MANAGEMENT VERIFICATION CERTIFICATE

Publicly Available Specification 55 Part 1 (PAS 55-1) : 2008

through our Transmission Division

from Lloyd's Register Verification Limited

This certificate is a recognition of our continuous efforts to improve our service to our customers.

Powering the Nation

TENAGA NASIONAL

Conceptualised and Produced by

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We welcome your FEEDBACK, COMMENTS, and/or SUGGESTIONS to help us IMPROVE our SERVICES.

Please email your responses to: *dist_news@tnb.com.my or* log on to *www.tnb.com.my/customer-care.html*.

TNBCareline

15454 | 1300 88 5454

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for power outage or
TNB street light malfunction

Call or fax
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TENAGA NASIONAL

TENAGA NASIONAL BERHAD (200866-W)

TNB & MID VALLEY CITY INK AGREEMENT

(From left to right) Ir Hj Ismail Mohd Din – Senior General Manager (Distribution) TNB, Ir Hjh Kamaliah Abdul Kadir – Senior General Manager of TNB Customer Services, Chai Lai Sim, CFO of IGB REIT Management and Antony Barragry – CEO of IGB REIT Management at the signing ceremony between Mid Valley City and TNB.

On the 6th of June 2013, at The Gardens Hotel in Mid Valley City, an official ceremony was held to mark the commencement of the bulk electricity supply and asset sales agreement between Tenaga Nasional Berhad (TNB) and Mid Valley City. Present at the occasion were Chai Lai Sim the CFO and Antony Barragry the CEO of IGB REIT Management, Ir Hj Ismail Mohd Din, Senior General Manager (Distribution) TNB and Ir Hjh Kamaliah Abdul Kadir, the Senior General Manager of TNB Customer Services, as well as staff of Mid Valley City Electricity (MVCE), IGB and TNB.

Barragry opened the proceedings with a welcome speech in which he explained that the agreement was the culmination of two years of hard work between Mid Valley City and TNB, and a milestone to mark the long and fruitful relationship between the two companies.

Through the deal, MVCE power demand from TNB will be about 27MW of electricity, along with one 33kV and two 11kV intakes. Thus MVCE will become the utility provider for Mid Valley City, providing electricity to some 1200 residences, 600 retail outlets, 2 hotels, numerous offices and over 6000 car park spaces.

"The customisation and implementation of these agreements have exposed many issues. And the resolution is a case study on how to convert an existing power infrastructure in an urban-area from the nation's main utility distributor to an independent operator. We are confident that this is a win-win for all parties involved; for TNB, MVCE and the consumers," Barragry said, adding that he thanked all TNB personnel involved in this project over the last two years. "Your support, encouragement and expertise made the difference. I also thank our MVCE staff, consultants and lawyers, who had the task of putting together a workable agreement."

Antony Barragry also revealed that the Mid Valley City infrastructure modifications were expected to be completed in the next few weeks. The switch-over from TNB to MVCE was finalised in July 2013.

EFFLUENT TO ELECTRICITY

Sime Darby Plantation (SDP) signed a shareholders' agreement with Tenaga Nasional Berhad Energy Services (TNBES) to set up a joint venture to extract biogas from palm oil mill effluent (POME). Wastewater generated from palm oil milling activities, POME requires effective treatment before being discharged onto land or water owing to its highly polluting properties. Generating energy from POME resolves disposal issues faced by the oil milling industry while providing a renewable and sustainable source of power.

A joint-venture company, Sime Darby TNBES Energy will operate and maintain two power plants using methane gas recovered from POME. SDP Flemington and Hadapan oil palm estates located in Perak and Johor respectively will supply the POME. The gas will then be used to generate power which will be sold to the national grid.

As at June 2012, SDP had 129 oil palm estates and 36 oil palm mills in Malaysia and operates 70 oil palm estates and 23 oil palm mills in Indonesia. Sime Darby has been using empty fruit bunches (EFB) and POME as organic fertiliser in its plantations.

ATTAINING GOALS

Tenaga Nasional Berhad (TNB) – Malaysia's largest utility company – announced increased profits for the 3rd Quarter of its 2013 Financial Year, which ended in May this year. In a statement released on the 18th of July, the company revealed that for the three months which ended in May 2013, its net profit before Forex Translation stood at RM1.38b. This far outstripped the RM0.88b from last quarter.

Among the factors which contributed to this was a steady demand as well as the low prices of imported coal which reduced generation costs.Datuk Seri Ir. Azman Mohd, TNB's President and CEO, highlighted the utility's commitment to prudent fuel cost management while supporting sustained domestic economic growth. In addition, its Chairman, Tan Sri Leo Moggie added that TNB will not rest on their laurels but will continue to explore international opportunities in line with meeting strategic goals and becoming a regional leader.

Right: *(From left) TNB President and CEO Datuk Seri Ir. Azman Mohd, Chairman Tan Sri Leo Moggie and Chief Financial Officer and Vice President (Group Finance) Fazlur Rahman bin Zainuddin.*

CERTIFIED COMPLIANCE

Tenaga Nasional Berhad (TNB)'s Transmission Division is the first in Southeast Asia to be recommended for the PAS 55-1:2008 (Asset Management System) Certificate. This was announced by Bernard Woods – Chief Auditor of Lloyd's Register (UK) during the closing ceremony of the evaluation on the 30th of May 2013 at TNB's headquarters in Kuala Lumpur.

The two stages of assessment were conducted from the 28th to the 31st of January and the 21st to the 30th of May this year. The Transmission Division fulfilled the technical requirements from Lloyd's Register, including having action plans to cover any non-compliance and a mutually agreed surveillance audit plan.

This certification shows that TNB follows and maintains best practices according to world-class standards, taking its place as one of the leading electric utilities in the world.

Previous page: *The Vice President of TNB (Transmission) – Datuk Rozimi Remeli (left) receiving the PAS 55-1:2008 (Asset Management System Certificate from Mohd Azhar Sulaiman – Managing Director of Lloyds Register Technical Services Kuala Lumpur (right) while TNB President and CEO Datuk Seri Ir. Azman Mohd looks on.*

POWER SYNERGY

Malaysia and Indonesia are partnering to establish a coal-fired power plant in Sumatra, Indonesia, which will be capable of generating 2,000 megawatts (MW) of electricity. 1,000MW is to meet Sumatra's energy needs, while the remaining will be distributed to Malaysia. This was the result of a memorandum of understanding (MoU) signed between Malaysia's Tenaga Nasional Berhad (TNB), Indonesian utility PT PLN and coal-miner PT Bukit Asam.

Under the agreement, Malaysia will be responsible for the construction of the plant, while Indonesia will provide the land and coal. When completed, it will be managed by TNB Repair and Maintenance (REMACO) – a wholly owned subsidiary of TNB. The construction of a 275kV interconnection line from Telok Gong, Melaka to Garuda Sakti, Sumatra is included in the MoU.

Development of the power plant will require an investment of US$2.5b (RM7.9b) and it is scheduled to commence operations in 2018.

In June this year, Indonesia's Energy Minister, Jero Wacik announced the power generation cooperation between Malaysia and his country at the ASEAN Senior Officials Meeting in Jakarta. He also indicated that Singapore was interested to be in the partnership.

WORKING WITH ÉLECTRICITÉ DE FRANCE (EDF)

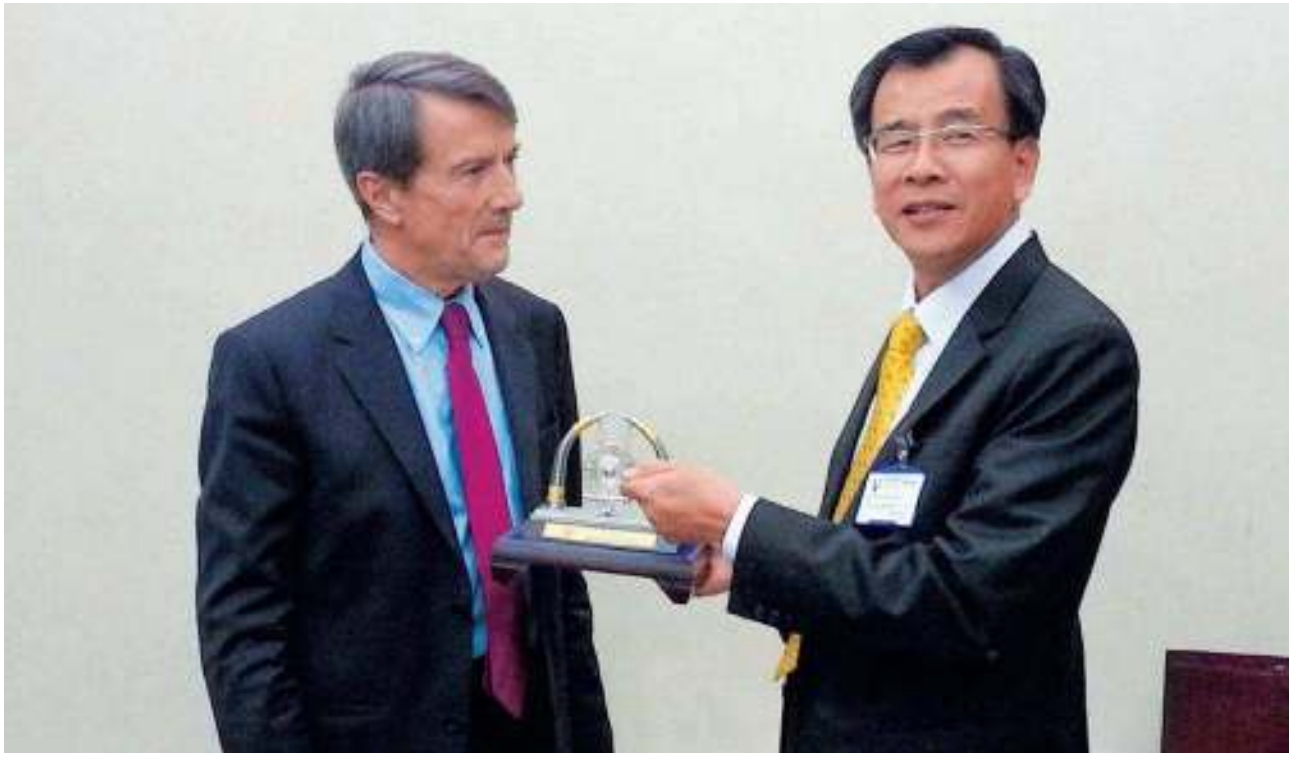
On the 24th of June 2013, a delegation from Tenaga Nasional Berhad (TNB) visited France to discuss several issues in detail with Électricité de France (EDF) as a follow-up to the Memorandum of Understanding signed by both parties on the 14th of June 2013. It comprised Dato' Roslan Abd Rahman – Chief Corporate Officer, Datin Roslina Zainal – Vice President, Planning Division, Hj Ismail Abd Rahman – General Manager, Regulatory and Stakeholder Management Department, Dr Nor Azlan Mostafa – Head, Nuclear Energy Branch and Khairuddin Aziuddin – Executive, Nuclear Energy Branch.

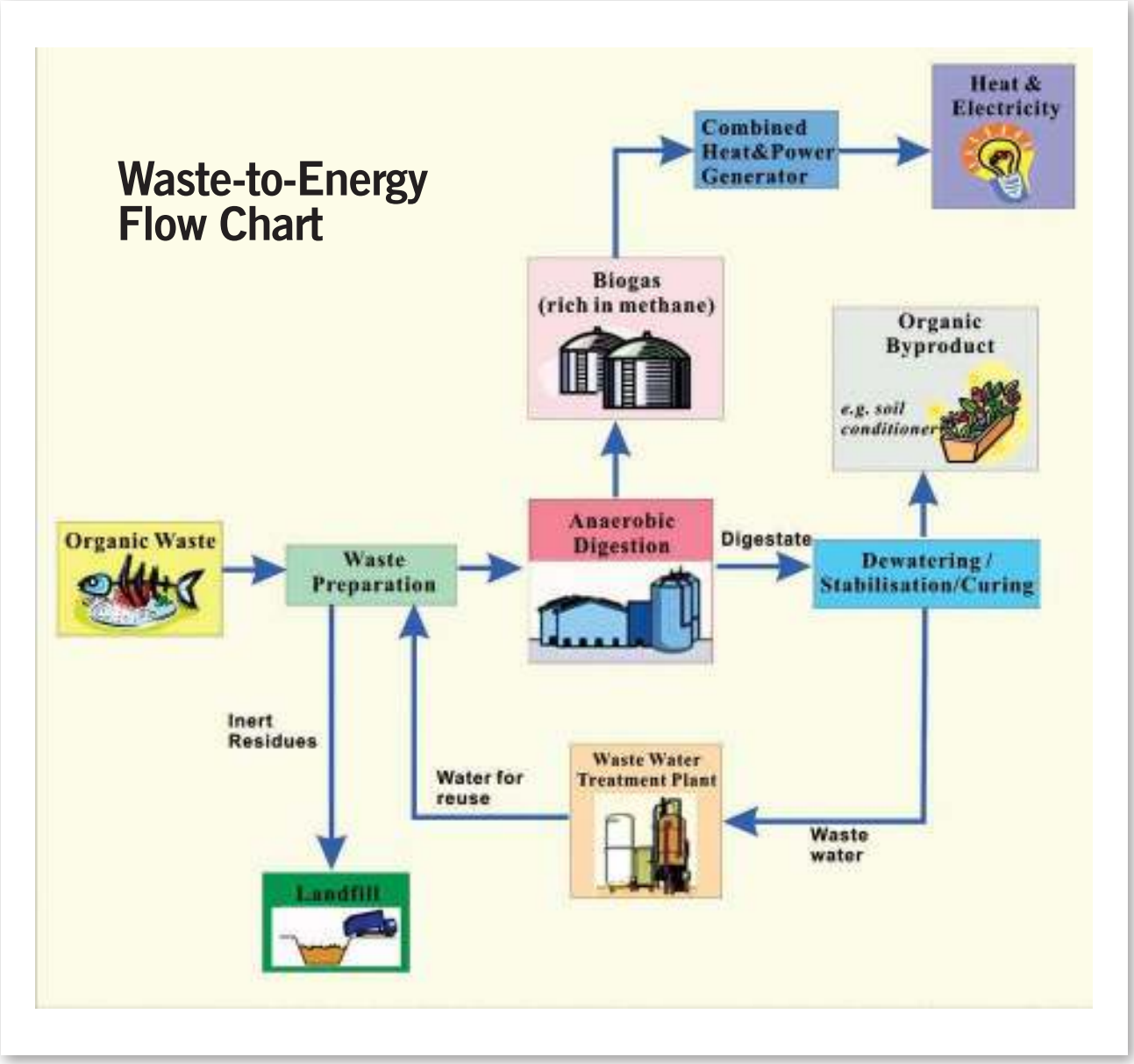
Representatives of the EDF included Hervé Machenaud – Vice President, Senior Executive Group, Jean-Christophe Philbe – Vice President, Southeast Asian Division and Jean-Paul Chatry – Director, Nuclear Project Development, as well as several representatives of EDF work groups. The Second Meeting of the Steering Committee was an extension of the first meeting held on the 8th of November 2012 in Hotel Residence, UNITEN, Selangor.

The one day discussion covered three main topics: Regulatory, Study, Regulatory Management and Nuclear Power Roadmap. TNB benefits from the collaboration with EDF, one of Europe's best Vertical Integrated Utility (VIU) companies. The French utility is skilled and experienced in regulatory management and several aspects of nuclear development, and currently owns and manages all 58 reactors in its home country.

The TNB delegation also visited a nuclear power plant located at Flamanville, a nuclear fuel recycling plant in La Hague and a radioactive waste disposal centre at Soulaines-Dhuys, and received advice on ways to gain support for nuclear power from local residents.

TNB's Chief Corporate Officer Datuk Roslan (right) presenting a gift to EDF Senior Executive Group Vice President Hervé Machenaud to symbolise their partnership.





FROM WASTE TO ENERGY

Worldwide Holdings and IMPSA (Industrias Metalúrgicas Pescarmona) Malaysia recently signed a memorandum of cooperation (MoC) to develop waste-to-energy (WTE) plants in several states. The WTE plants are intended to generate electricity by utilising the thermal energy generated from incinerating municipal solid waste. This move promises to increase the sources of sustainable energy in Malaysia.

Worldwide Holdings proposed that the Federal government build a WTE plant in Selangor, which will be supported by investment from the State government. It has identified two locations for this purpose. Under the Renewable Energy Act (RE Act), electricity produced from WTEs can be routed to the national grid and will be eligible to claim feed-in tariffs (FiT) with more favourable rates compared to normal electricity. The system can provide 35MW of electricity for 100,000 houses per hour.

The waste-to-energy system adopts biological technologies to stabilise organic waste and turn it into useful compost products and biogas for energy recovery.

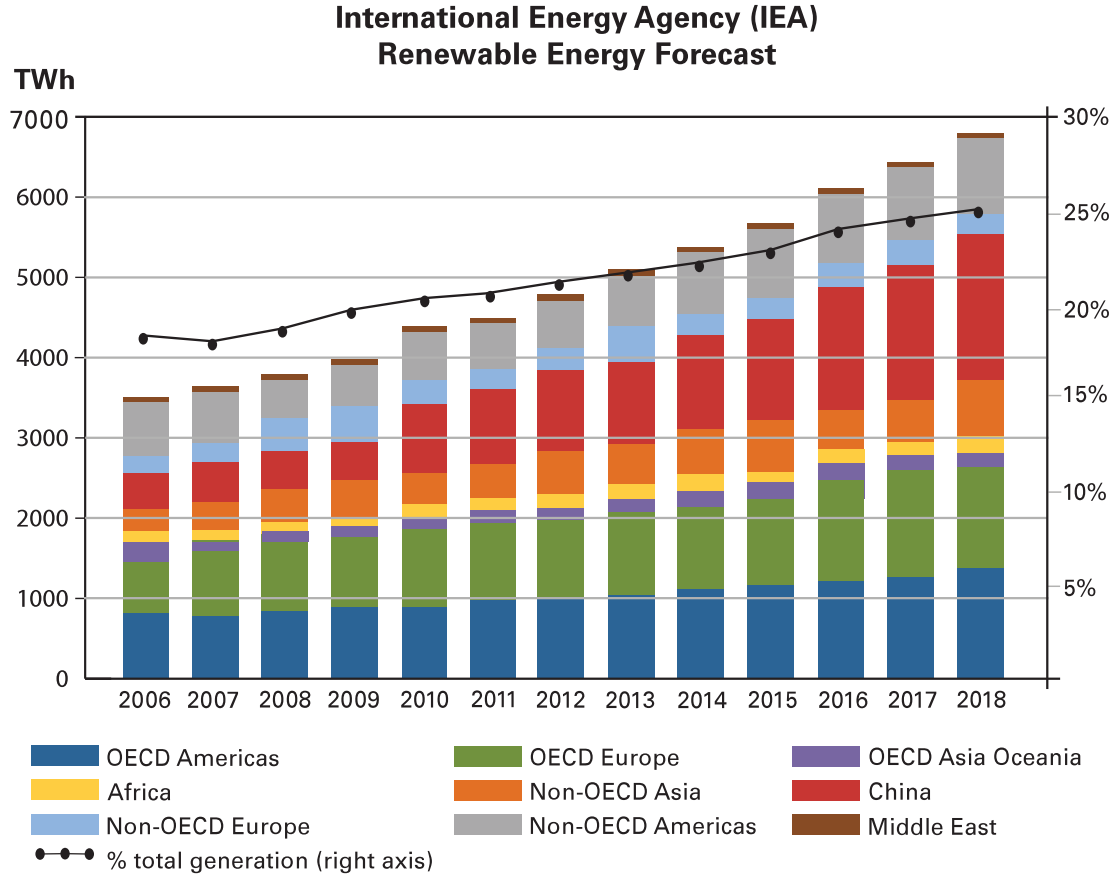
ADVANCING SUSTAINABILITY

According to a five-year outlook published by the International Energy Agency (IEA), renewable energy (RE) will be the second largest fuel source in the world. As of 2011, 20% of the world's energy came from it. By 2018, this is expected to rise to 25%.

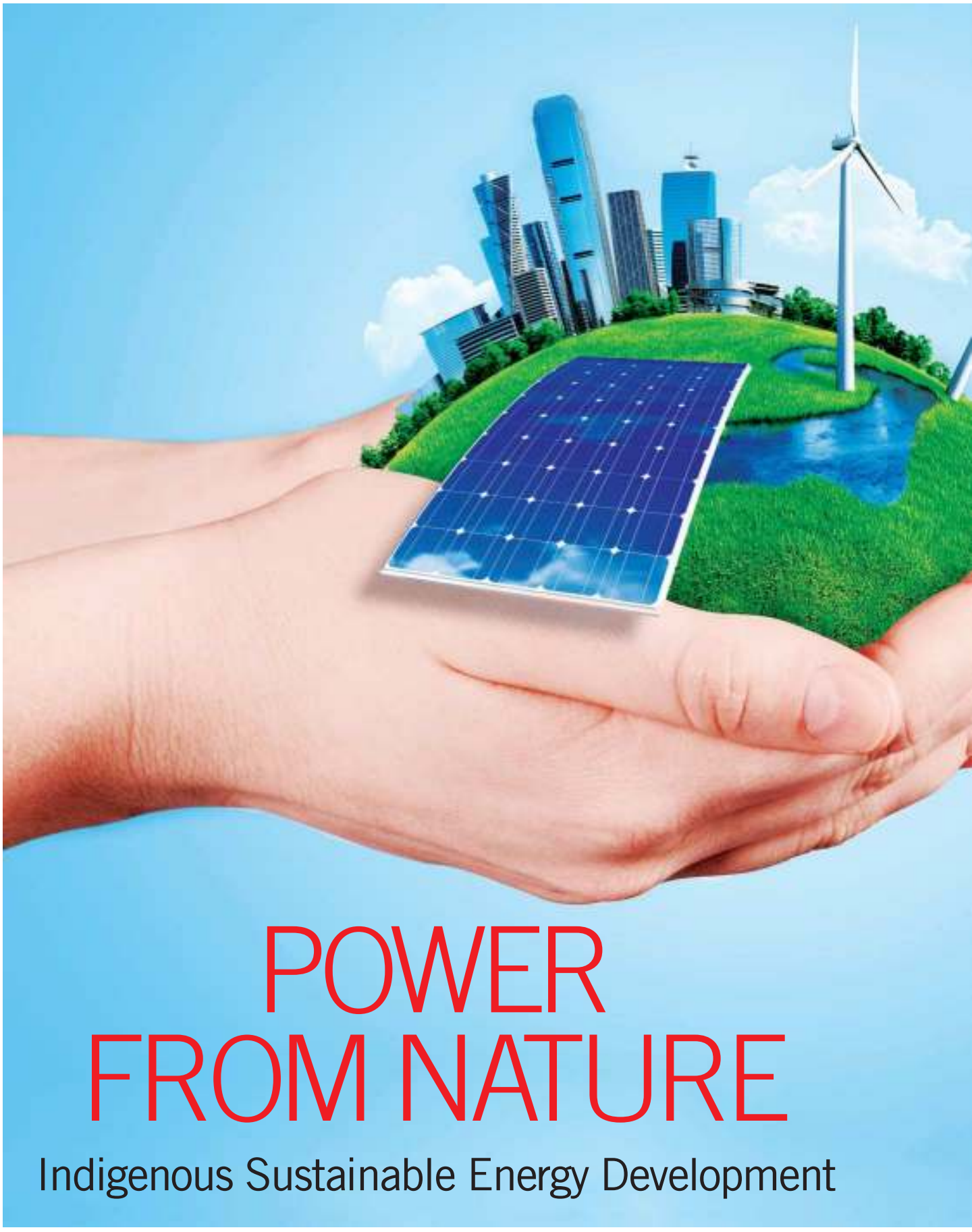
Developing countries are building more wind, solar and hydro plants to meet rising electricity demands and combat local pollution problems. Therefore, the cost of renewables has fallen below traditional fuels in some markets. Presently, hydroelectricity enjoys the lion's share. However, non-hydroelectric means are expected to supply 8% of the world's energy by 2018, up from 4% in 2011.

The World Bank is assisting efforts by restricting financing of coal-fired plants to only extreme circumstances. This is when no other feasible alternatives are available to meet basic energy needs and other sources of financing are absent. It reflects the lender's increased focus on mitigating the effects of climate change. The World Bank committed US$8.2b (RM25.9b) to finance energy products in the 12 months from June 2012 onwards, with 43.9% or US$3.6b (RM11.4b) for renewables.

The International Energy Agency forecasts power generation from renewable sources will exceed natural gas and be two-times the contribution from nuclear energy globally by 2016.



Note: TWh = terawatt hours. Figures are derived from IEA data and analysis.



POWER FROM NATURE

Indigenous Sustainable Energy Development

Energy is one of the foundations that supports and spurs the socio-economic development of a country. As such, sustainable sources are needed for long-term growth and planning for future power demand is very crucial. The imminent depletion of fossil fuels and the high cost of energy importation have prompted research and development into renewable energy (RE). Tenaga Nasional Berhad (TNB), Malaysia's main power utility, is spearheading the drive to tap into the abundant sustainable energy sources readily available in the country.

DEALING WITH CHALLENGES

Energy is helping to power Malaysia's economic expansion, but it comes at a cost. In 2012, a total 122.12 terawatt-hours (TWh) of electricity was produced, with gas as the major source. Currently, coal contributes 45% of the total generation mix, followed by gas at 44%, hydropower at 10%, oil at 1% and others at 0.2%.

Malaysia faces several challenges and issues with regards to energy supply and demand, mainly on energy security, fuel supply and pricing (especially gas), renewable energy, energy efficiency and conservation. Energy security has always been an important issue highlighted by various agencies in support of the country's socio-economic growth trajectory towards becoming a high income nation by 2020.

The underlying concern of the country is to ensure continuous power supply at affordable prices. As a result of depleting indigenous oil and gas resources in the country, Malaysia is expected to become a net oil importer by 2015. Such a situation will pose considerable challenges.

ADVANCEMENT STRATEGIES

Introduced in 1979, the National Energy Policy has three core objectives – supply, utilisation and the environment. The first ensures adequate, secure and cost-effective supply of energy. The second promotes efficient use of energy and discourages wasteful and non-productive patterns of energy consumption. Finally, the last objective minimises the negative impacts of power production, transportation, conversion, application and consumption on the environment.

To achieve these objectives, various related policies were formulated such as the National Depletion Policy in 1980 to regulate the exploitation of crude reserves. In 1981, the Four-Fuel Strategy policy was introduced – oil, natural gas, coal and hydro.

These guidelines accelerated the transition from oil to natural gas as the main fuel source as it is cleaner and cheaper. It was then succeeded by the Five-Fuel Diversification Policy in 2001, whereby the importance of renewal energy was highlighted and added to the generation mix, reducing over-dependence on a single fuel source.

This signalled the intention of the government to direct energy sector development towards a greener path. Through the years, it has introduced several policies and fiscal incentives to stimulate the development of RE activities and the introduction and implementation of new RE technology.

RENEWABLE OPTIONS

Among the promising RE resources in the country are biomass (EFB – Palm Empty Fruit Bunches) and biogas (POME – Palm Oil Mill Effluent). This is not surprising as 15% of the nation's total land area is covered by palm oil plantations. Malaysia accounts for 39% of world palm oil production and 44% of exports from over 417 oil mills.

These mills discard about 30 million tonnes of EFB and other residue (shells and fibres) annually. One tonne of EFB can potentially produce about 40W of electricity, whereas one tonne of biomass residue – including shells and fibres – can produce a daily average of 148W.

In addition, these mills also produce about 43 million tonnes of palm oil mill effluent (POME) per year. During the production process, POME gives off greenhouse gases such as methane (65%) and carbon dioxide (35%), which can generate up to 8W per tonne of electricity.

Continued on page 20

MAXIMISING EFFICIENCY

As one of the three main divisions of Tenaga Nasional Berhad (TNB), the Generation Division plays an important role in the sustainability drive of the nation's largest utility. Its Vice President Zainudin Ibrahim reveals to *TenagaLink* how his division is ensuring the production of quality and sustainable energy while meeting the needs of the *rakyat*.

"Efficiency is the key to sustainability as it results in stable electricity supply to consumers while ensuring we do not waste resources," Zainudin explains. "Since the Generation Division is where power production begins, it is important that we are proactive and that we work closely with the other two divisions of TNB which are Transmission and Distribution."

The key is to minimise costs while maximising output, and according to the Vice President of Generation this is achieved through the use of state-of-the-art technology. Elaborating further, he reveals that TNB's equipment have evolved considerably over 50 years. Previously, only 30% of extractable energy was converted into electricity. Today the conversion rate is 60%, which means that the same amount of fuel is able to produce twice the power as before.

RELIABILITY TO SUPPORT EFFICIENCY

The increased yield can also be attributed to the improved reliability of TNB's power plants. Zainudin Ibrahim highlights that this is part of the Generation Division's 5-year strategic plan in line with the Macro Restructuring exercise where it was given the responsibility of enhancing the life cycle of assets.

"In order to fully utilise our assets, we adopted Asset Management Best Practices. These are based on the British standard Publicly Available Specification (PAS) 55, which examines the life cycle of an asset, such as a power plant, from the planning and acquisition stages, to when it is retired," he added.

Through this, the Generation Division ensures optimal management of TNB resources, which includes 10 power plants in Peninsular Malaysia. To further support this, other initiatives such as Plant Uprating, Asset Performance Management System, and Centralised Plant Performance and Diagnostic are also implemented.

SUSTAINABILITY AND QUALITY

Aside from enhanced technology and process management, the Generation Division's focus on safety has also helped improve efficiency. Expounding on this, Zainudin Ibrahim says, "Work stoppages owing to accidents affect performance and slow us down. This is why we endeavour to develop an environment that is free of accidents and near-misses."

He reveals that all TNB-owned power stations practise the ISO 18001 Occupational Health & Safety Management System, as well as the ISO 14001 Environmental Management System. This ensures

the safety of their workers and plants, as well as the environment they work in. The ISO 14001 standard especially helps the division minimise – and continually improve – how operations might negatively affect the surroundings in terms of changes to air, water, or land.

WORKING WITH OTHERS

"We recognise that success in efficiency and sustainability can only be achieved through teamwork," says Zainudin. "For that reason, we work closely with TNB Energy Services (TNBES) as their Managing Director leads one of our division's projects in the Heads of ASEAN Power Utilities/ Authorities Council (HAPUA). This project looks after the common interest of the entire region, coordinating with other utility agencies in ASEAN countries and meeting every three months to examine best practices in the industry in order to reduce emissions."

In addition, TNB is deploying technologies that minimise CO_2 emissions, to support the Malaysian government's aspirations in reducing carbon emissions from the power sector. Large hydros, supercritical boilers and advanced single-shaft combined-cycle gas turbines will all eventually replace the ageing plants currently in operation. There are also low carbon emission major hydroelectric projects under various stages of development at several locations in the country that will not emit CO_2.

There is much to be done, and learned about sustainability and RE, but there is also much that has already been done. With all the divisions and power utilities in the country working together towards efficiency and eliminating wasteful practices, and now with the countries in the region also working together, we are closer to a cleaner, more sustainable earth.

Vice President Zainudin Ibrahim says, "Our top priority is always the public's interest. Sustainability and efficiency both serve the public, and we will continue to uphold this in the best possible way we can, as we have always done."

Above: *Sultan Mahmud Power Station, also known as Kenyir Dam, is capable of generating an average annual energy output of 1,600GWh. It serves the dual purpose of providing hydroelectric power and serving as a flood mitigator.*

Left: *The country's only wind turbine station capable of generating up to 200kW of electricity (enough to power approximately 200 households). The project is a collaboration between TNB, the Terengganu State Government and the Ministry of Regional and Rural Development (MRRD) as part of the national effort to look into other sources of renewable energy. It is also the nation's first tri-hybrid power generation system which includes diesel generators, a solar station and the wind turbine, working together to power communities on the island of Pulau Perhentian in Terengganu.*

Continued from page 18

Another major option for renewable energy source is solar-photovoltaic (Solar PV). Located close to the equator, Malaysia enjoys 12 hours of sunlight per day all year round. On average, Solar PV can generate 3 kilowatt-hours (kWh) per square metre a day.

Geothermal power is another option for Malaysia, albeit one which has yet to be fully tapped. The country is strategically located in a geothermal region, and neighbours Indonesia and the Philippines are already utilising this as a source of electricity, producing about 1,196MW and 1,930MW respectively.

In 2011, TNB announced the discovery of four possible geothermal sites capable of collectively generating up to 2MW of energy in Peninsular Malaysia. In East Malaysia, the Tawau Green Energy Geothermal Power Plant in ApasKiri Sabah is being built. It will have the capacity of generating up to 36MW of electricity and has a 2015 completion date.

EFFICIENT USE OF ENERGY

Another way that TNB is reinforcing sustainability is the implementation of energy efficiency (EE). Being energy efficient simply requires employing less energy to accomplish the same everyday tasks, monitoring energy use and simple behavioural changes to conserve energy which translates to monetary savings.

The importance of EE may not be significantly noticeable in an individual unit or home but

collectively. More efficient use of energy throughout the nation will result in less money spent by homeowners, schools, government agencies, businesses, and industries. The money that would have been spent on energy can instead be spent on consumer goods, education, services and products.

Helping with the EE initiative are the two main strategies that TNB Generation Division is enforcing. Its activities focus on the first one, Supply Side Management, which includes the implementation of online and real-time power plant efficiency monitoring, with the objective of maximising fuel energy usage. The division has also put in place the development of remote online and auto-combustion tuning systems for state-of-the-art gas turbines at the Tuanku Jaafar Power Station.

The second strategy, Demand Side Management, focuses on monitoring and reducing auxiliary power consumption in TNB plants. It involves benchmarking with world class best practices, and for this reason, Tenaga Nasional Berhad Research (TNBR) has been engaged to conduct Energy Audits at selected thermal power plants.

Continued on page 23

Below: *Capable of generating more than 600MWh of energy annually (enough to power 250 homes), the PETRONAS Solar PV Project is installed on the 9,000 sq m rooftop of the Suria KLCC shopping mall. The clean energy generated from the system contributes to greenhouse gas reduction by approximately 360,000kg of carbon dioxide per year.*

GREEN POWER

A wholly-owned subsidiary of Malaysia's largest electricity utility – Tenaga Nasional Berhad (TNB) – TNB Energy Services (TNBES) flies the flag for the development of the renewable energy (RE) sector as well as systems and technology related to the field. In line with our cover feature, *TenagaLink* speaks with TNBES Managing Director Shahrir Abdul Latiff on how the company is fulfilling TNB's aims and a national mission by being a domestic and regional champion of RE.

According to Shahrir, TNBES has developed its strength and expertise from the long list of projects and services it has undertaken and successfully delivered. It benefits greatly from having TNB as a parent company, as it is able to tap into the utility's large pool of experience and expertise to support its business activities. This, he said, has placed the company in the right direction to be the domestic and regional leader in the provision of end-to-end integrated services for the development of RE as well as the operation and maintenance of RE plants.

"TNBES is involved in providing reliable and quality power solutions with RE being our current focus. As part of TNB, we are the implementer initiator of such technology and we have been entrusted with executing several projects by the government," Shahrir explained.

One such example is the Rural Electrification Programme – an initiative which aims to enhance the living standards of people living in such areas by providing them with continuous and uninterrupted electricity supply. To achieve this, TNBES has built more than 40 solar hybrid stations which it also maintains and operates. In addition, it has recently embarked on the construction of a 10MW biomass plant and two biogas plants in Perak and Johor respectively.

Speaking on the RE efforts of TNBES, Shahrir Abdul Latiff revealed, "We are concentrating on all the energy sources under the Feed-in Tariff (FiT) scheme, which are solar, biomass, biogas, and mini hydro. We currently have 30 mini hydro stations across the country which we operate and maintain and we are in a joint venture with the Federal Land Development Authority (FELDA) to produce 12MW of energy from biomass. A partnership has also been developed with Sime Darby Plantations to develop energy plants that use biogas from palm oil mill effluent (POME)."

While TNBES is most optimistic about solar power as Malaysia has a lot of sunlight, it is also exploring the suitability of other types of sustainable sources of energy such as wind and geothermal power. It does this in order to fulfil its vision of becoming the premier RE solutions provider.

CHAMPIONING RE

"RE is important because it minimises damage to the environment. However, its cost currently is still high and that is hindering its uptake in the energy mix. Nevertheless, the government has been very proactive in supporting it as the 5th fuel in the energy policy, such as introducing the FiT measure," Shahrir explained.

Under this programme, individuals and businesses can produce RE and then sell back to the grid. In order to fund the FiT, SEDA charges consumers exceeding 300KW of usage a surcharge of 1% of their bill to put into the initiative.

This however has been a point of contention among consumers. Shahrir highlighted though that the levy – along with public and government support – is necessary in order to achieve the mission for RE to make up 980MW of power by the year 2015. He holds that without the levy, this aim will not be feasible unless the RE development cost is going

Effective 2nd of September, Shahrir Abdul Latiff is reporting to the New Business and Major Project Division.

down substantially. Thanks to the surcharge, the RE industry is getting a boost which in turn spurs growth and employment opportunities.

A WORLD LEADER

The TNBES Managing Director revealed that the ultimate goal is to be an international player in the industry. In order to do so, the company is strengthening itself locally and building up its expertise in preparation for the global market.

"We have strengths and expertise and we offer quality services to our customers. In addition, we are looking at expanding into other countries – namely in Southeast Asia, the Middle East and Africa. That is why we are working to increase our competence level to be ready for our move to go international," he said.

Ultimately, Shahrir Abdul Latiff realises that there are challenges that need to be addressed so that RE will become the energy of the future. These include clearing doubts over its cost, reliability and efficiency. He believes that in order to do so, research and development in RE must be constant and 'aggressive' so that the technology becomes even more reliable and cost effective.

Ending the interview, the TNBES Managing Director said, "My vision is to see rapid and sustainable growth in RE and for it to contribute significantly to the energy mix." No doubt, with TNBES leading the way, this hope will become an eventuality.

Above: *The Malaysian oil palm industry currently accounts for about 39% of world palm oil production. Over 17 oil palm biomass and six palm oil biogas projects have been approved for grid connection to date under the Small Renewable Energy Power Programme, as well as more than four biomass and biogas plants with a total capacity of over 43MW already connected to the grid.*

Continued from page 21

RENEWING SUPPORT

TNB is committed to furthering the Government's goal of 5.5% or 985MW of grid-connected RE by 2015. Over the years, its subsidiary TNB Energy Services (TNBES) has developed several mini-hydro stations, installed solar hybrids and PV panels, as well as wind stations to promote its use.

Another move to develop the RE industry in the country is through the 1% levy imposed by the Sustainable Energy Development Authority (SEDA) Malaysia on TNB customers whose monthly bills exceed 300kWh or RM77. This is a public funding mechanism under the Renewable Energy Act 2011. It provides for the establishment and implementation of a special tariff system to propel the generation and development of RE through cost-sharing among electricity consumers.

The money is also used to support the Feed-in Tariff (FiT) which allows renewable electricity generated under the FiT mechanism to be sold to power utilities, such as TNB, at a fixed premium price. As at 2013, the FiT rates are about 4 times more than TNB's residential tariff rates.

The role of TNB in promoting RE development in Malaysia cannot be over-emphasised. As fossil fuels reach the end of their life-span, it is imperative that options are available, particularly those that are sustainable over time. Over the years, TNB has blazed the trail in the use of renewables – launching various Green initiatives across the country, as well as being the biggest purchaser of RE.

The One-Stop Solution

Maintaining Quality with TNB REMACO

Nothing is perhaps more important in the quest for sustainable energy than the backbone, which holds it up and keeps it running. TNB Repair and Maintenance Sdn. Bhd. (TNB REMACO), a subsidiary of Malaysia's largest power utility, Tenaga Nasional Berhad (TNB), is exactly that. Managing Director Hj Nor Azman Mufti talks to TENAGALINK about his company's comprehensive services, and its success in making it at a global level, including its seminal RM1b project in Kuwait.

According to Hj Nor Azman, there are four core businesses of TNB REMACO. The first one, Maintenance Services, carries out scheduled inspections for TNB's power stations and Independent Power Producers (IPPs) at home and abroad. It also provides overhaul, repair and maintenance services for turbines and generators of all types.

"Just as a car needs to go through scheduled inspection every few thousand miles, so too does

Left: *TNB REMACO's Managing Director Hj Nor Azman Mufti stresses the importance of competent employees providing excellent service that will in turn rank TNB REMACO number one in the industry.*

Next page: *TNB REMACO's Maintenance Services include major and minor overhauls and repairs on mechanical and electrical equipment, as well as material management services.*

energy equipment. Through this department, we execute planned overhauls," he explains. "After Maintenance Services, we have the Repair Centre. During an overhaul, we might remove, replace, refurbish or rehabilitate pieces at our very own local repair centre."

The third service, Test & Diagnostics, takes care of commissioning the machine after repairs have been made. It carries out performance tests, calibrations, electrical and mechanical diagnostics, and systems upgrades. Finally, Project Management provides TNB REMACO's clients with the team that oversees and monitors everything, including day to day operations, and schedule maintenance of the plant on behalf of the owner.

CLIENTS AND SERVICES

"About 4 years ago, we introduced the less capital-intensive Operations & Maintenance (O&M) service to meet our clients' needs. This can be categorised into two kinds: the long-term O&M which includes continuous service, and the one-off contract, which is when we send a team to carry out overhaul, and then leave."

When it comes to equipment repair, Hj Nor Azman is of the view that quality of performance is most important. To ensure this, TNB REMACO prioritises training and re-training of staff in order to maintain high-level and up-to-date competency to ensure quality services to customers. The company also sends its teams to conferences in the industry so that they are updated on the latest technologies. Having good communications with its customers has also helped it keep abreast of the latest state-of-the art equipment and market needs.

"We also get support from equipment manufacturers," he says. "For instance, the General Electric (GE) Frame 9FH Gas Turbine has higher efficiency, better output and therefore lowers costs. When we obtain new equipment from manufacturers, we also acquire the knowledge to repair and maintain it."

TNB REMACO has also established efficiency with the establishment

of their in-house repair centre, located in Klang. Instead of sending gas turbine pieces to the US or Europe for repairs, they cut costs by working on the components locally, which enables them to offer competitive prices.

FOCUS ON QUALITY

Malaysia's premier specialist in the power industry, TNB REMACO faces strong challenges in the global arena. For instance, Hj Nor Azman explains that the company faces competition from neighbouring countries like Thailand, Indonesia and Singapore, and other countries such as the United Arab Emirates and Saudi Arabia in the Middle East. These are regions where TNB REMACO has a market presence. Analysing their competitors' pricing helps ensure high quality service with competitive rates, instead of merely lowering TNB REMACO's prices and compromising quality – a mistake that many companies make.

"We are backed by our parent company TNB, which means that we have the support of its 30,000-member staff and its various departments with multiple competence and expertise which support the subsidiary companies. Furthermore, we have the right support to ensure that not only do we maintain the quality of our services, we also strive to get better," he says. "Our value proposition is that we are a one-stop solution and we take care

TNB REMACO performed major inspections on two GE Gas Turbines at the Patau-Patau Power Station in Labuan, which was successfully completed in less than 30 days.

of everything, from beginning to end. Our customers can get rid of their headaches by passing them on to us."

INTERNATIONAL RENOWN

It is this dedication to quality that prepared TNB REMACO for their entrance into the international scene. Aside from Malaysia, TNB REMACO has clients overseas. These are usually plant owners who request a reputable operator to run their plants. Their first O&M contract was at three different locations in Pakistan. Through word-of-mouth and networking, their excellent service was made known to potential customers, including the Kingdom of Saudi Arabia, where a plant in Shoaiba is now jointly owned by Malaysia and Saudi Arabia.

"We have been focusing on the Middle East – Saudi Arabia, Kuwait, Qatar, Yemen – as they require services that we are well-equipped to provide," the Managing Director says. "Malaysia being a member of the Organisation of Islamic Cooperation (OIC) makes it easier for us to understand their requirements and vice versa, and to continue having a good relationship. Having partners in these countries who have a good handle on the market, helps us gain an even better understanding of the culture we are being immersed in, and they also introduce us to the region's important players."

For instance, TNB REMACO recently appointed a reputable partner to represent TNB REMACO in the Saudi Arabia market. We are fully pre-qualified by the Saudi Electricity Company (SEC) for inspection, maintenance and refurbishment of power plant machinery equipment.

Another new partner for TNB REMACO is Kharafi National of Kuwait, with whom they have won a contract worth RM1 billion from the Kuwaiti government. The 7-year contract is for the operation and maintenance of the Shuaiba North Power and Distillation Plant in the Middle Eastern country. These projects are all in line with the company's ultimate goal of being a global one-stop power plant service provider.

"We are not going to rest on our laurels," Hj Nor Azman says. "There are challenges, but the company is ready to face them to become the strongest player in the industry."

Keeping updated, focusing on capable staff to provide excellent services, and learning more about their clients, are all part of TNB REMACO's priorities. It is certainly no accident that the company is popular both locally and internationally. With more than 60 years of experience and support from TNB, a well-trained and competent pool of staff – TNB REMACO has all the components that make a strong backbone.

SUSTAINABLE FIT

Maintaining Lasting Power Sources

In line with the need to consider alternatives to fossil fuels, the Sustainable Energy Development Authority of Malaysia (SEDA) was established under the Sustainable Energy Development Authority Act 2011 to explore renewable substitute fuel sources to power cities across Malaysia. SEDA's key role is to administer and manage the implementation of the feed-in tariff (FiT) mechanism which is mandated under the Act. TENAGALINK delves into SEDA's solutions for renewable energy (RE) generation and the contribution of the largest buyer of RE in the country, Tenaga Nasional Berhad (TNB).

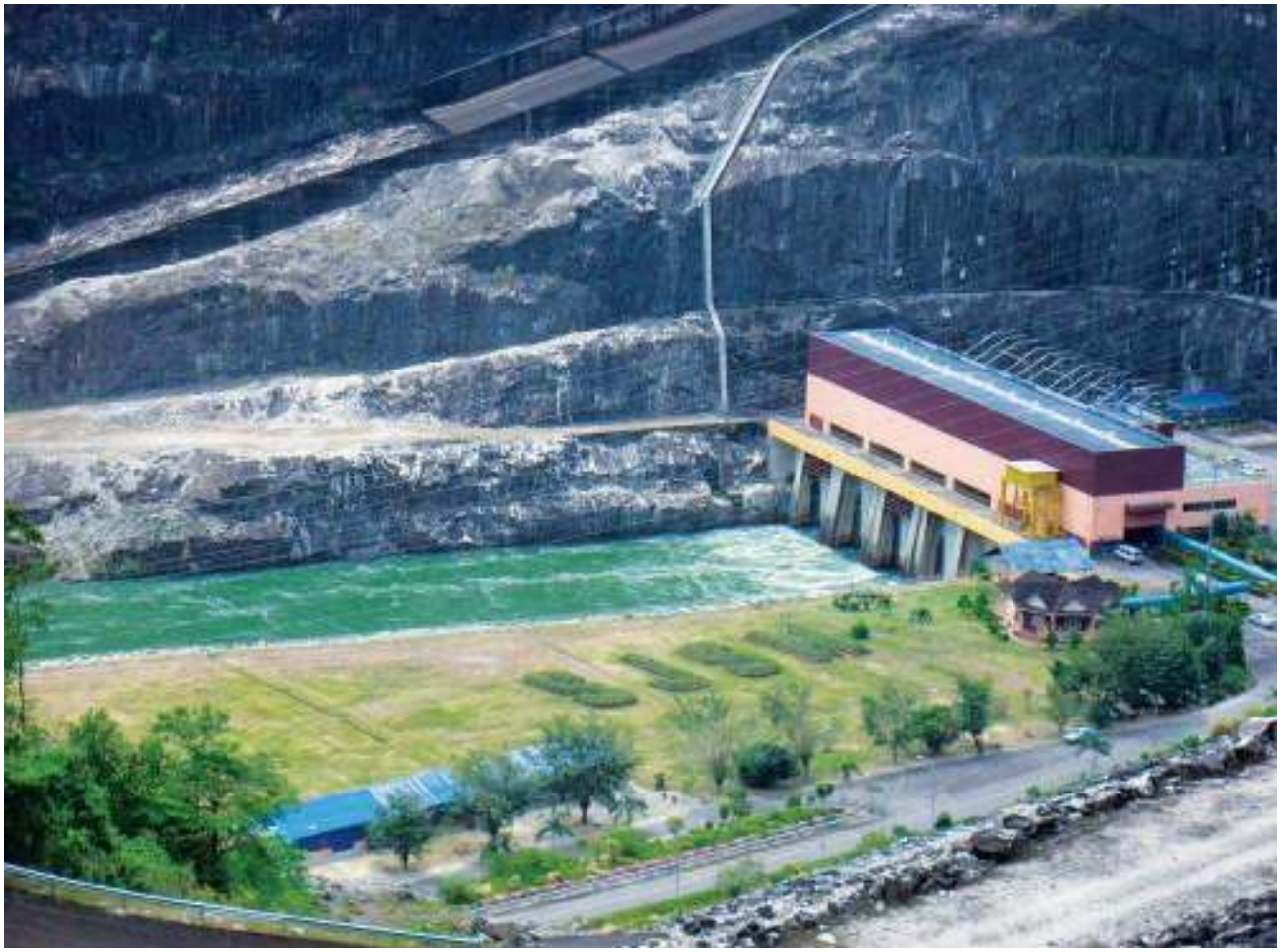
In 2001, the Malaysian government identified RE as the 'fifth fuel' after oil, natural gas, coal and hydro in the Five-Fuel Policy. The focus was to introduce more sustainable power into the national grid by setting a goal of reaching 985 megawatts (MW) or 6% of the overall energy mix by 2015 and 11% or 2,080MW by 2020.

As an incentive, the government introduced the FiT which allows individuals or organisations that install RE systems to sell surplus power to TNB (the country's largest energy supplier, powering over eight million homes). The FiT mechanism obligates utility companies to purchase RE from producers, at a mandated price. Guaranteed access to the grid and a favourable set price per unit of power, ensures that RE is a viable long-term investment, thereby creating a strong economic incentive to invest.

Left: *Malaysia is one of the largest producers of solar panels in the world. The country is also blessed with abundant sunlight, which is advantageous in the adoption of the RE source. Homeowners can also sell their excess power generated to TNB for up to RM500 per month.*

GENERATING GREEN

The idea behind FiT is to allow a Distribution Licensee (such as TNB) to pay a FiT Approval Holder (for example, a residential property holder) a premium tariff for every kilowatt-hour (kWh) of clean energy generated. This allows owners of Green power generators to sell excess power to the distribution licensee for a fixed number of years. The duration of this is dictated by the type of eligible sustainable resources involved, including biogas, biomass, small or mini-hydro or solar photovoltaic (PV) panels.



Above: *Operated by Tenaga Nasional Berhad (TNB), the Sultan Mahmud Power Station also known as the Kenyir Dam, was launched in 1987 and is capable of generating up to 165MW daily.*

Consumers who install generators with capacities up to 4 kilowatt-peak (kWp) can earn about RM1.23 per kWh. As a bonus, the installation of solar photovoltaic (PV) panels on buildings or building structures entitles residential building owners to an additional RM0.26. Also consumers who install solar PV panels for use in building (such as using them as roofing replacements) will get RM0.25 per kWh and receive RM0.03 more for using locally manufactured or assembled solar PV modules. All solar power producers who sell to TNB are guaranteed an income of RM500 per month for up to 21 years from the date of signing an agreement, under the FiT scheme.

The system however is not only about creating income for individuals or companies that generate the power. A quota of 190MW for 2011 to 2013 was set by SEDA to avoid over-subscription to the FiT system. Of the 190MW, 50MW was allocated to solar PV. From 2014, the limit will be raised to 250MW. Mini-hydro and biogas were fixed at 30MW, while biomass was allotted 80MW.

Similar to countries like Germany and Italy, the FiT in Malaysia is not financed from tax revenue, but

by an RE Fund. This fund, which is managed by SEDA Malaysia (and collected by TNB through the imposition of a 1% surcharge on electricity bills) is essential to support the FiT mechanism as well as the overall development of the RE sector in the country.

It was set up under Part V Section 23 of the Renewable Energy Act 2011 and stipulates that only customers who consume more than 300kWh (approximately RM77) a month will be subject to the additional costs. This works on the basis of 'higher use, contribute more' to Green energy, and encourages conscious electricity conservation and energy efficiency.

RENEWABLES

In 2012, a total of 377 RE applications were made to SEDA with an installed capacity of 311.56MW. Of that amount, 140MW was for solar PV. The Authority reports that while it had received massive requests for solar PV, biogas and biomass have not been as popular. Recently, TNB through its subsidiary TNB Energy Services (TNBES) partnered with Sime Darby Plantation to convert palm oil mill effluent (POME) into energy as an initiative to get more private palm millers interested in FiT.

This is due to the fact that an estimated 430MW of energy from these private millers are off-grid, as many of them believe that connecting to the national grid will present too many challenges. SEDA however, continues to encourage the relevant body for the oil palm industry to become involved in FiT.

TNBES has also been instrumental in developing several mini-hydro, wind turbine, solar PV and solar hybrid (a combination of solar and diesel power) generators in West Malaysia and remote coastal areas in the eastern states of Sabah and Sarawak that previously had no access to the national grid. Some of its projects include a 5MW capacity Wind Turbine and Solar Hybrid station in Johor and mini-hydro stations (MHS) in Peninsular and East Malaysia.

Below:
The Chief Executive Officer of Sustainable Energy Development Authority of Malaysia (SEDA Malaysia), Datin Badriyah Hj Abd Malek believes that "Every country has the crucial responsibility of ensuring their energy strategies will accommodate a growing population without compromising on the needs of future generations. Sustainable and renewable energy, which are widely accepted holistic approaches to solving global power crisis, need to play a more prominent role in Malaysia and the world."

A solar cell, also called a photovoltaic cell, converts the energy of light directly into electricity. The adoption of renewable energy sources like this is highly encouraged, especially with the abundance of sunlight in Malaysia.

The RE industry is estimated to generate at least RM70b worth of revenue for the private sector and this will translate into tax revenue of about RM1.76 billion for the Government by 2020. With TNB paying 1% of its annual revenue – which stood at RM300 billion in 2012 – to SEDA for FiT, it is the largest contributor to the development and advancement of RE in the country.

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TENAGA NASIONAL

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TENAGA NASIONAL BERHAD (200866-W)

MID VALLEY CITY

A Business and Lifestyle Hub

A prime development by IGB Corporation in Kuala Lumpur, Mid Valley City is well-known for being the location of The Gardens – which comprises luxury residences, a high-end shopping gallery, two office towers and The Gardens Hotel – as well as Mid Valley Megamall – an unparalleled shopping, dining and one-stop entertainment destination. Antony Barragry, Chief Executive Officer of IGB REIT Management (a wholly owned subsidiary of IGB Corporation) provides an inside look at what makes the commercial, retail, lifestyle and hospitality hub that is Mid Valley City, tick.

MID VALLEY CITY

The 50-acre Mid Valley City is managed by IGB REIT which has the task of ensuring that this very popular hotspot runs smoothly. It is not an easy task given the tremendous amount of traffic that passes through. For instance, on an average weekday, it receives more than 70,000 visitors, not including the 30,000 people who work in offices in there.

Weekends are even more crowded when pedestrian traffic can number up to 100,000 with vehicular traffic of more than 13,000 even on weekdays. Earlier this year, Mid Valley City introduced Ladies Parking Zones – designated parking areas aimed at providing added security for female visitors.

Many of the operations here at Mid Valley City run 24 hours every day of the year. Even when shops are closed, all the mechanical systems continue uninterrupted as engineering work, shop-fitting and housekeeping all take place at night. Walking around after hours, one will be surprised at just how many things are happening after the customers are no longer around.

Cooling Mid Valley City requires a lot of energy and to conserve power, the chilled-water systems operate on a schedule. They are started up sequentially in the daytime at about 12 noon and much of the load begins to drop gradually at about 9:00 pm. Having put a lot of effort into energy efficiency systems, the company strives to keep them in place and maintain them at their peak.

POWERING UP

Electrical infrastructure is one of the key factors that a developer must have in place for a successful project. Currently, electricity consumption in Mid Valley City

averages 128,000 MWh per annum and this is expected to increase in 2016 when the third phase is completed.

Barragry explains, "Every month we review how much electricity we use, and are always looking at ways to improve our energy efficiency. Over the years, we have discovered the best lighting systems to use, based on efficiency and low energy consumption."

A lot of consideration also goes into the air-conditioning system as that is the single biggest contributor to energy cost in Mid Valley City. The team has learned how to balance the systems and how to run them as efficiently as possible, in order to get as much savings as possible.

AN MSC DEVELOPMENT

In order to encourage high-speed connectivity in the country, Multimedia Super Corridor (MSC) status is awarded to organisations which have stimulated the use of Information and Communications Technology (ICT). Recipient companies enjoy several benefits such as 10-year income tax allowance and waiver of import duties on multimedia equipment. Mid Valley City was awarded MSC status in 2008 and this means that it has to be compliant with the requirements which include connectivity and power distribution.

"The MSC is something the government has been pushing very strongly for many years now and it has attracted several companies into Malaysia, some of which have been drawn to Mid Valley City. This has made us more diligent when designing our electrical systems, particularly when it comes to ensuring the maintenance of quality and reducing downtime because consistency of supply is something that all tenants want," Barragry explains.

Elaborating further, he emphasises, "Having consistent voltage is equally important, as sudden spikes can damage electronic equipment. Owing to the efforts by Tenaga Nasional Berhad (TNB), we can assure our stakeholders that the quality of electricity will be uniform."

Giving kudos to TNB, the CEO of IGB REIT Management wraps up with, "We have a good working relationship with TNB and they have been instrumental in assisting us with project developments in Mid Valley City. I believe the lack of any problematic issues speaks volumes about the relationship. The supply has always been very reliable and the backup is always very good. Our electrical department has a hotline to TNB and if we have any issues, they are usually resolved within 30 minutes."

"Over the years, we have discovered the best systems to employ that ensure maximum energy efficiency."

Antony Barragry,
CEO of IGB REIT Management

Mid Valley City continues to reinvent itself and build on its achievements which include FIABCI Award of Distinction in 2001 for Best Retail Development, Malaysia Tourism Awards 2000 for the Best Shopping Centre category and Gold Award for the Retail World Excellence Award for 2006/2007 for the Mid Valley Megamall. Antony Barragry says with pride, "We are never a 100% satisfied. We always have to look for that little bit extra. While I think we have achieved a lot, we still have to keep on top of everything."

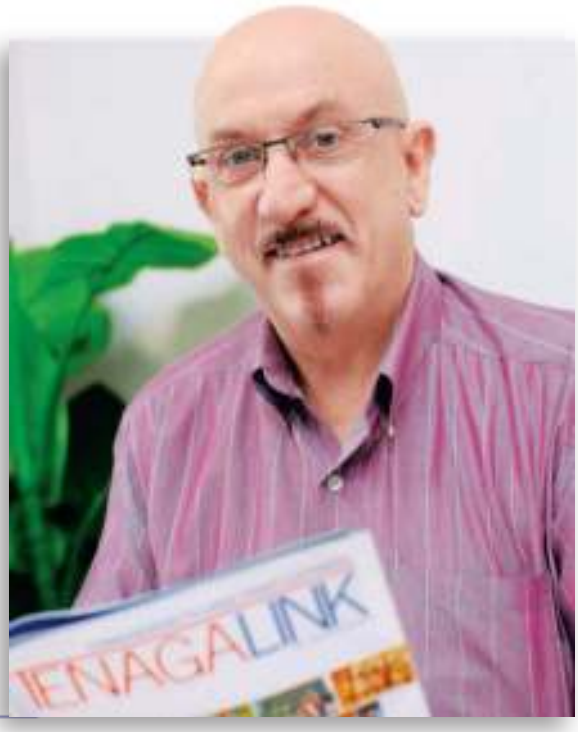
HIGHLIGHTS OF FEEDBACK ON THE NEW TENAGALINK

"After reading about how TNB provides electricity to schools in rural areas, I have a greater appreciation of how much the company contributes to make our society better."

Amirah

"It is nice to see how far TNB has come over these many years, powering the country all the way. I am certainly looking forward to future editions."

Izzat



"*TenagaLink* feels like an aggregated news and information source. Among others, it provides an in-depth look into the ways in which the country is promoting Green renewable energy sources, and how far we have come in reaching those goals."

Salim

"Until I read Corporate Viewpoint about KPJ Healthcare, I never realised how the services they provide are linked to the efficiency of TNB or how much the utility has contributed to nation building. This was all well explained in the new *TenagaLink*."

Azzarul

"Aside from looking good, the magazine is also enlightening. I like knowing how things work behind the scenes at TNB Customer Service Division for them to meet the needs of consumers across the country."

Annaliza

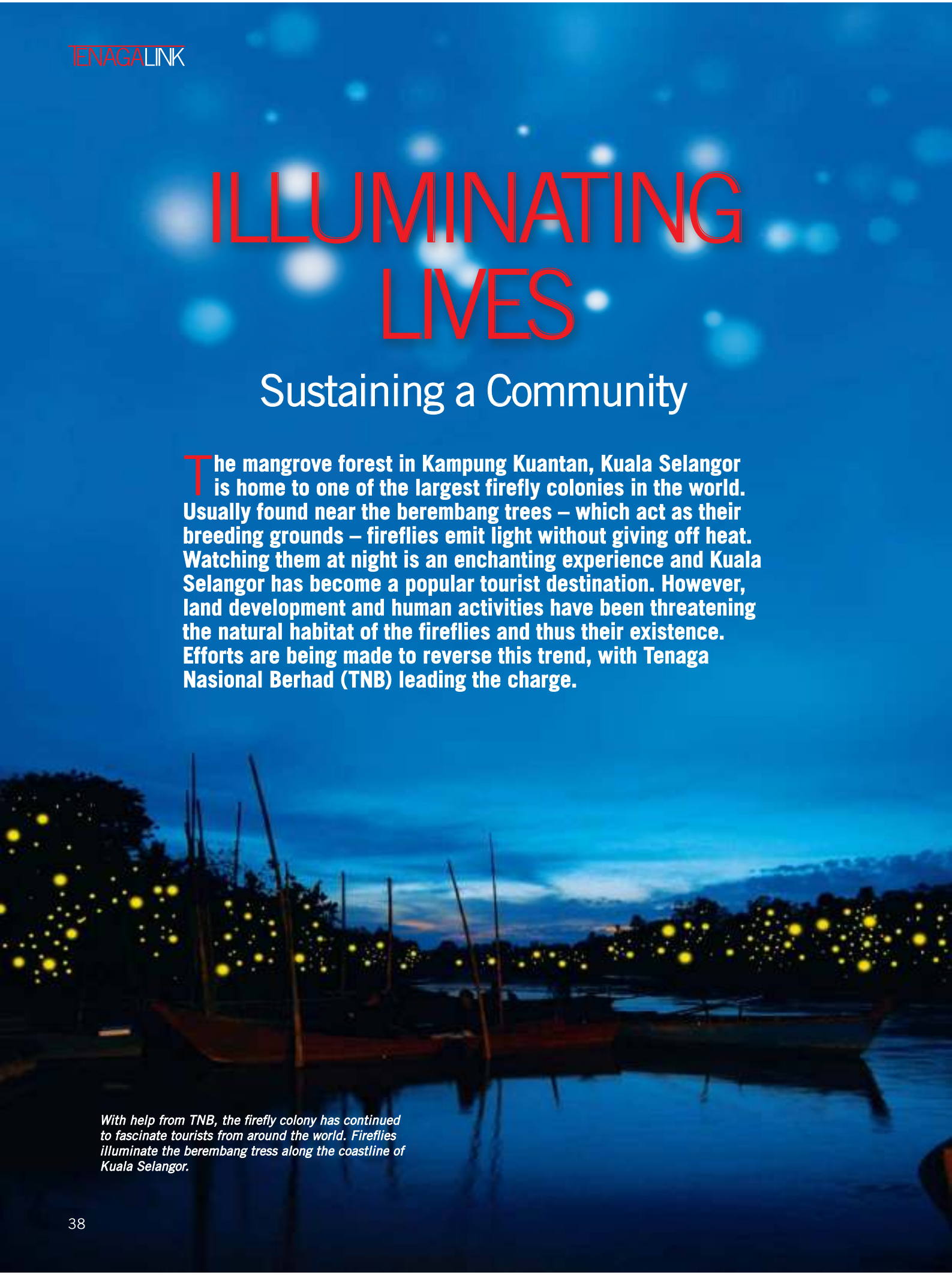
"I find that the publication has a quality layout and contains first-rate information such as TNB's solar power initiative to reduce dependence on fossil fuels. This is a magazine worth reading."

Sujen

ILLUMINATING LIVES

Sustaining a Community

The mangrove forest in Kampung Kuantan, Kuala Selangor is home to one of the largest firefly colonies in the world. Usually found near the berembang trees – which act as their breeding grounds – fireflies emit light without giving off heat. Watching them at night is an enchanting experience and Kuala Selangor has become a popular tourist destination. However, land development and human activities have been threatening the natural habitat of the fireflies and thus their existence. Efforts are being made to reverse this trend, with Tenaga Nasional Berhad (TNB) leading the charge.



With help from TNB, the firefly colony has continued to fascinate tourists from around the world. Fireflies illuminate the berembang tress along the coastline of Kuala Selangor.

In 2008, TNB – in collaboration with the Selangor State government – undertook the task of protecting the firefly colony for a period of five years, reflecting a commitment to being a socially responsible company with a focus on the environment. It is also apt that the nation's largest electricity utility has adopted the firefly, as both are involved in the process of illumination.

These efforts are spearheaded by TNB's Corporate Responsibility unit and TNB Research (TNBR). Working with *Universiti Kebangsaan Malaysia* – (UKM – the National University of Malaysia), they carry out activities to protect the fireflies by conserving their habitat. In order to achieve this, a number of groups have been formed.

For instance, members of the 'Firefly Squad' teach villagers how to grow *berembang* seedlings so that the fireflies will have new breeding places. Then there is the 'Love Your River Squad' comprising young people from the community of Seri Asahan. Their task is to monitor the river and ensure the healthy growth of the *berembang*.

In addition, TNB regularly organises campaigns and contests in educational institutions to showcase ways of protecting fireflies to students. This has increased public awareness of the cause. Also contributing to efforts are beneficiaries of *Yayasan Tenaga Nasional* (YTN – Tenaga Nasional Foundation) – a trust fund which proffers scholarships and study loans to deserving students. These young men and women have helped plant 51 berembang trees at the Firefly Tourist Centre in Kampung Kuantan.

The flower of the berembang tree (otherwise known as Mangrove Apple) in Kuala Selangor. The tree is important for the fireflies as a source of food and a habitat and also filters dirt, thus producing clean water for river organisms.

COMMUNITY UPGRADE

TNBR has also funnelled resources into conservation studies and renovated the existing Firefly Park. New features include four pavilions, a mini theatre, a public address system and a jetty. The company also improved the access road and introduced directional signs at strategic locations from Kuala Lumpur to Kuala Selangor.

This will also improve the lives of locals because tourist numbers are expected to rise as it is easier for visitors to find the firefly colony. Furthermore, TNB has also sponsored Arabic and Japanese lessons for the local boatmen who take tourists on the river to view the fireflies, due to the increase of visitors from the Middle East and Japan.

The fireflies of Kampung Kuantan are part of the national heritage and their preservation is important to Malaysians. Through its efforts, TNB is helping to bring about several results. It is promoting awareness of the importance of the fireflies to the local economy and the ecosystem and is highlighting Kampung Kuantan as a tourism destination. Most importantly, TNB is helping to preserve a unique aspect of Malaysian life. In doing so, it is giving the younger generations the opportunity to appreciate and cherish these wonders of nature.

Fireflies are usually found in marshy or wet wooded, temperate regions. At Kuala Selangor, thousands of fireflies group together on the trees, beginning their display about one hour after sunset.

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.

TENAGA NASIONAL BERHAD (200866-W)

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