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Towards A World-Class Energy Sector

Energy Malaysia

Suruhanjaya Tenaga
Energy Commission

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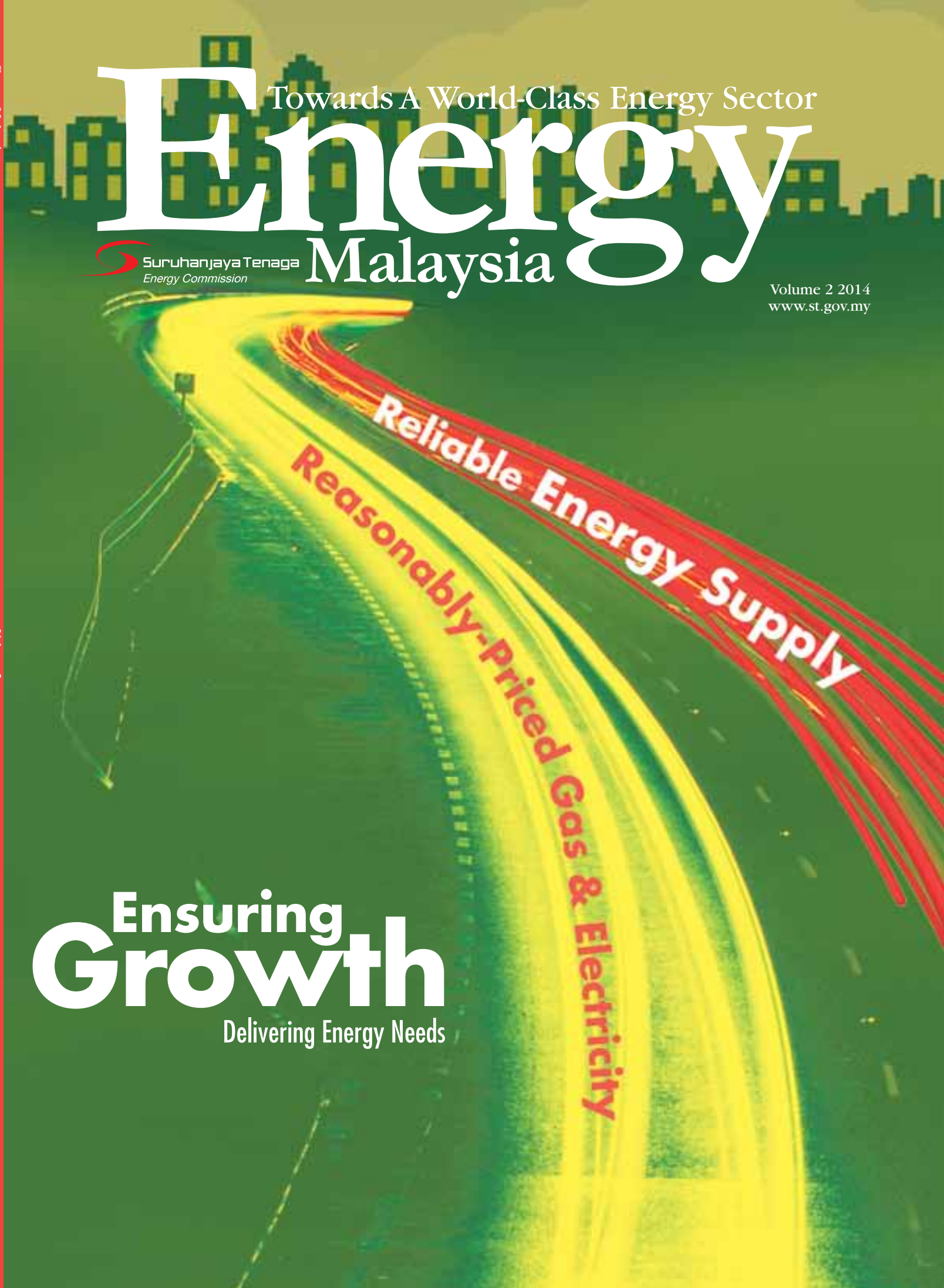

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Energy Malaysia

Suruhanjaya Tenaga Energy Commission

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Maintaining Reliable Energy Supply

At the Energy Commission, we have the responsibility of ensuring the efficient supply of energy in the country through effective regulation of the electricity and piped-gas industries. This is an enabler to maintain the pace of economic growth in Malaysia, which is expected to expand by more than 5% this year. In line with this, the demand for energy will also rise as businesses, industries and households move up in their lifestyle and consumption patterns.

Our responsibility as the regulator of the energy sector requires us to take into consideration the views and needs of our various stakeholders and partners – namely the government, the consumers, and members of the industry. Ultimately though, our main priority is to look after the security and reliability of electricity supply.

Reliability means ensuring that there is adequate plant capacity and fuel supplies, as well as sufficient robustness in the transmission and active distribution network at all times. To guarantee a higher level of supply security, the Energy Commission has adopted a new fuel-mix strategy and we will regularly look at and revise this plan every half year during our planning sessions. This will assist us in optimising the use of coal and gas, including imported energy, in order to secure ample fuel supply to meet generation demand throughout the year.

The Energy Commission has also submitted proposals to the government for the planting up of additional capacity over the next eight years. These take into consideration projected economic growth rate and forecasted sectorial demand. We need to take into account that there is normally a lead time required to construct facilities at the identified sites, which will also undergo an environmental impact assessment, irrespective of the generation technology applied.

Based on these planning parameters, we are working very closely with the ring-fenced Single Buyer and the Systems Operator, so that the near-term objectives of energy supply will be met at the least cost possible, thus reducing the impact on the tariff and, of course, on the end-user billings.

In order to ensure that there is a satisfactory level of performance through the supply chain, the premier electricity utility TNB has to perform to the rules of the Incentive-Based Regulation (IBR). Embedded in this, is the requirement for TNB to submit operational performance parameters which will form the basis of rewards and penalties under the IBR's rate-based aspects.

Another major factor of IBR is the Imbalance Cost Pass-Through (ICPT) mechanism, which is currently undergoing its trial period. Towards the end of the year, the results and outcomes will be verified and the mechanism amended as necessary in line with the formal commencement of IBR in January 2015.

Together with subsidy rationalisation, which has been introduced to wean us off dependency on burdensome fuel subsidies, IBR aims to enhance the energy sector in the country and create a scenario which better reflects market reality.

This may sometimes result in some adjustments of energy tariffs, depending on the market price for fuel, and it is also possible for see downward movements. Nevertheless, this is something that needs to be done to effectively and efficiently create a robust and viable energy industry in Malaysia. At the same time, the Energy Commission is here to make sure that consumer interests are looked after, and that everyone can be assured of a reliable supply of energy.

Dato' Abdul Razak Abdul Majid
Energy Commission of Malaysia

Sabah's Stabilising Supply

Power supply in Sabah has been a constant problem for both locals and visitors, and has negatively impacted investment, facilities and infrastructure in the state. The demand averaged around 910MW and was rarely met by existing power plants, which are available to an average of 840MW, leading to frequent interruptions. To help the state cope with this problem, two new Independent Power Providers (IPPs) started generating electricity in July, providing nearly 290MW of additional electricity to the power grid.

The Ministry of Energy, Green Technology and Water is also looking at other options to ensure a consistent, high quality supply in Sabah. For instance, it is taking a zoning approach, based on districts more prone to blackouts in order to determine the most problematic ones, and monitoring existing electricity generation facilities for repair, upgrade or replacement. Local authorities are also implementing Demand Side Management, in which large consumers, such as industries, are given incentives to operate during off-peak hours, to ensure stability within the state-wide power grid and minimise disruption to other users.

Right: According to Energy, Green Technology, and Water Minister, Datuk Seri Panglima Dr Maximus Johnity Ongkili, the Federal government has set aside RM1.8 billion for state energy utility Sabah Electricity Sdn Bhd (SESB) for the next three years. This is on top of the RM200 million SESB already receives from the government, and the increased grant is aimed at improving power supply in the state.

SPR Energy is producing 100MW, while the Kimanis Powerplant (pictured here) will produce 190MW from two of its three generators, with the final generator expected to add 95MW by October, helping to fulfil Sabah's energy needs.

Power Upgrades

Energy, Green Technology and Water Deputy Minister, Datuk Seri Mahadzir Khalid recently announced that the Federal Government has allotted RM1.8 billion to enhance and upgrade electricity supply in Sabah.

Apart from the already completed 285MW Kimanis Power Plant in Kota Kinabalu, the upgrades will include improving transmission to neighbouring towns such as Sandakan, Lahad Datu and Tawau.

The energy sector in Malaysia is overseen by the Ministry of Energy, Green Technology and Water and regulated by the Energy Commission, which also encourages and promotes the supply of electricity and piped gas for the overall development of the nation.

Above: The 285MW Kimanis gas-fired combined cycle power plant in Sabah is one of the Malaysian government's initiatives to provide sufficient and reliable energy to propel economic development of the state.

Left: Energy, Green Technology and Water Deputy Minister, Datuk Seri Mahdzir Khalid noted that consumers in Sabah can expect more stable electricity supply as soon as the Kimanis Power Plant and SPR Energy Power Plant become operational.

Rationalising Rates

Peninsular Malaysia's Energy Commission-licenced reticulated gas supplier, Gas Malaysia, revealed on the 11th of April that its proposal for a revision in the tariff of natural gas for the non-power sector was approved by the Federal government, with effect from the 1st of May.

Tariff Category	Average Annual Gas Consumtion (mmBtu)	Existing Tariff (RM/mmBtu)	Revised Tariff Effective 1 May 2014 (RM/mmBtu)
A	Residential	19.25	19.52
B	0-600	20.61	20.61
C	601-5,000	13.98	17.64
D	5,001- 50,000	14.61	18.14
E	50,001-200,000	16.07	19.00
F	200,001-750,00	16.07	19.18
L	Above 750,00	16.45	19.65
Average		**16.07**	**19.32**

Note: MMBtu = Million Metric British thermal unit

Source : Gas Malaysia

Under the new tariff structure, consumers of more than 601 million metric British thermal units (mmBtu) of gas will pay a higher tariff ranging between 18.23% and 26.18%, marking an average hike of RM16.07/mmBtu to RM19.32/mmBtu.

The increased gas prices – part of the Malaysian government's subsidy rationalisation plan to enhance and promote the country's gas market and industry – are likely to affect major manufacturing industries such as rubber gloves and the food, beverages and tobacco subsectors. However, liquid natural gas (LNG) and natural gas for automobiles are not affected by the tariff revision.

Left: Natural and liquefied petroleum gas from the national petroleum company, PETRONAS is delivered to domestic, commercial and industrial users through the primary licensed supplier in Penisular Malaysia, Gas Malaysia.

Utilising the Heat

Following the Malaysian government's drive to diversify local sources of energy, a survey covering a 50 sq km area in Apas Kiri, Sabah, has indicated that the site has the potential to host the country's first geothermal plant.

The Sabah geothermal plant, the first in Malaysia, has the potential to generate up to 67MW of energy.

The surveyed area measuring up to 12 sq km, with sub-surface hot water at a depth of 2.5km, is expected to have a generation capacity of up to 67MW when it is completed in 2016.

Tawau Green Energy, the company managing the development of the project, announced that in addition to the geothermal plant, a resource centre will also be created. This is aimed at providing short training courses for stakeholders and specialists in the industry and will function as a platform for local and foreign academic institutions to collaborate in the field of geothermal sciences and energy.

The plant, which will reduce CO2 emission by up 200,000 tonnes annually, is expected to contribute at least 30MW to the state's grid through Sabah Electricity's 132 kV grid network under a 21-year renewable energy power purchase agreement.

Renewable energy from biomass, solar and wind-powered plants will help to ensure a more diverse and sustainable power supply for the country.

Winds of Change

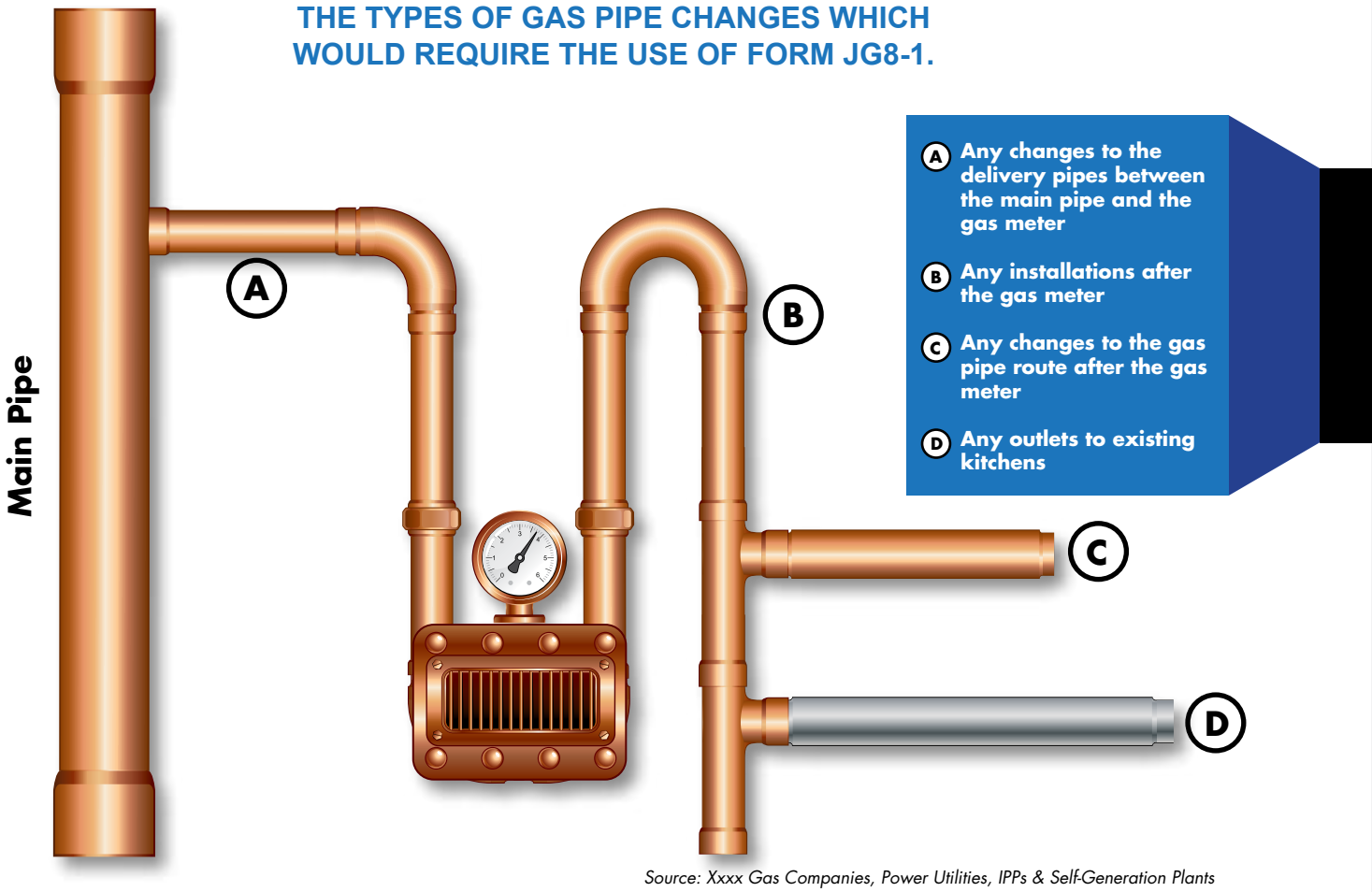
The Malaysian government is aiming to complete a comprehensive nationwide wind-mapping project as part of its drive to identify new sources of renewable energy (RE) that will help diversify the country's portfolio of sustainable power sources.

This is in addition to a study of geothermal energy potential in Ulu Slim, Perak, as indicated in the 2013 Annual Report of the country's Economic Transformation Programme (ETP), which aims to elevate Malaysia to developed nation status by 2020.

The report also highlights a number of areas that can be enhanced to further push Malaysia towards achieving its RE targets, regulated by the Sustainable Energy Development Authority of Malaysia (SEDA). These include a stronger advocacy and communications strategy that will reflect future changes in electricity tariff under the RE Fund and strengthen human resources training for on- and off-grid solar photovoltaic, as well as biogas, biomass and small hydro systems.

The 2013 ETP Report notes that there are some challenges inherent in ensuring the sustainability and long-term viability of RE, which will require implementing incentive packages to make the sector self-sustaining and guarantee that taxpayers are not burdened by the adoption of the system. As the appointed authority responsible for Malaysia's energy sector, particularly the electricity supply, the Energy Commission assists potential independent power producers – both institutional and individual – by issuing provisional licences to facilitate financing from financial institutions.

Speeding Up Approvals



Source: Xxxx Gas Companies, Power Utilities, IPPs & Self-Generation Plants

Under Regulation 15(1) in the *Gas Supply Regulations 1997*, approval is required from the Energy Commission before work on a new gas installation or extension can begin. The JG8 form was used for application alongside the relevant documentation, and the approval was granted or rejected within three weeks.

The Energy Commission is taking steps to speed up its internal processes, and is introducing several changes to enable faster approvals. Since August, certain works involving gas pipes require the use of a new form, the JG8-1, to reduce approval waiting time to just three days.

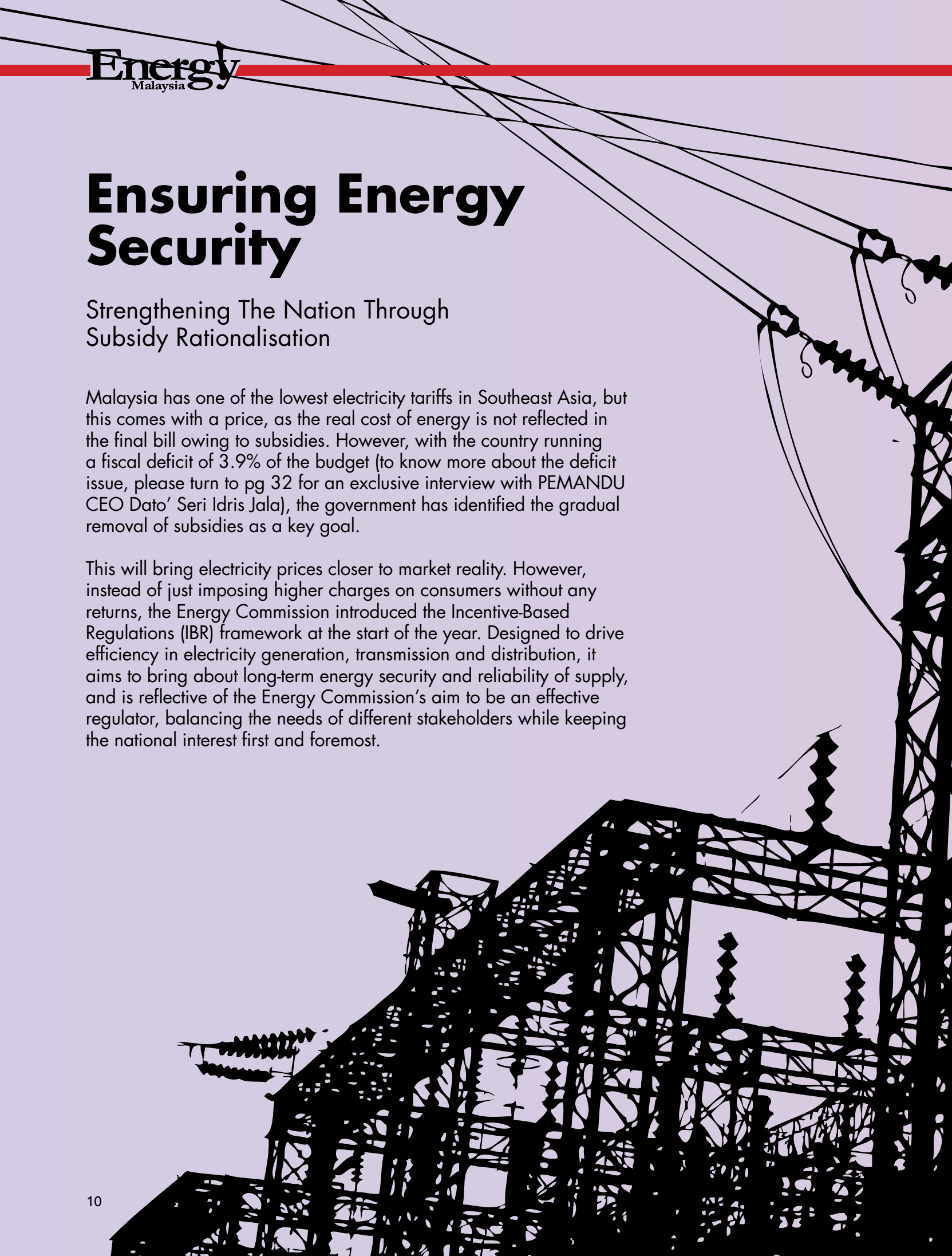
The JG8-1 form will be needed for work involving installations for natural gas or liquid petroleum gas. This includes any changes to the delivery pipes between the main pipe and the gas meter, any installations after the gas meter, any outlets to existing kitchens and any changes to the gas pipe routes after the gas meter. Together with key documents that need to be attached for approval, including the design calculations summary, and layout and schematic drawings, the complete information provided on the new form will give a clearer picture regarding the gas installation, and enable the Energy Commission to process the applications at a faster pace.

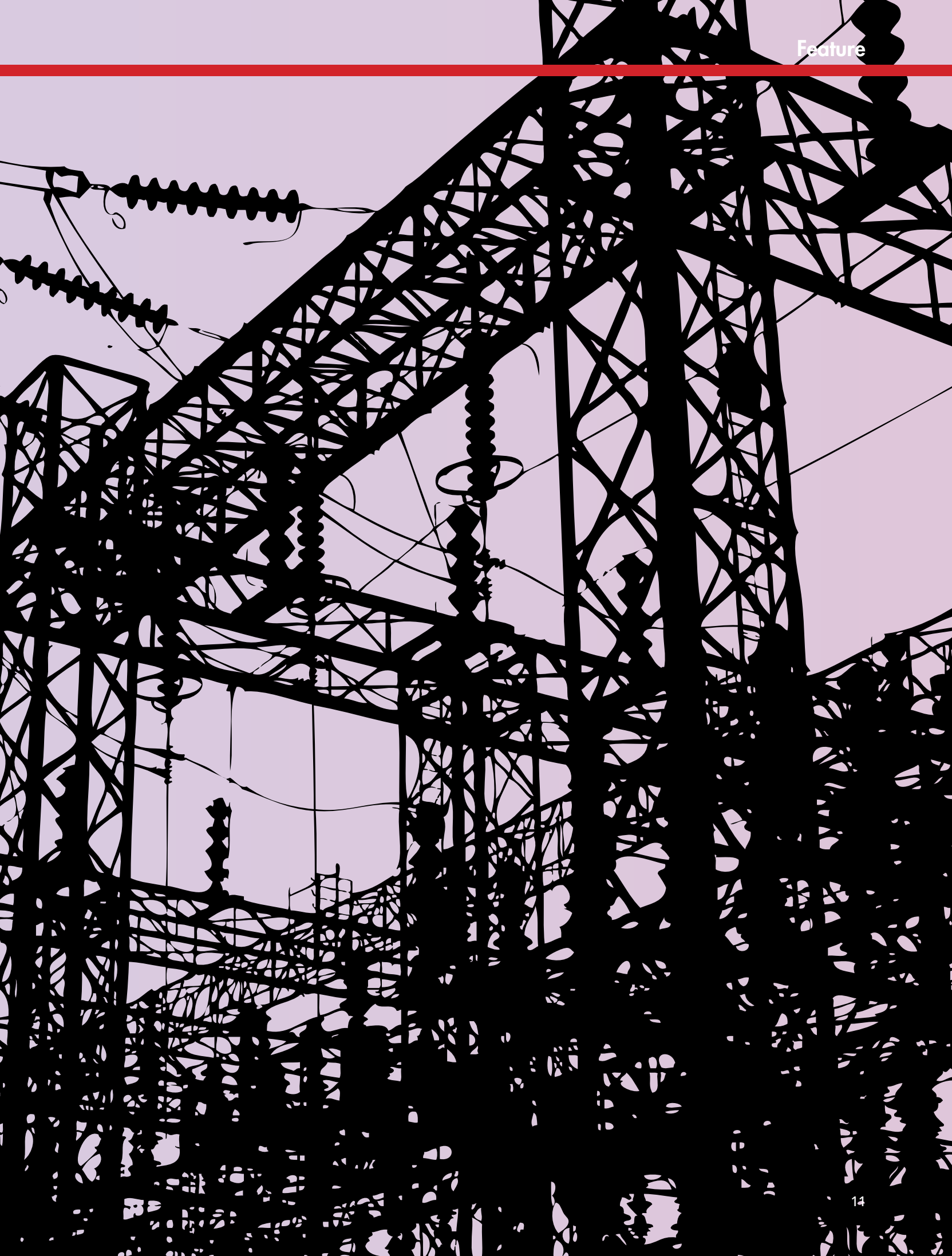
Ensuring Energy Security

Strengthening The Nation Through Subsidy Rationalisation

Malaysia has one of the lowest electricity tariffs in Southeast Asia, but this comes with a price, as the real cost of energy is not reflected in the final bill owing to subsidies. However, with the country running a fiscal deficit of 3.9% of the budget (to know more about the deficit issue, please turn to pg 32 for an exclusive interview with PEMANDU CEO Dato' Seri Idris Jala), the government has identified the gradual removal of subsidies as a key goal.

This will bring electricity prices closer to market reality. However, instead of just imposing higher charges on consumers without any returns, the Energy Commission introduced the Incentive-Based Regulations (IBR) framework at the start of the year. Designed to drive efficiency in electricity generation, transmission and distribution, it aims to bring about long-term energy security and reliability of supply, and is reflective of the Energy Commission's aim to be an effective regulator, balancing the needs of different stakeholders while keeping the national interest first and foremost.





ADDRESSING IMBALANCES

Overseeing the IBR is the Energy Commission's Electricity Pricing Unit which is under the Electricity Supply & Market Regulation Department. It is a fitting responsibility, as the unit is in charge of assessing the electricity tariff and charges set by Tenaga National Berhad (TNB) – the main utility in Peninsular Malaysia – and Sabah Electricity Sdn Bhd (SESB). In addition, the Electricity Pricing Unit has also been tasked with analysing fuel price trends, particularly those used in power generation , such as coal, gas, crude oil and LNG.

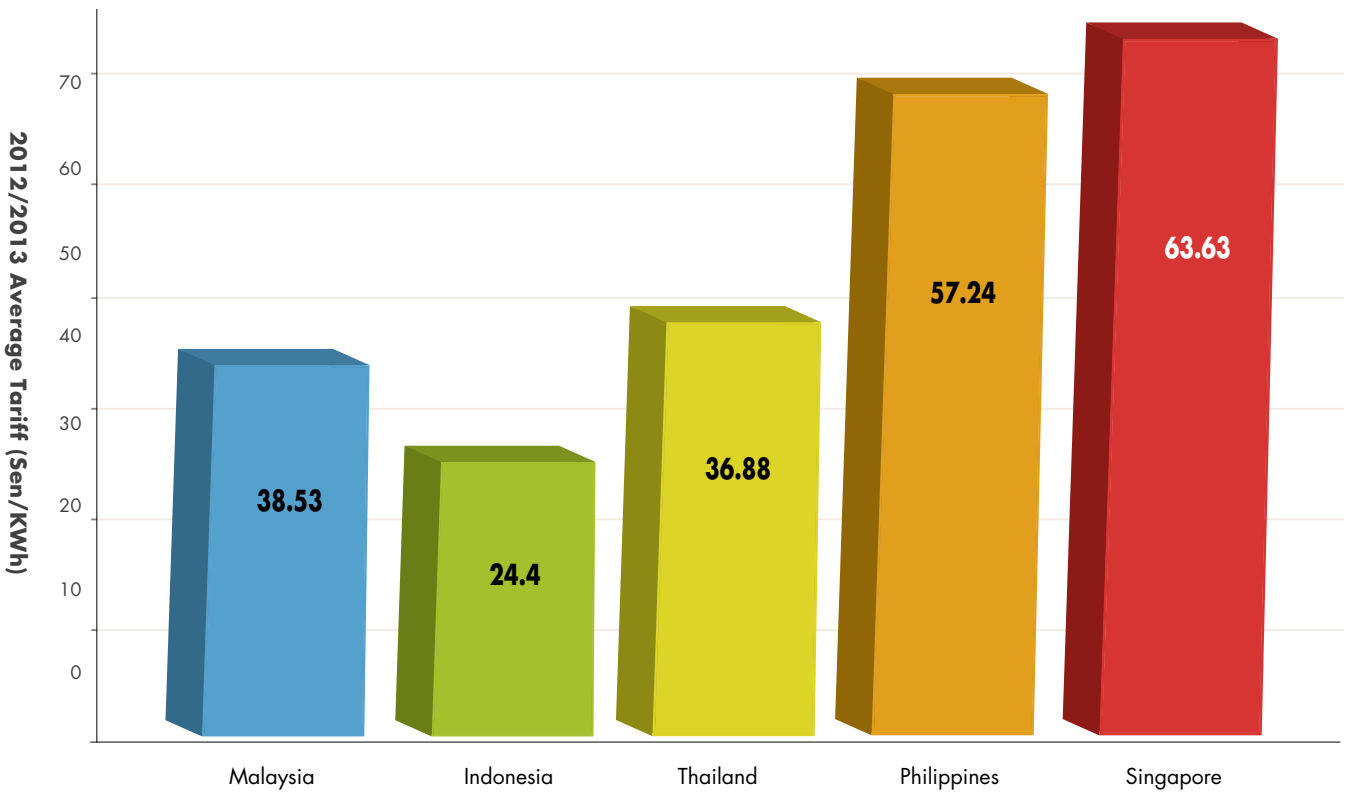
This analysis is important as it allows the Energy Commission to accurately implement the Imbalance Cost Pass-Through (ICPT) mechanism. Explaining more to Energy Malaysia, Marlinda Mohd Rosli – the head of the Electricity Pricing Unit – said, "By using ICPT, the actual impact of fuel cost – which is an uncontrollable factor – will be better reflected in the final electricity tariff. Basically, it allows for electricity prices to be changed every six months depending on the price and type of fuel, fluctuation in demand and other generation-specific costs."

As Marlinda pointed out, ICPT ensures that the rationale for electricity tariffs will be more transparent, as it is now clearer to consumers why rates are raised. At the same time, it has to be noted that while the tariff may increase if fuel prices rise, the opposite is also true. As such, a drop in fuel prices will bring about lower electricity costs.

Therefore ICPT is a fairer system. Previously, neither the utility nor

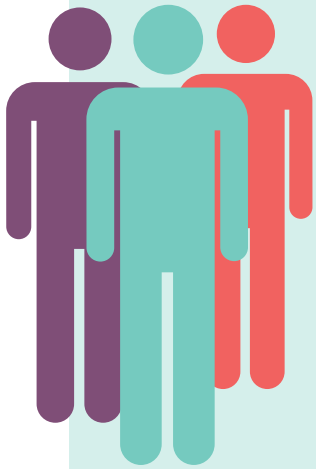
While some may worry about the effects of subsidy rationalisation on electricity tariffs in Malaysia, the country has one of the lowest rates in Southeast Asia, and the Energy Commission will ensure that charges will be fair to both the utility provider and consumers.

ELECTRICITY TARIFFS IN SOUTHEAST ASIA



Source: Energy Commission of Malaysia

IMBALANCE COST PASS-THROUGH COMMITTEE



Chairman: Chief Executive Officer, Energy Commission

Members:

- Ministry of Energy, Green Technology and Water
- Economic Planning Unit
- Ministry of International Trade and Industry
- Performance Management Delivery Unit
- Energy Commission
- MyPower Corporation
- Tenaga Nasional Berhad
- Petroliam Nasional Berhad
- TNB Fuel Sdn. Bhd.
- Single Buyer
- Grid System Operator

Secretariat: Energy Commission

Functions and Responsibilities

- Review and verify information and data for the ICPT calculation
- Review calculation of fuel costs and other generation specific costs, and ensure that the costs are efficient
- Certify the ICPT value for Government approval
- Resolve any disputes concerning the implementation of the ICPT mechanism, if any

Source: Energy Commission of Malaysia

consumers benefitted from price fluctuations of the different fuels involved. If fuel prices were higher, then the utility had to absorb the extra. If they were lower, then consumers would still have paid the same rate, despite the utility benefitting from the reduction in overheads.

Simply put, ICPT is all about achieving a balance. As Senior Analyst at the Energy Commission's Electricity Supply & Market Regulation Department M Ishan H Bakar pointed out, "There is no additional revenue as far as the utility is concerned. Instead, any increase in electricity tariff will just take into account the extra cost of energy, so essentially revenue remains the same."

WEANING SUBSIDIES

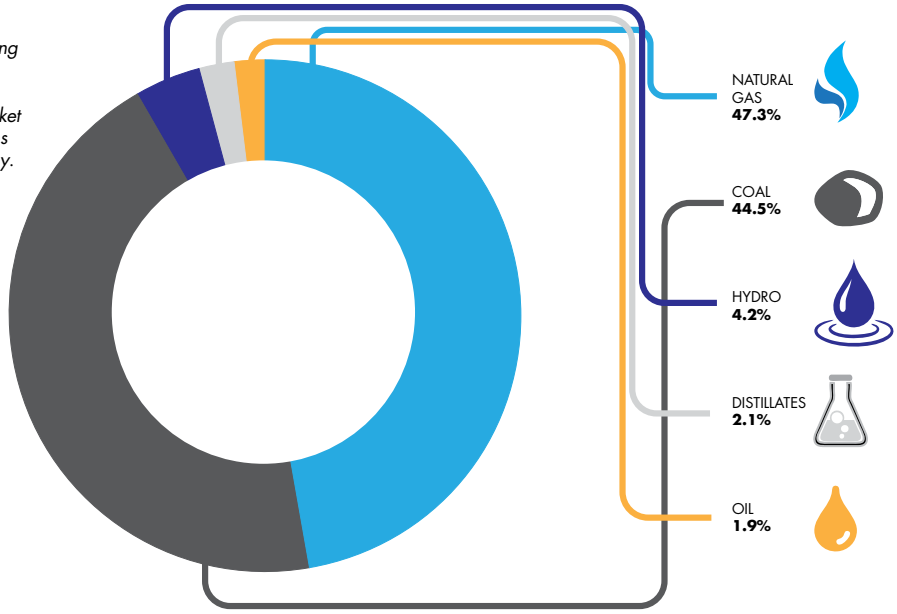
Another rationale for the introduction of ICPT is to prepare electricity consumers in Peninsular Malaysia for subsidy rationalisation. At present, power producers in Malaysia buy piped gas, at a fixed price of RM15.20 per million British Thermal Units (mmBTU), after it was increased from RM13.70 per mmBTU in January 2014. What this means is that national oil and gas company PETRONAS is selling natural gas to the electricity production sector at a heavily discounted rate.

To put things into perspective, it should be noted that the current average market price for natural gas is RM48 per mmBTU. As such, the subsidy means that consumers are enjoying an effective discount of RM31.80 per mmBTU for the cost of generating electricity by using piped-gas.

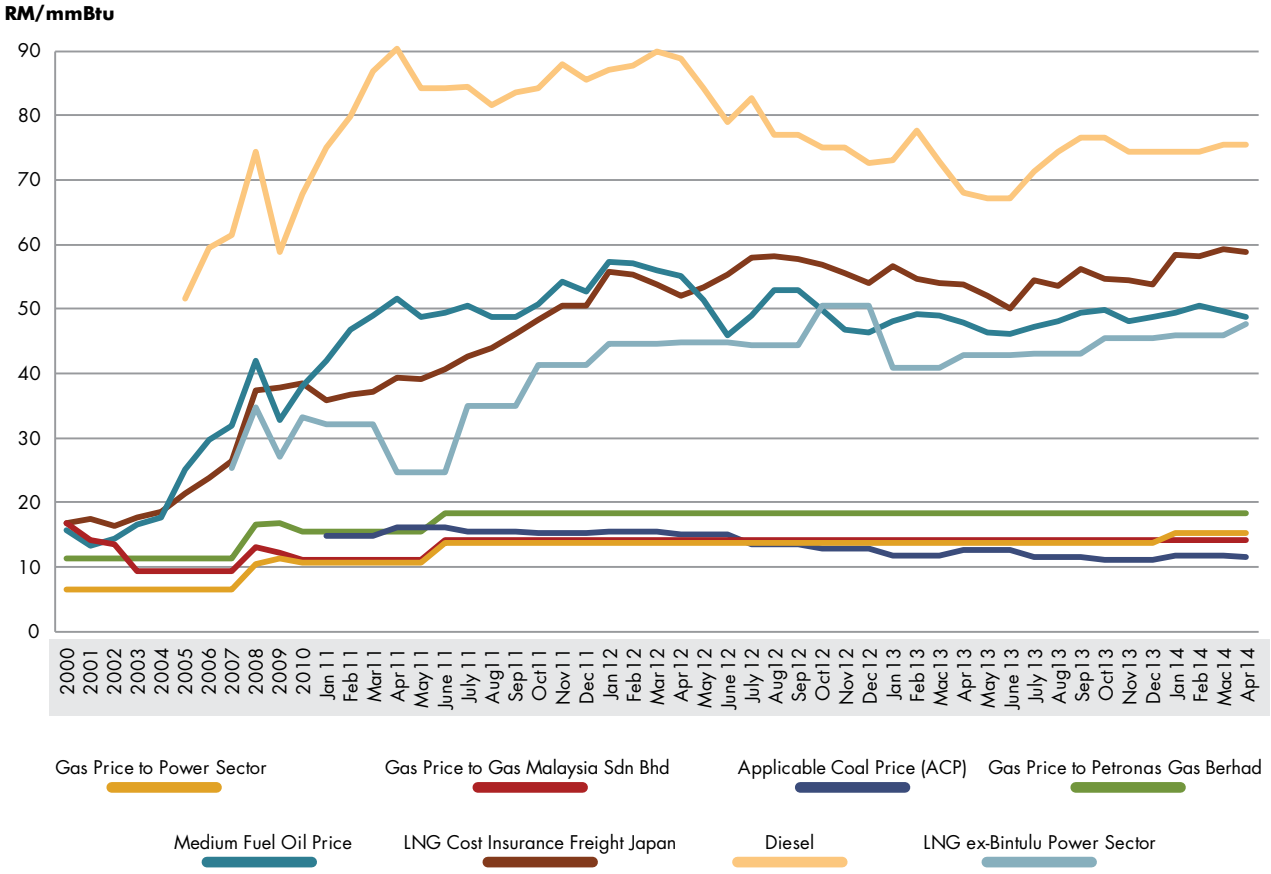
This is putting a strain on national finances, as profits from PETRONAS are ploughed back to the Treasury

PENINSULAR MALAYSIA'S ENERGY GENERATION MIX 2013

Natural gas accounts for nearly 50% of power production in Malaysia, and owing to subsidies provided by the Malaysian government, power producers have a discount of more than RM31 on the market price of natural gas, resulting in concerns over the long-term effects on the economy.

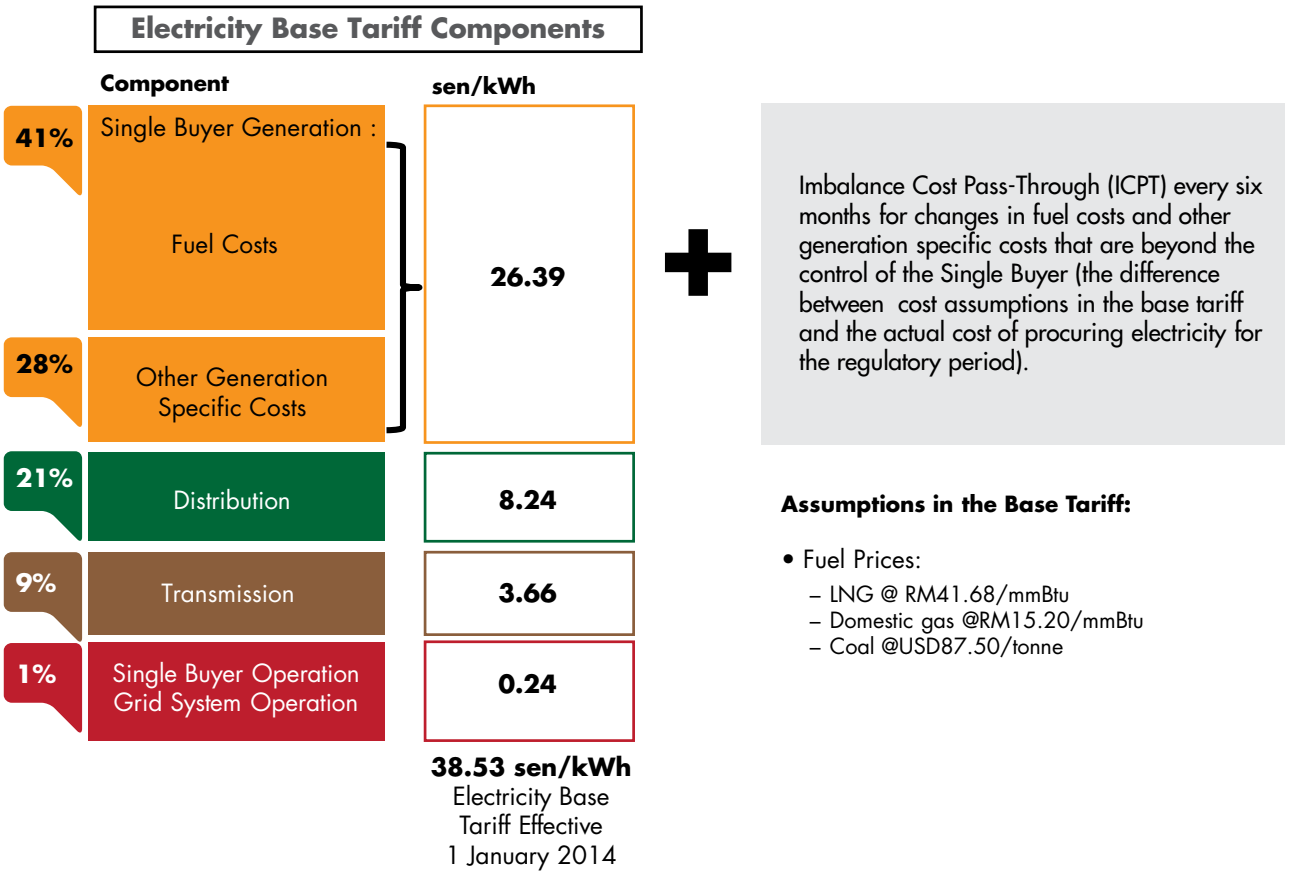


TREND OF AVERAGE FUEL PRICES (RM/mmBtu)



Fuel prices fluctuations necessitate the ICPT implementation, i.e LNG, coal and MFO/distillate prices

ELECTRICITY TARIFF COMPONENTS UNDER THE INCENTIVE-BASED REGULATION (IBR) FRAMEWORK



in the form of dividends and taxes. Subsidies mean that the government has to forego revenue which could be used to reducing the deficit which stood at 3.9% of GDP in 2013.

ENCOURAGING RELIABILITY

For the Energy Commission, the rationalisation of natural gas subsidies is a must, in order to bring about greater efficiency in energy usage and also increased reliability in supply. Explaining further, Ishan noted that because the electricity tariff in Malaysia is cheap, owing to the subsidies, there has been very little emphasis placed on energy efficiency in the country.

"For example, some factories use inefficient motors that consume more energy. Of course, the efficient motors are more expensive, but over time they pay for themselves in the form of money saved on power charges. Because the tariffs are so low, the factories do not feel the pinch from the inefficient equipment," the Energy Commission's Senior Analyst highlighted.

Such outmoded equipment, however, does more than just bring about more expensive electricity bills. Because of their heavy consumption, they also increase the power demand load, leading to a greater strain on electricity producers and the grid, especially during peak hours.

Another problem of subsidies identified by the Energy Commission, is that they result in a distortion of

market reality. Although the low tariffs help draw in foreign investments, the concern is that Malaysia's competitive edge is based on an artificially created advantage that the country is hard-pressed to maintain.

Although subsidy rationalisation will result in some short-term pains, such as higher electricity tariffs, the long-term effect is stronger national energy security. At the same time, it should also be noted that the Energy Commission and the Malaysian government are here to ensure that any increases to the rates will be gradual, and take into account the overall well-being of the people.

This is why, rather than a previously planned cut of RM3 in the gas subsidy every six months, the reduction will be a mere RM1.50 every half-a-year, starting from the 1st of January 2014. At the same time, under the provisions of Incentive-Based Regulations and other measures such as the latest generation Power Purchase Agreements (PPAs),power producers and the utility are expected to perform according to the highest standards.

From overseeing power sector players and ensuring the reliability of electricity supply to promoting energy efficiency among end-users, including the commercial and industrial sectors, the Energy Commission plays a vital role in the short, medium and long-term prosperity of Malaysia. Its efforts have shown that it is undoubtedly, a key partner in national development.

In order to reduce the price of power production, the Energy Commission encourages power producers to adopt efficient and sustainable practices. For instance, the Manjung power station in Perak uses clean coal to reduce its carbon footprint.

Safe, Reliable, Efficient

Creating First-Class Gas Supply in Malaysia

As one of the cleanest and most useful of all energy resources, natural gas – or piped gas – with its availability and abundance, has become the ideal fuel, offering significant economic and environmental benefits to nations. Be it for powering energy-intensive industries, commercial buildings or even for domestic usage, it is a viable energy solution that continues to grow in importance. In Peninsular Malaysia, the Energy Commission plays a vital role to effectively regulate piped gas supply, and under its purview, the sustainability and consistency of supply is ensured to maximise the benefit of this power source for businesses.

Glass manufacturing is among the most energy-intensive industries that are reliant on gas supply, as furnaces which melt raw materials to form glass are heated by the power generated from natural gas combustion.

COMPREHENSIVE REGULATIONS

With Malaysia's natural gas sector growing significantly and the domestic demand for the fuel tripling over the past 10 years, the Energy Commission's role in regulating the gas distribution industry has become even more crucial, to ensure that these demands are met and possible challenges addressed. The adequacy of energy supply is key to driving economic development, so the priority is to ensure that gas supply channelled to consumers is constant, reliable and reasonably priced.

As part of the *Gas Supply Act 1993* (GSA) and the *Gas Supply Regulation 1997*, the Energy Commission is responsible for validating that the required licence has been obtained by the main players in the supply business, and that gas prices are set in coherence with market principles. It also approves the installation of gas piping systems. Furthermore, when it comes to the quality of distribution and dependability of supply, the Energy Commission's technical regulations focus on details such as the composition, pressure, purity and volume of gas supplied through pipelines.

As part of the *Gas Supply Act 1993* (GSA) and the *Gas Supply Regulation 1997*, the Energy Commission is responsible for validating that the required licence has been obtained by the main players in the supply business, and that gas prices are set in coherence with market principles.

The enforcement of these regulations by the Energy Commission ensures that gas supply services are affordable, consumers are protected in areas such as dispute resolution, and piped-gas supply and services are of high quality, while overall, the best interests of consumers are safeguarded.

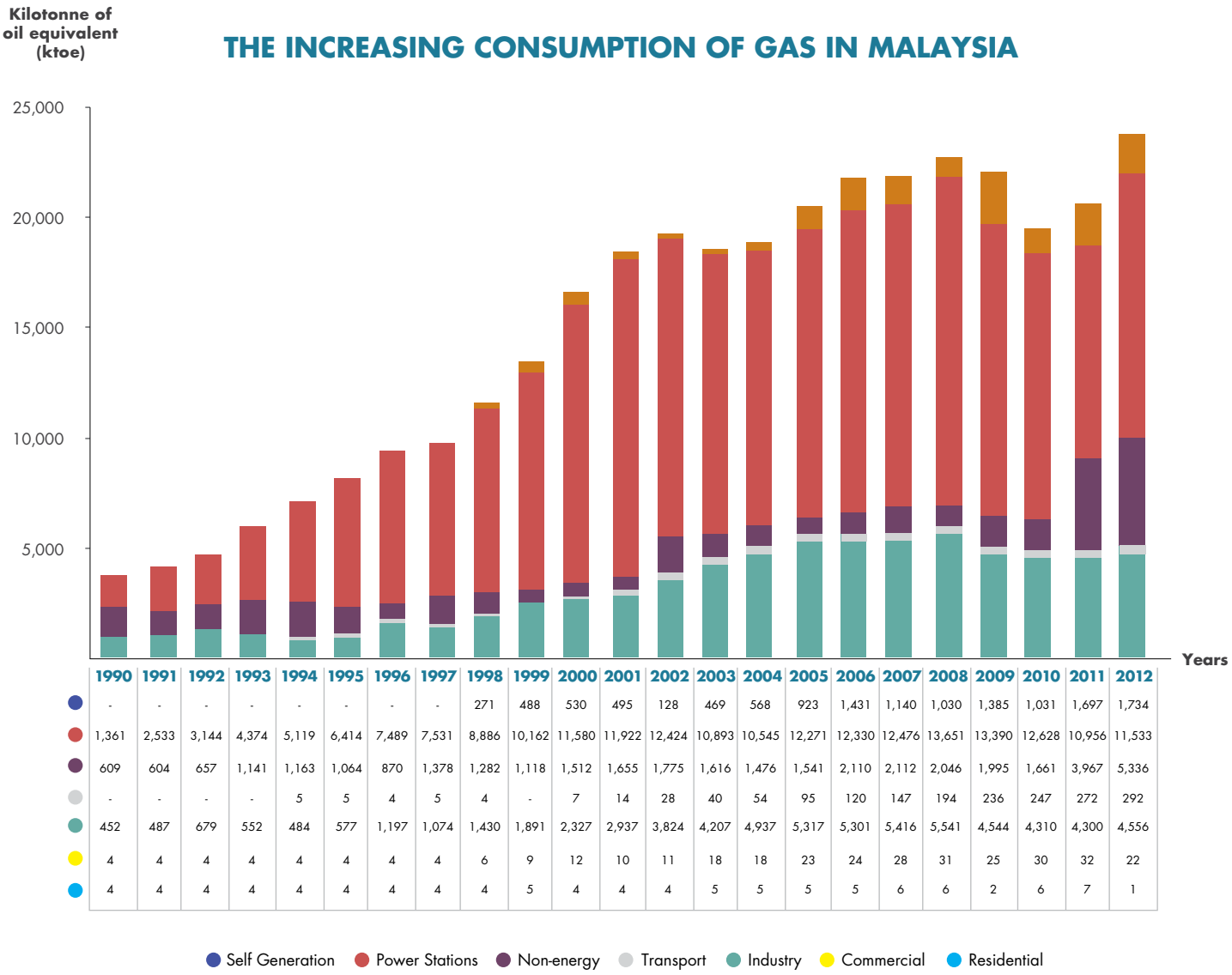
Additionally, in order to prevent the misuse of monopoly or market power in the piped-gas industry, the Energy Commission monitors the gas distribution sector. In addition, the Energy Commission advices the Economic Planning Unit (EPU) on policies that ensure a fair and efficient, competitive and sustainable gas market is established which will contribute to the economic development of the country.

PENINSULAR GAS UTILISATION PROJECT

The Energy Commission is responsible for regulating the piped gas industry in Peninsular Malaysia, which has a gas pipeline network measuring 2,500 km.

Source: Gas Malaysia Berhad

THE INCREASING CONSUMPTION OF GAS IN MALAYSIA



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Self Generation	-	-	-	-	-	-	-	-	271	488	530	495	128	469	568	923	1,431	1,140	1,030	1,385	1,031	1,697	1,734
Power Stations	1,361	2,533	3,144	4,374	5,119	6,414	7,489	7,531	8,886	10,162	11,580	11,922	12,424	10,893	10,545	12,271	12,330	12,476	13,651	13,390	12,628	10,956	11,533
Non-energy	609	604	657	1,141	1,163	1,064	870	1,378	1,282	1,118	1,512	1,655	1,775	1,616	1,476	1,541	2,110	2,112	2,046	1,995	1,661	3,967	5,336
Transport	-	-	-	-	5	5	4	5	4	-	7	14	28	40	54	95	120	147	194	236	247	272	292
Industry	452	487	679	552	484	577	1,197	1,074	1,430	1,891	2,327	2,937	3,824	4,207	4,937	5,317	5,301	5,416	5,541	4,544	4,310	4,300	4,556
Commercial	4	4	4	4	4	4	4	4	6	9	12	10	11	18	18	23	24	28	31	25	30	32	22
Residential	4	4	4	4	4	4	4	4	4	5	4	4	4	5	5	5	5	6	6	2	6	7	1

Gas consumption in the country has increased by 866% to 23,474 ktoe in 2012 as compared to 2,430 ktoe in 1990, with the bulk of it by power stations to generate electricity.

Source: PETRONAS, Gas Companies, Power Utilities, IPPs & Self-Generation Plants

STRATEGIC ALLIANCES

In carrying out its responsibility for all matters relating to the supply of gas through pipelines and the use of gas as provided under the GSA, the Energy Commission of Malaysia has licensed Gas Malaysia Berhad (PGB) and the Sabah Energy Corporation Sdn Bjd to distribute gas in Peninsular Malaysia and Sabah respectively. On the other hand, transmission of gas through the transmission network in the Peninsula is self-regulated by PGB .

Although the the distribution of gas is monopolised, the operation is subject to a highly regulated business environment.

In accordance with these regulations, Gas Malaysia's buying and selling prices of natural gas are determined by the Government and are controlled to ensure tariffs are reasonable. Within the period from 2008 to 2014, gas prices have been revised four times and are constantly

Gas Malaysia's buying and selling prices of natural gas are determined by the Government and are controlled to ensure tariffs are reasonable.

THE ROLE OF THE ENERGY COMMISSION (UNDER *THE ENERGY COMMISSION ACT 2001*)

01 Provide advice on all matters concerning energy supply activities

02 Implement, enforce and review energy supply laws

03 Promote efficiency, economy and safety in electricity and piped gas industries

04 Promote competition and prevent misuse of monopoly power in electricity and piped gas industries

05 Promote research and development of new techniques relating to supply and use of electricity and piped gas

06 Promote self-regulation

Within the period from 2008 to 2014, gas prices have been revised four times and are constantly reviewed to be reflective of the current market scenario.

Left: Out of the many functions and powers of the Energy Commission, these six roles are the most prominent and are integral to ensuring the reliability and efficiency of piped gas supply to the nation.

reviewed to be reflective of the current market scenario.

As a result, the Energy Commission ensures that Gas Malaysia continually provides a clean, efficient, cost-effective and uninterrupted supply of gas to homes, commercial businesses and industries. At present, Gas Malaysia supplies to more than 36,000 residential and commercial customers as well as 740 industrial customers, and this number is expected to grow.

PRIORITISING SAFETY

While the Energy Commission is focused on ensuring reasonable tariffs and a dependable supply, it is also committed to addressing safety concerns arising from the gas piping system. As a responsible regulator, it has enforced regulations to protect the public from hazards to health, safety and the environment.

These cover the provision and maintenance of piping systems, and require that all employees be informed, be given instruction and training on how to operate and monitor the piping system in a safe manner.

Above: Among the dangers posed by natural gas is leakage which may lead to poisoning or explosions. Since gas is odourless, it is impossible to detect it with a naked nose. That is why the Energy Commission places great emphasis on safety.

As the Energy Commission furthers its efforts to develop the gas supply industry to meet various future challenges, its end goal is still to facilitate the self-regulation of the entire gas industry in a receptive and responsible way. Organisations in the gas supply chain will then be able to monitor their own adherence to legal, ethical, and safety standards, and proactively assess and enforce those standards to achieve excellence. Once this is in place, the Energy Commission will not only continue to regulate, but also seek to innovate and serve the energy industry as a partner.

Championing Best Practices

Energy Commission Workshop Discusses Plant Reliability

As the regulator of the energy sector in Peninsular Malaysia, responsible for the reliable production and supply of electricity, the Energy Commission decided to bring together the various stakeholders in the generation sector, particularly power producers, for a one-day *Workshop on Plant Reliability and Performance Improvement* on the 23rd of June at the Energy Commission's headquarters.

AN URGENT TOPIC

While such a topic is important in itself, the need for this workshop was further emphasised by an incident on the 7th of May when pockets of areas in five states in Peninsular Malaysia experienced power outages owing to unexpected trips in three blocks of the TNB Janamanjung (TNBJ) plant in Manjung, coupled with scheduled maintenance at the Jimah plant. This resulted in a loss of 3,000MW of generation, bringing installed capacity dangerously close to demand.

In a nutshell, a Peninsular-wide blackout could very well have occurred during this time as not enough electricity was being produced to meet the needs and wants of consumers. Thanks to the quick action by the Grid System Operator (GSO), which manages the electricity grid in Peninsular Malaysia, the worst-case scenario did not happen.

Instead the GSO carried out a load-shedding exercise, where it executed a series of planned outages resulting in pockets of power interruptions in at least five states, but left the overall system intact.

While the prompt and speedy action of the GSO has been commended, the Energy Commission realises that the underlying causes have to be addressed in order to prevent a reoccurrence.

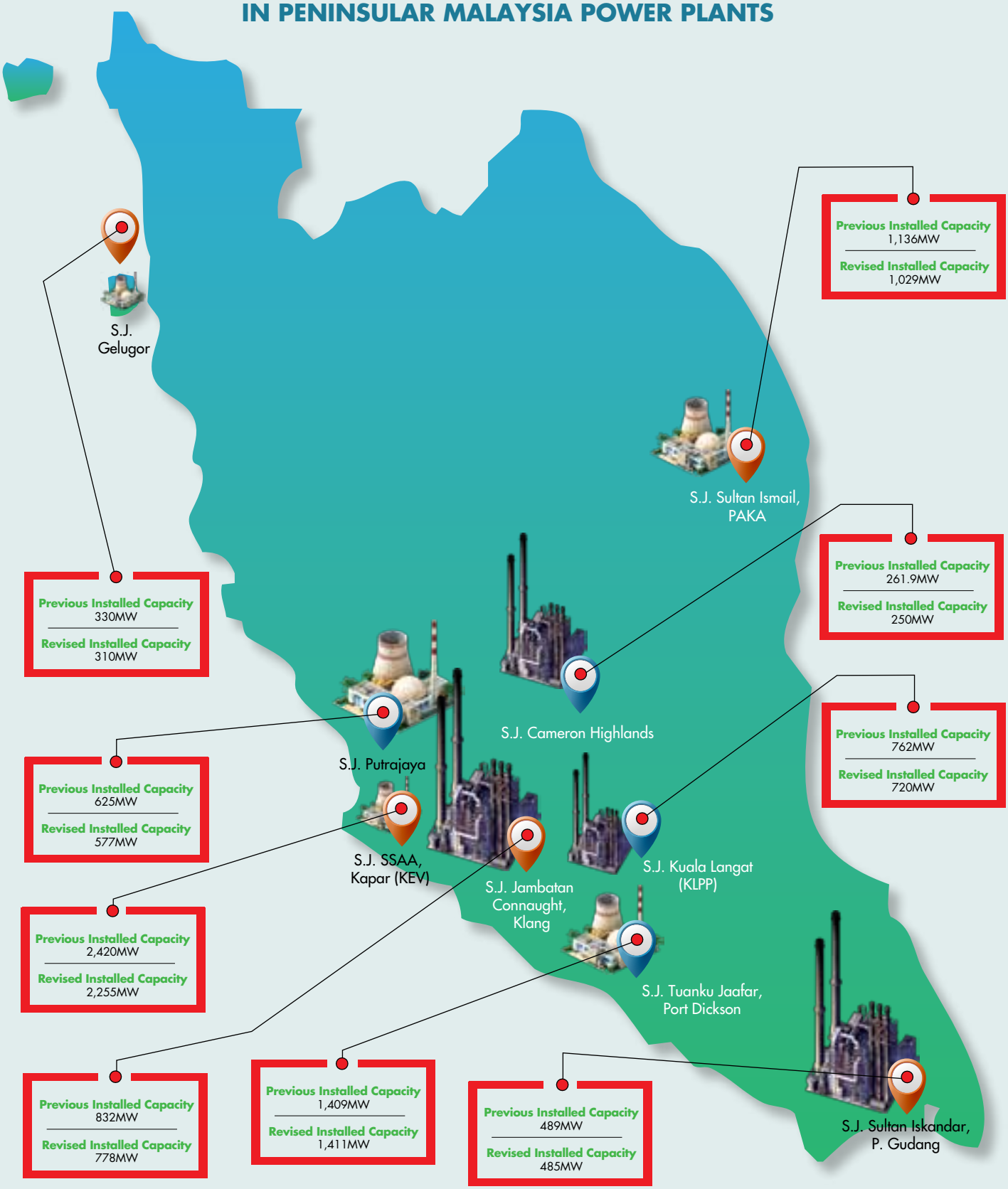
FROM THE REGULATOR'S VIEW

Speaking at the start of the Workshop, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan revealed that the session was mooted as a way for industry players to discuss issues regarding power plants in the country. Of special focus were the recent breakdowns which had raised concerns in the regulator as well as in the government.

According to Datuk Ir Ahmad Fauzi, over the last two to three years, the reliability and performance of generators have been declining, as evidenced by an increase in the number and severity of warnings issued by the Grid System Operator. There has been a steady increase in the number of days in a year when the daily operating margins decreased from 24.7% in 2012 to 15.4% in 2013 and, up to June 2013, 8.6% due to plant outage.

Following Datuk Ir Ahmad Fauzi to the podium, the Energy Commission's Senior Director of the Electricity Supply

CHANGES IN INSTALLED CAPACITY IN PENINSULAR MALAYSIA POWER PLANTS



"This workshop has been very fruitful and very useful in helping to guide us in moving forward to tackle the issues the industry faces pertaining to reliability."

- Datuk Ir Ahmad Fauzi Hasan
CEO, Energy Commission of Malaysia

and Market Regulation Department – Ir Azhar Omar – revealed that there has been a permanent loss in total installed capacity – namely the amount of power capable of being generated by plants in Peninsular Malaysia – from 21,509MW to 21,060MW, owing to a loss of capacity in power plants.

In addition, Ir Azhar highlighted that the electricity reserve margin has been dropping in recent years, as a result of an increased demand and the lack of any new capacity being added to the grid. In fact, the reserve margin has fallen from 41% in 2011 to 24.6% as of June 2014.

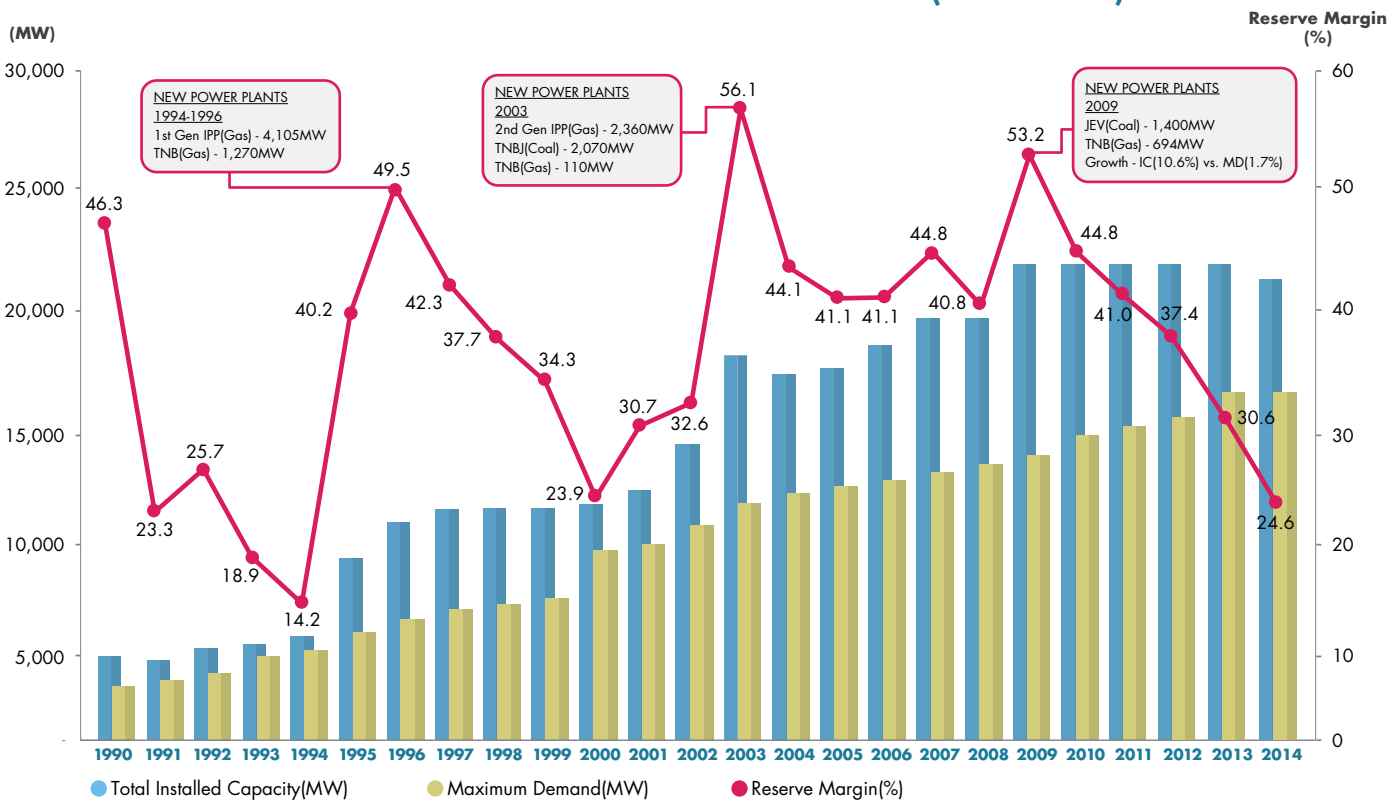
Another problem is that a substantial number of power plants are not fulfilling the provision of the Power Purchase Agreements (PPAs) or Service Level Agreements (SLAs). For instance, over the last three years, 32 generator units with a capacity totalling 9,272MW had outage rates that exceed the ones allowed by the PPAs and SLAs.

The reliability of power plants affects the operations of many stakeholders in the transmission and distribution of electricity, particularly the Single Buyer Department – responsible for procuring electricity from producers – and the aforementioned Grid System Operator. Both these entities are run by Tenaga Nasional Berhad (TNB) – the country's main utility – and are overseen by the Energy Commission.

Addressing the audience, Ir Gucharan Singh – General Manager of System Operations at the GSO – reaffirmed that electricity demand has been on the rise, and warned that it is expected to spike in 2014 owing to the *El Niño* weather phenomenon. He also highlighted that in May of this year, there were several incidents – most notably the 7th of May load-shedding exercise – which saw generation unable to meet demand, owing to several outages in the power plants.

Ir Gucharan also revealed that over the course of four days in May, a total of more than 3,000MW of generation capacity was lost. "Normally, this convergence of outages does not happen," he explained, "but if this continues, then we are going to have more of these load-shedding issues coming up."

INSTALLED CAPACITY, MAXIMUM DEMAND AND RESERVE MARGIN PROFILE FOR PENINSULAR MALAYSIA(1990-2014)



Source: Energy Commission of Malaysia

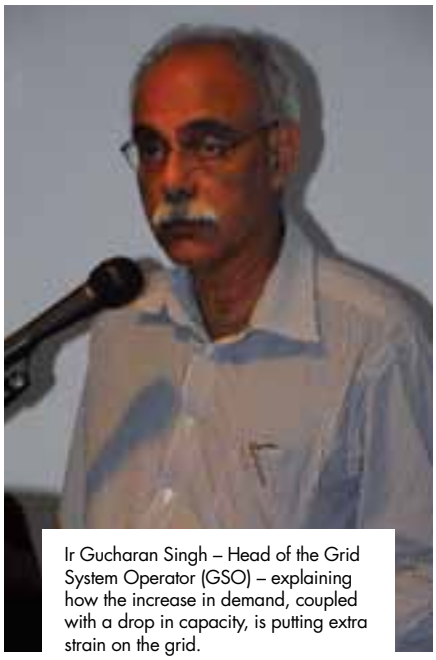
THE PRODUCER'S PERSPECTIVE

While fast-tracking the construction of new power plants is one way of addressing the problem, this method takes time to show results. A more immediate solution is to look at the root causes of the drop in plant performance and reliability, and address them.

One of the problems identified is that coal-fire plants are becoming increasingly susceptible to boiler tube failures, which was the main cause of plant outage at the Tanjung Bin and Jimah power plants. A task force formed by the Commission to look at this problem had made several recommendations to resolve the issue. Urgent rectification works on the boilers are being undertaken by the plant owners and major work is to be completed by the end of 2015.

As the workshop aimed to find solutions to such problems by bringing the regulator (the Energy Commission) and industry players together, representatives from the power generation sector were given the opportunity to present the challenges they face and the solutions that are being proposed.

One representative from the industry, Tan Keng Hoon, who is head of maintenance at TNB Janamanjung Power Plant, gave an account of the problems that the plant encountered in early May. As he explained, the decision to shut down the plant came when high chloride content was found in the boilers and, as per guidelines



Ir Gucharan Singh – Head of the Grid System Operator (GSO) – explaining how the increase in demand, coupled with a drop in capacity, is putting extra strain on the grid.

"The reliability of power plants has become a major concern due to deteriorating performance over the last three years."

- Ir Azhar Omar
Senior Director of the Electricity Supply and Market Regulation Department, Energy Commission of Malaysia

In order to answer growing demand for power, three power plants have received approval to extend operations while 14 new power plants have been planned from 2015 to 2024. These new power plants will add 8.220GW to total generation capacity in the country.

NEW GENERATION PROJECTS

PROJECTS	FUEL	INSTALLED CAPACITY(MW)	COMMERCIAL OPERATION DATE	
MANJUNG IV	Coal	1,010	31st Mar 2015	
CBPS REDEVELOPMENT	Gas	384.7	1st Sept 2015	
HULU TERENGGANU	Hydro	250	16th Sept 2015 17th Dec 2015	Phase1 Phase2
HULU TERENGGANU (TEMBAT)	Hydro	15	15th Nov 2016 15th Dec 2016	Phase1 Phase2
ULU JELAI	Hydro	372	13th Dec 2015 14th Mar 2016	Phase1 Phase2
TNB PRAI CCGT	Gas	1,071.43	1st Jan 2016	
TG. BIN ENERGY	Coal	1,000	1st Mar 2016	
PENGERANG CO-GENERATION	Gas	400	1st June 2017	
MANJUNG V	Coal	1,000	1st Oct 2017	
JIMAH EAST POWER	Coal	1,000 1,000	15th Nov 2018 15th May 2019	Phase1 Phase2
ADDITIONAL CHENDEROH	Hydro	12	Oct 2018	
TEKAI	Hydro	156	Dec 2020	
TELOM	Hydro	132	Dec 2022	
NENGGIRI	Hydro	416	Dec 2024	
TOTAL GENERATION CAPACITY		8219 MW/8.219 GW		

Source: Energy Commission of Malaysia

INSTALLED CAPACITY BY TYPE

TYPE	FUEL	CAPACITY(MW)
CONVENTIONAL THERMAL	Coal	7,056
COMBINED CYCLE GAS TURBINE (CCGT)	Gas	9,200
CONVENTIONAL THERMAL	Gas	564
OPEN CYCLE GAS TURBINE (OCGT)	Gas	2340.4
HYDROELECTRIC	Hydro	1,899.1
	TOTAL CAPACITY (MW)	21,060

Gas is the dominant fuel in Peninsular Malaysia's energy mix, accounting for 49.4% of all electricity generated. However, efforts are in place to encourage the use of other fuels such as renewables.

Source: Energy Commission of Malaysia

governing the running of the plant, it had to cease operations immediately.

Another speaker, Abdul Halim – a representative from Malakoff – revealed that one issue which they have faced in the Tanjung Bin power plant, particularly in recent years, is that of increased fouling and slagging in the boiler unit. This is where molten ash deposits build up in the boiler furnace (slagging) or ash deposits are found in the boiler's convection region (fouling).

Although different in definition, the results of fouling and slagging are the same – they cause a reduction in operational efficiency and availability of power, as the unit has to be shut down in order to carry out repairs. According to Halim, one of the reasons for this is the quality of coal used in the boilers, pointing out that Tanjung Bin alone uses 46 different types of coal. Recently, steps have been taken by the coal supplier to supply the power plants with "preferred coal" of higher quality.

While the industry representatives were from different power producers, it became clear that the issues they faced were essentially the same – that over time, use and wear and tear have caused the power plants to degenerate. In order to find a solution to these problems, members of the audience were divided into four different groups to discuss and then present ideas on how to improve gas power plants, coal-fire plants, plant reliability, and reliability-centred maintenance (RCM).

Among some of the measures proposed were to encourage IPPs and TNB Generation to sign long-term service contracts with equipment suppliers, which will then allow for remote monitoring of the power plants, and to adopt risk-based RCM (rather than conventional RCM) so total plant shutdown can be avoided. In addition, suggestions were also given for IPPs to be allowed to source coal for themselves, thus ensuring that the quality meets their needs, and for more of these sessions to be held between the IPPs, the Single Buyer, the GSO and the Energy Commission so that issues can be discussed and solutions found.

All in all, the *Workshop on Plant Reliability and Performance Improvement* demonstrated how the Energy Commission is determined to be more than just a regulator, but also a partner in the development of the energy sector in Malaysia. The strong turnout has also given the Commission confidence in the responsiveness of the industry, and having already done so in Peninsular Malaysia, it hopes to have a similar workshop in Sabah where the issue of power outages has become particularly worrying.

WE WOULD LIKE TO HEAR FROM YOU!

Energy Malaysia welcomes your questions, comments and suggestions to help the Energy Commission of Malaysia work better at safeguarding your interest.

Where to lodge complaints and how to get in touch with the Energy Commission?

Send in your feedback and questions at ***aduan.st.gov.my***
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Where to get more energy-related data and statistics?

Log onto our official website: ***www.st.gov.my*** for the latest updates and news.
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Registration of Electrical Energy Managers

The Energy Commission aims for the efficient use of energy to become a standard practice in order to encourage consumers to save energy. At the same time it ensures that comfort and safety of the facility is not compromised. This is achieved through the enforcement of the *Efficient Management of Electrical Energy Regulations 2008* (EMEER 2008) where installations subjected to these regulations must appoint a Registered Electrical Energy Manager (REEM).

Application of EMEER 2008

Installations, as well as the registration process of EEMs, are specified under the *Efficient Management of Electrical Energy Regulations 2008* (EMEER 2008) and are defined as those that receive a minimum of 3GWh of electrical energy from a licensee or supplier (such as Tenaga Nasional Berhad – TNB), as measured at metering points over any period not exceeding six consecutive months. The regulation also covers private installation licensees that generate at least 3GWh over the same time frame.

Qualifications of EEM

1. Malaysians aged 23 years and above.
2. Possess a Certificate of Registration as a Professional Engineer + > 6 months experience or
3. Certificate of Competency issued by the Energy Commission as an Electrical Engineer + 9 months experience or
4. A degree in Science, Engineering, Architecture or its equivalent + > 1 year of experience
5. Adequate knowledge of the requirements, rules and regulations of the *Electricity Supply Act 1990*

Roles and Responsibilities of EEM

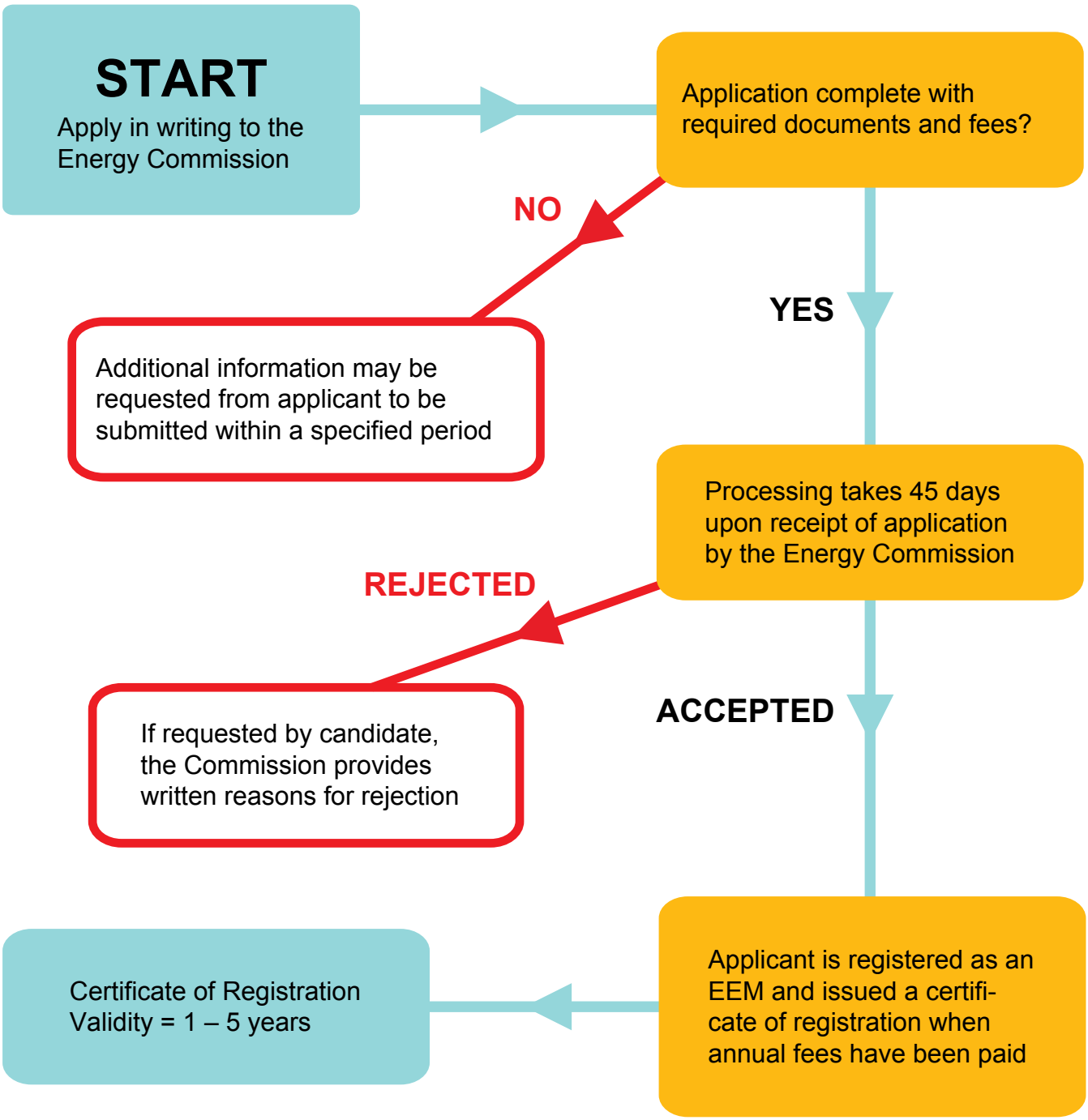
1. Analysing and auditing the amount of electricity consumed at installations
2. Supervising the collation of records on efficient management of electrical energy
3. Ensuring the information is submitted and reported to the Energy Commission as stipulated in the EMEER Act
4. Advising private licensees on the development, implementation and monitoring of energy efficiency measures

Renewals

Certificates can be renewed at least one month before expiry, providing the EEM has complied with the regulations stipulated in certificate and has paid the prescribed fees. In the event of non-compliance with the requirements specified by the Commission, failing to carry out stated EEM duties or using the Certification of Registration for purposes which differ from its intended purpose, the Energy Commission, under the EMEER Act, may cancel the registration of an EEM.

Such cancellation requires the Commission to notify the EEM of its decision to withdraw the certification, and allows the affected registrant to respond within 14 days with reasons why deregistration should not be effected. The cancellation, if the Energy Commission decides to proceed with it after due consideration, takes effect 21 days after the initial notice of termination of certification.

Application Procedure for EEMs



Dato' Seri Idris Jala

PEMANDU CEO on Energy Efficiency, Subsidy Rationalisation and Market Liberalisation

Under the Economic Transformation Programme (ETP), the Malaysian government's initiative to turn the country into a high-income economy by the year 2020, the Oil, Gas and Energy (OGE) sector has been identified as a National Key Economic Area (NKEA). As such, various entry point projects (EPPs) have been identified to help enhance the contribution of the sector to the gross national income (GNI). **Energy Malaysia** speaks with Dato' Seri Idris Jala – the CEO of the Performance Management and Delivery Unit (PEMANDU), the agency entrusted with overseeing the implementation of the ETP – who expounds his views on efforts to promote efficiency in the energy sector.

PLEASE TELL US MORE ABOUT THE EFFORTS THAT PEMANDU HAS MADE IN IMPLEMENTING THE OGE NKEA, PARTICULARLY IN THE AREA OF ENERGY EFFICIENCY.

The OGE sector makes up 20% of Malaysia's GDP, and is the single largest contributor to the economy. At the time we started in 2009, OGE's contribution to the GNI was RM110 billion, and we aim to increase this to RM241 billion by 2020.

As part of the NKEA OGE roadmap leading to 2020, one of the goals is to reduce the energy bill by 5%. Energy efficiency has been estimated to generate US$4.4 billion, which is around RM14 billion, of GNI by the year 2020, through the reduction of energy consumption. We've worked closely with the Ministry of Energy, Green Technology, and Water (KeTTHA), the Energy Commission of Malaysia, and the Sustainable Energy Development Authority of Malaysia (SEDA) in this respect.

For example, the SAVE programme under SEDA was introduced to encourage people to buy energy efficient appliances by giving them a rebate. Today, such appliances have a market share of 46% in Malaysia.

Another goal is to increase the use of renewables. This is why solar was pushed very hard and we also encouraged more hydropower to be added to the energy mix. We also introduced the feed-in-tariff (FiT) system which allows people to produce electricity using renewable resources and then sell it to the grid. To support that, there is a 1.6% surcharge on electricity bills, the proceeds of which is put into a fund to subsidise FiT.

WHAT ACHIEVEMENTS HAVE BEEN REACHED SO FAR THROUGH THE EFFORTS INTRODUCED?

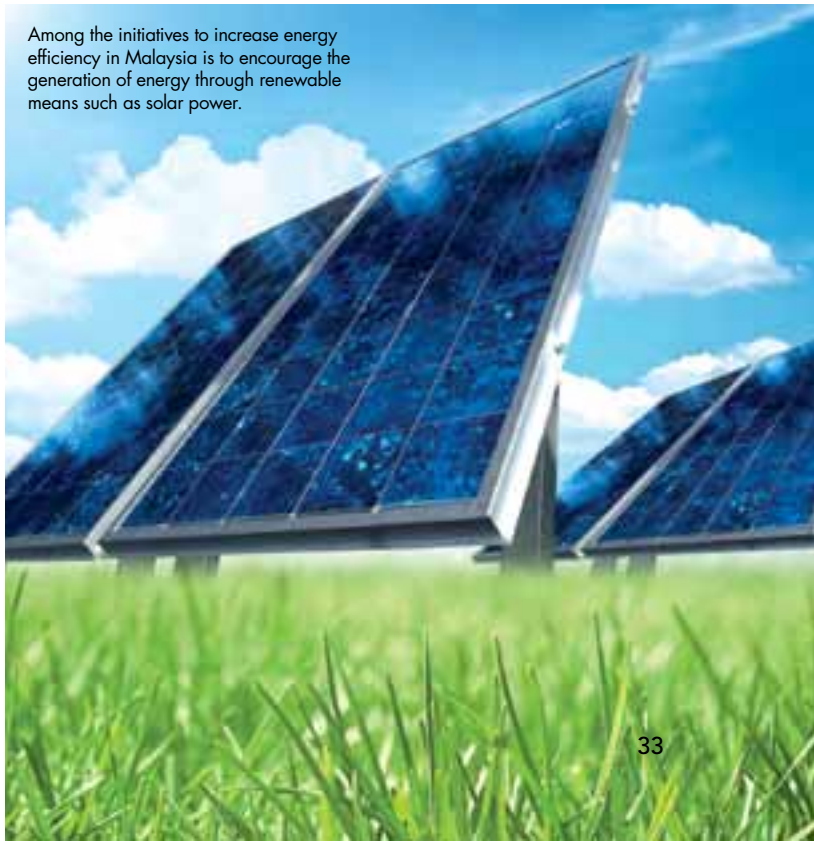
We are gradually reducing our dependency on oil and gas revenue. When we first started in 2009, OGE accounted for almost 40% of government revenue. Last year, we brought it down to about 30%. How did we manage to do that? By concentrating on services, such as tourism, wholesale and retail, communications and finance.

In 2008, services comprised 50% of our GDP, and in a short period of time we were able to increase it to 55%. We want to grow it to 65% by 2020. One of the reasons for this is because in 2009, the PM announced that we will have a 40% reduction in our carbon intensity by the year 2020.

Reducing carbon intensity does not mean reducing emissions. Intensity is defined as how much carbon you emit as a percentage of your GDP. So a services-based economy has less intensity than an extractive one.

WHAT ARE THE MAJOR CHALLENGES TO REACHING ENERGY EFFICIENCY, AND HOW DOES PEMANDU PROPOSE TO RESOLVE THEM?

We need to reduce the consumption of energy. In Malaysia, we spend a lot on subsidies, and the amount that we spend on OGE alone is close to RM40 billion a year. For example, our gas, which is used to generate electricity, is heavily subsidised. When we produce energy and we sell it for such a cheap price, there is less incentive for people to think about what they use energy for.



Among the initiatives to increase energy efficiency in Malaysia is to encourage the generation of energy through renewable means such as solar power.

PEMANDU is a part of and provides advice and input to the Tariff and Electric Supply Planning and Implementation Committee and is also part of the Imbalance Cost Pass-Through (ICPT) meeting, both of which are chaired by KeTTHA. We believe that implementing the Incentive Based Regulation (IBR) framework and the ICPT, together with the staggered removal of subsidies, is the way forward.

Our view is that we must live in the real world. Malaysia is going through a fiscal deficit. When the PM took over in 2009, it was minus 6.6% of GDP. He cut it, and by 2013 it was minus 3.9%. Although there has been progress, we are still in a deficit, and our plan is to be neutral or even enjoy a surplus by 2020. When you are in a deficit, you need to make cuts, and subsidies are the single largest component of the government tax bill.

REMOVING SUBSIDIES AND INCREASING TARIFFS IS NOT A WELCOMED MOVE, HOW DO YOU ASSUAGE PUBLIC DISSATISFACTION?

The government has been very fair, and it believes that poor people must be protected. So it announced that those who use less than 300kWh a month will not experience a change in their tariff. This is more than 70% of consumers. So even though electricity tariffs have gone up, the majority are not affected.

However, I am of the view that consumers need to become a lot more aware about energy consumption. To do that, they need to pay the real price for energy. I always say that to get Malaysians to be in line with any proposal we need to have the pull factor as well as the push factor. The push factor, the deterrence, is the higher price of electricity.

A view of the Kuala Lumpur city skyline at night. As a modern and cosmopolitan city, the demand of power in the Malaysian capital is high, and the Energy Commission works with other stakeholders such as PEMANDU to come up with solutions that meet needs and enhance energy security.

"Under the Government Leads by Example *(GLBE) programme, energy-saving methods have been introduced in public sector buildings. Also in Putrajaya (Malaysia's administrative centre), we have a league table – produced by the Chief Secretary to the Government – which shows which building or which ministry has been successful in reducing their consumption of electricity. This encourages the various ministries, departments and agencies to be more environmentally conscious as there is an element of competition involved."*

What is the pull factor? I believe we need to look at liberalising the energy sector, which will allow for competition and give choices to consumers. I lived in the UK for four years, and people there can change their electricity provider. They can compare rates and efficiency. Also rates differ according to whether it is peak or off-peak.

But we don't do that here, and there is a lot of wastage because we do not fully utilise the difference between the peak and the trough. The Energy Commission should look at how to move towards a liberalised market, which means greater competition and more choices for customers, who are a lot more educated on how to optimise energy usage.

While subsidy rationalisation may result in some short-term pain, it will ultimately lead to long-term gain, including a stronger economy that is able to compete in a globalised world on its own merits. As promoting energy efficiency is one of its key roles, the Energy Commission is working hand-in-hand with PEMANDU to come up with comprehensive action plans and policies that will bring about a more secure tomorrow for Malaysia and Malaysians.

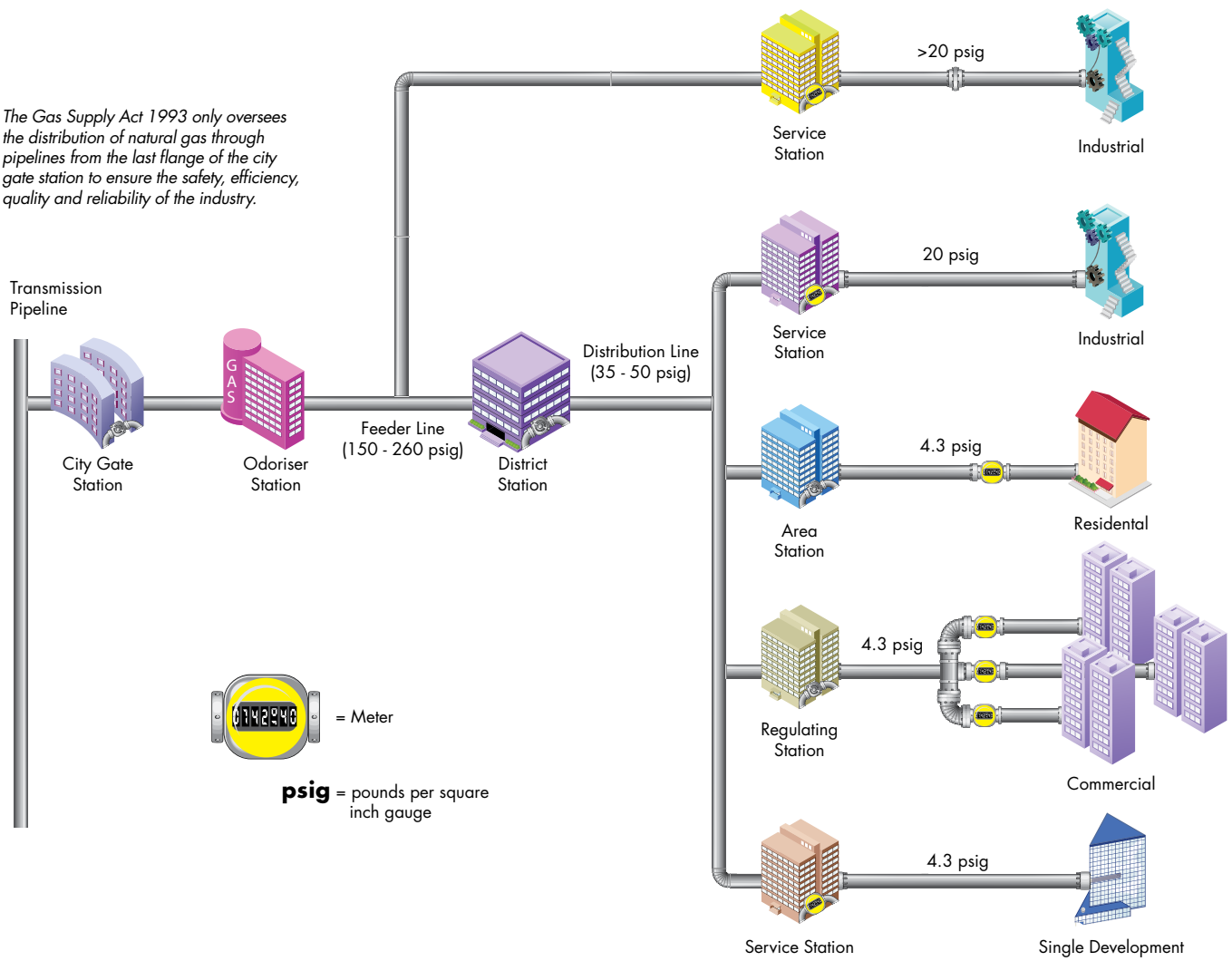
Piped Gas Distribution

Ensuring Economic Advancement

One of the key goals of the Malaysian government is reducing the country's dependence on a single source of energy. To this end, alternative sources such as natural gas (NG) and liquefied petroleum gas (LPG) have been identified as suitable and financially viable substitutes that can be used in various industries. Furthermore, the Malaysian government, through policies and laws enforced by the Energy Commission, monitors supply of the commodities across the country. **Energy Malaysia** examines gas distribution and consumption across Peninsular Malaysia and Sabah between 2007 and 2012.

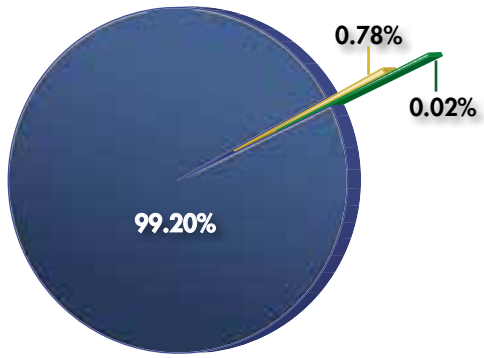
NATURAL GAS DISTRIBUTION SYSTEM

The Gas Supply Act 1993 only oversees the distribution of natural gas through pipelines from the last flange of the city gate station to ensure the safety, efficiency, quality and reliability of the industry.



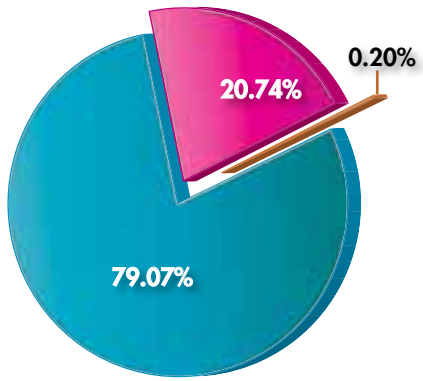
Source: Piped Gas Distribution Industry Statistics 2012

TOTAL NATURAL GAS SUPPLIED IN 2012 BY GAS MALAYSIA



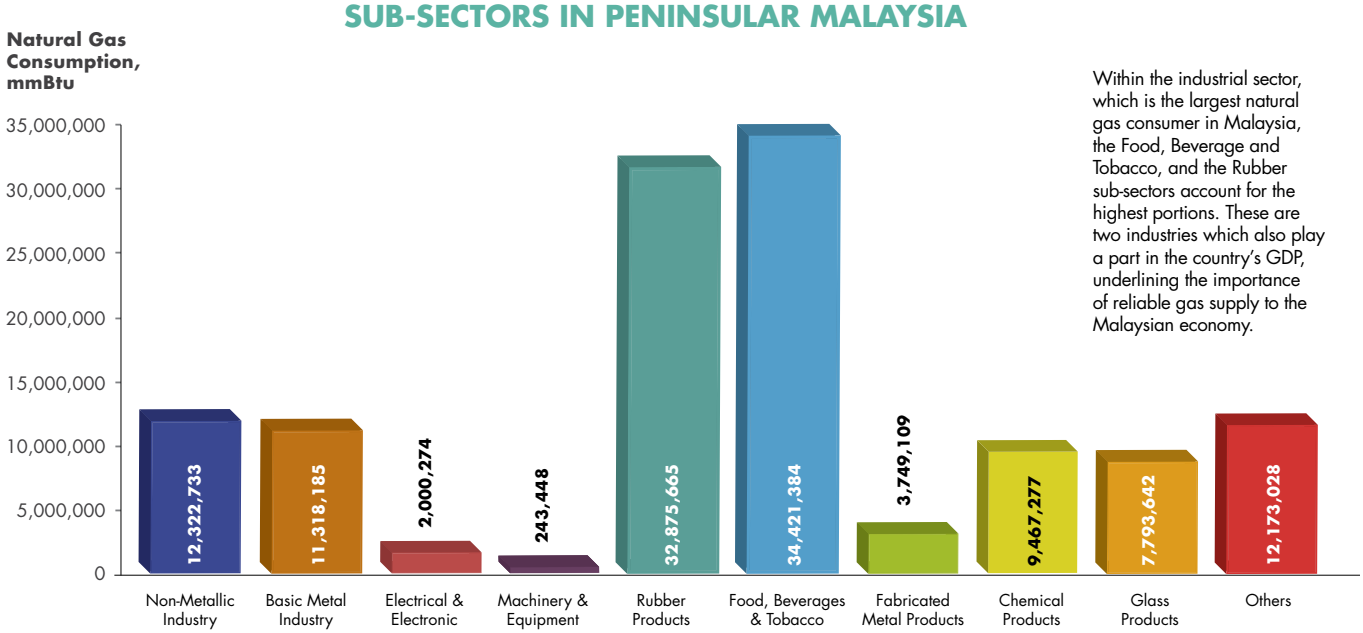
- Industrial sector: 126,364,815 mmBtu (99.20%)
- Commercial sector: 990,892 mmBtu (0.78%)
- Residential sector: 24,546 mmBtu (0.02%)

TOTAL LPG SUPPLIED IN 2012 BY GAS MALAYSIA



- Industrial sector: 510 mmBtu (0.20%)
- Commercial sector: 205,912 mmBtu (79.07%)
- Residential sector: 54,009 mmBtu (20.74%)

NATURAL GAS CONSUMPTION BY INDUSTRY SUB-SECTORS IN PENINSULAR MALAYSIA



Within the industrial sector, which is the largest natural gas consumer in Malaysia, the Food, Beverage and Tobacco, and the Rubber sub-sectors account for the highest portions. These are two industries which also play a part in the country's GDP, underlining the importance of reliable gas supply to the Malaysian economy.

Source: Piped Gas Distribution Industry Statistics 2012

PENINSULAR DISTRIBUTION

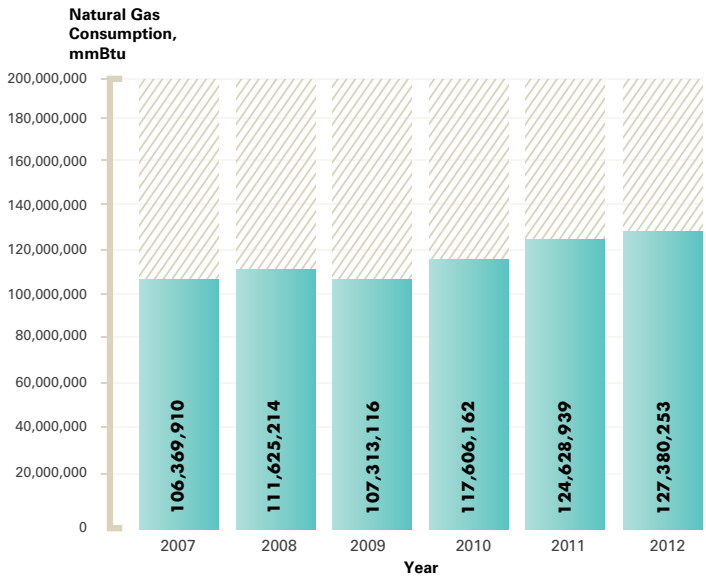
With Malaysia's rapid economic development and industrialisation combined with an increased awareness of the cost benefits of piped gas, its use has accelerated in the last few years.

In the peninsula, Energy Commission regulated NG consumption in Peninsular Malaysia increased by 19.75% to 127 million metric British thermal units (mmBtu) in 2012 from 106 million mmBtu in 2007, 99.20% of which was by the industrial sector – with the Food, Beverages and Tobacco production sub-sector accounting for the highest use at 27.2% or 34 million mmBtu.

While the number of residential and commercial customers of piped NG grew exponentially during the

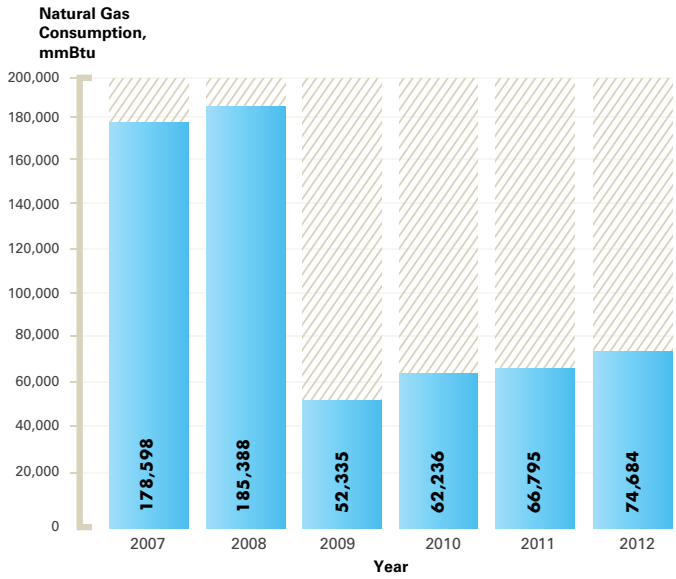
CONSUMPTION OF NATURAL GAS

PENINSULAR MALAYSIA



Between 2007 and 2012, the amount of Natural Gas supplied by Gas Malaysia and consumed in Peninsular Malaysia increased to over 127 million mmBtu from 106,369,910 mmBtu.

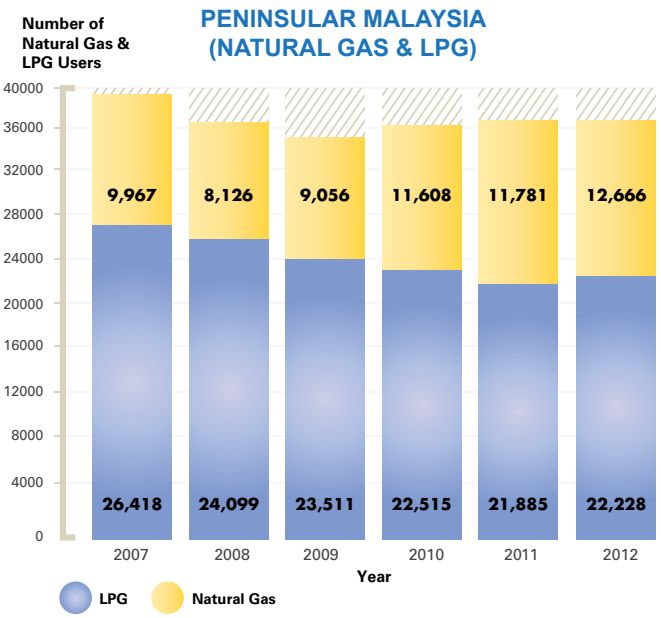
SABAH & LABUAN



While the consumption of Natural Gas declined in 2009 compared to 2008, the commodity recorded annual increases between 2009 and 2012.

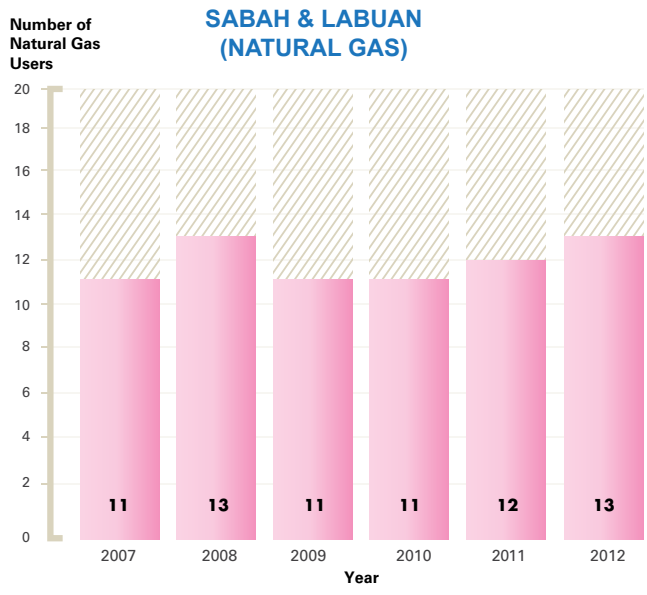
NUMBER OF GAS USERS

PENINSULAR MALAYSIA (NATURAL GAS & LPG)



The number of Natural Gas and commercial LPG users has recorded increases in Peninsular Malaysia. Natural gas is used for cooking in homes and commercially, and it is also used as an alternative to petroleum fuel for vehicles.

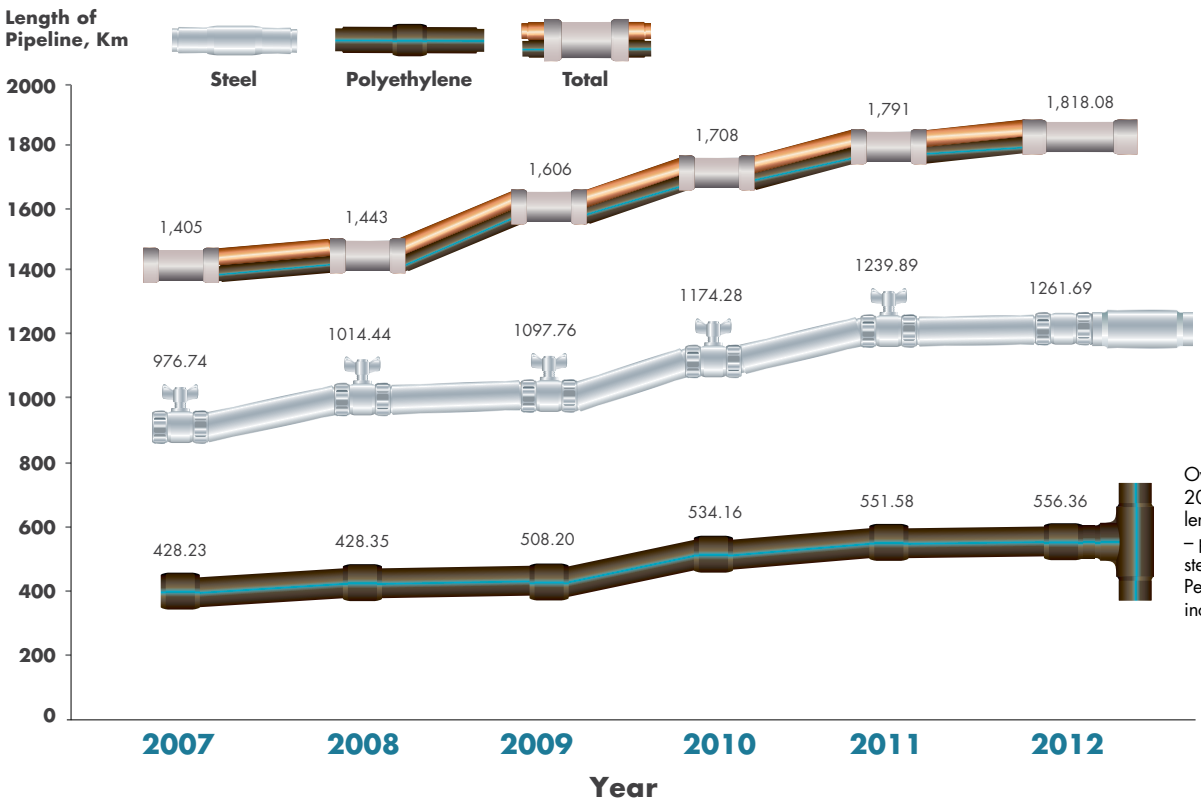
SABAH & LABUAN (NATURAL GAS)



With available pipelines confined to the state's Industrial Park, users of NG in Sabah are primarily industrial, recording an increase in the number of users to 13 in 2012.

Source: Piped Gas Distribution Industry Statistics 2012

OPERATIONAL NATURAL GAS PIPELINE LENGTH IN PENINSULAR MALAYSIA



Over five years, from 2007 to 2012, the length of NG pipelines – polyethylene and steel – in operation in Peninsular Malaysia increased by 29.4%.

Source: Piped Gas Distribution Industry Statistics 2012

same period – at 28.1% and 29% respectively to 11,382 and 565 in 2012 – both sectors accounted for 0.02% and 0.78% of consumption respectively. For the industrial sector only a 10.4% rise was recorded from 642 customers in 2007 to 709 in 2012. However, it accounted for 99.2% of NG consumption in Peninsular Malaysia. Matching the increase in supply points, the length of distribution pipelines – steel and polyethylene – across Malaysia's peninsula also expanded by 29.4% from 1,405 km in 2007.

As an alternative, LPG has advantages such as portability and a higher heat capacity allowing it to be used in cooking, which make it more commonly utilised by the residential and commercial sector. According to the *Piped Gas Distribution Industry Statistics 2012* report, commercial LPG consumers increased by 64% from 713 in 2007 to 1,170 in 2012 (accounting for 205,915 mmBtu), the number of residential and industrial customers declined by 22% and 100% respectively. However, between 2011 and 2012 the residential sector briefly recorded an increase of 1.44% in the number of LPG users.

HEADING EAST

In Sabah and the Federal Territory of Labuan, the NG and LPG supply industries are not as established as those in the Peninsula and are limited to the Kota Kinabalu Industrial Park. However, this is expected to change owing to the development of the Virtual Pipeline System (VPS) in 2013, which allows for the promotion and distribution of NG to other areas of the state. Only industrial customers utilise the commodity and consumption declined from 178,551 mmBtu in 2007 to 74,684 mmBtu in 2012, even as the number of NG users increased from 11 to 13.

The efforts of the Energy Commission to regulate the industry and ensure specified guidelines and quality standards are met, is encouraging more adoption of piped gas as a competitive and safe fuel in an increasing variety of applications. This is particularly so for natural gas distribution. New developments in the gas industry such as the VPS in Sabah and the Sungai Udang Melaka Regasification Terminal (RGT), which became operational in 2013, are expected to boost the overall supply of natural gas across the country.

Clean Coal Technology

Towards Generating Power Without Any Pollution

Statistics from the International Energy Agency (IEA) show that coal is currently generating 40% of the world's electricity. It is an extremely important fossil fuel and its use has been steadily increasing, powering the economic growth of developing economies. The downside is that burning coal releases 14 billion tonnes of carbon dioxide to the atmosphere each year. Regardless of the positive economic benefit, the environmental impact of coal use, especially that coming from carbon dioxide emissions, should not be overlooked.

CONTAINING EMISSIONS

In the pursuit of providing solutions to alleviate the effect of greenhouse gases, arising from the burning of coal for electrical power, a range of technologies collectively known as clean coal technologies, has been innovated and developed by nations over several generations. A notable advancement is the debut of the world's first clean coal power plant in 2008, which reduced its carbon dioxide emissions by up to 98%. This facility was built by Swedish energy company Vattenhall in Spremberg, Germany.

Fundamentally, the various techniques target to reduce the formation of pollutants such as nitrogen oxide, and to clean exhaust gases produced at power plants after combustion. They include the latest carbon capture and storage (CCS) method which the IEA has noted to be the most promising technology to significantly lower carbon dioxide emission levels to near-zero.

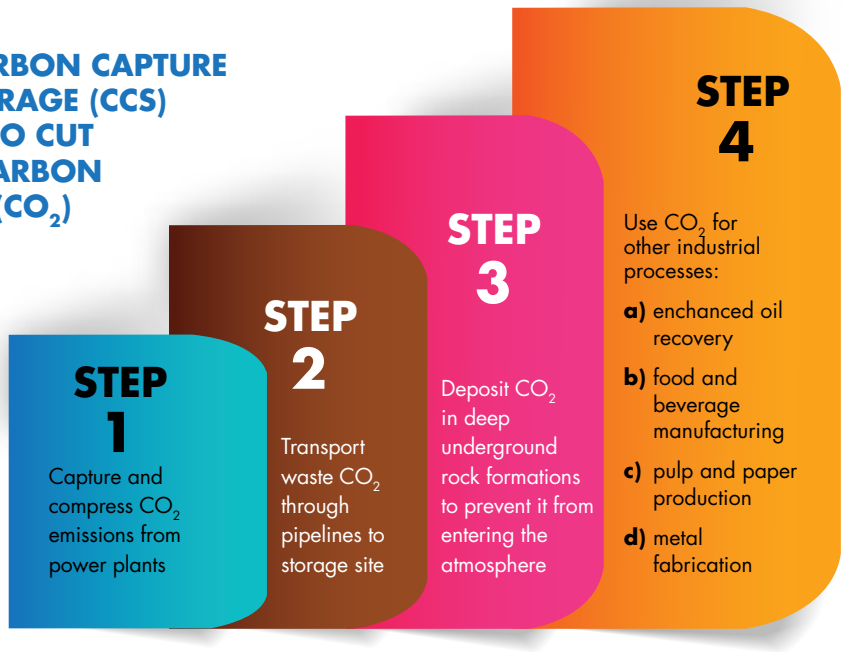
Another approach is based on coal combustion systems that are more thermally efficient – so that less coal is used to generate the same amount of power – and further enhanced with flue gas cleaning alongside treatment or disposal of residue. Well-established and practiced widely, the various techniques involved include stoker boilers, cyclone-fired wet-bottom boilers, and pulverised coal combustion, which was recently implemented in Malaysia.

LOCAL PRACTICES

Malaysia has four power plants using clean coal technology. They are the Sultan Azlan Shah plant in Manjung, Perak with 2,100MW capacity, the Sultan Salahuddin Abdul Aziz plant in Kapar, Selangor with 2,420MW, the Jimah plant in Lukut, Negeri Sembilan with 1,400MW and the Tanjung Bin plant in Pontian, Johor with 2,100MW capacity.

Burning coal can be a 'dirty business', but with the innovation of clean coal technologies, the use of coal can be facilitated in an environmentally satisfactory and economically viable way to meet the world's growing need for affordable and reliable electricity.

HOW CARBON CAPTURE AND STORAGE (CCS) WORKS TO CUT WASTE CARBON DIOXIDE (CO_2)

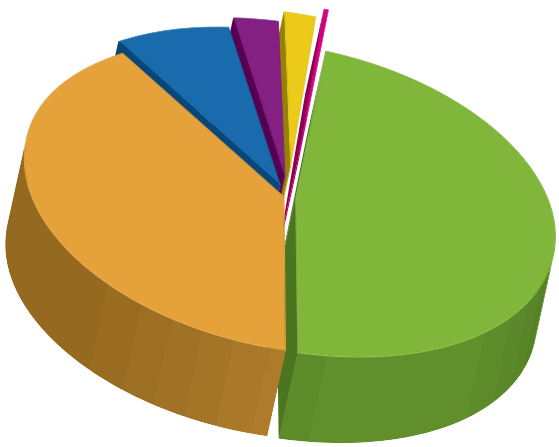


The plants adopt Pulverised Fuel Firing techniques which break coal into smaller pieces to expose more surface area for combustion. This results in faster response to load changes as the rate of combustion can be controlled easily and immediately. A wide variety of low-grade coal can be burnt more easily when the coal is pulverised. In addition to being up to 35% more energy-efficient compared to conventional coal plants, the facilities are equipped with air pollution control technology and systems to cut down emission levels.

Desulphurisation equipment and electrostatic precipitators in the plant trap sulphur dioxide and dust before they are discharged through the chimney, significantly reducing the release of particles and other hazardous gases into the atmosphere. The use of low sulphur and low bitumen coal also contributes further to minimising pollution and even doubles up to produce ash, which is valuable for the cement industry.

With the various clean coal technologies, the plants comply with emission standards set by the World Bank. For example, the Sultan Azlan Shah plant's operations emit minimal particulate levels of 50mg/Nm^3 which is comparatively lower than the average ASEAN level of 400mg/Nm^3. The up-and-coming Manjung 4 plant, which will use higher steam parameters

COAL TOPS THE ENERGY MIX FOR MALAYSIA'S POWER GENERATION IN 2012



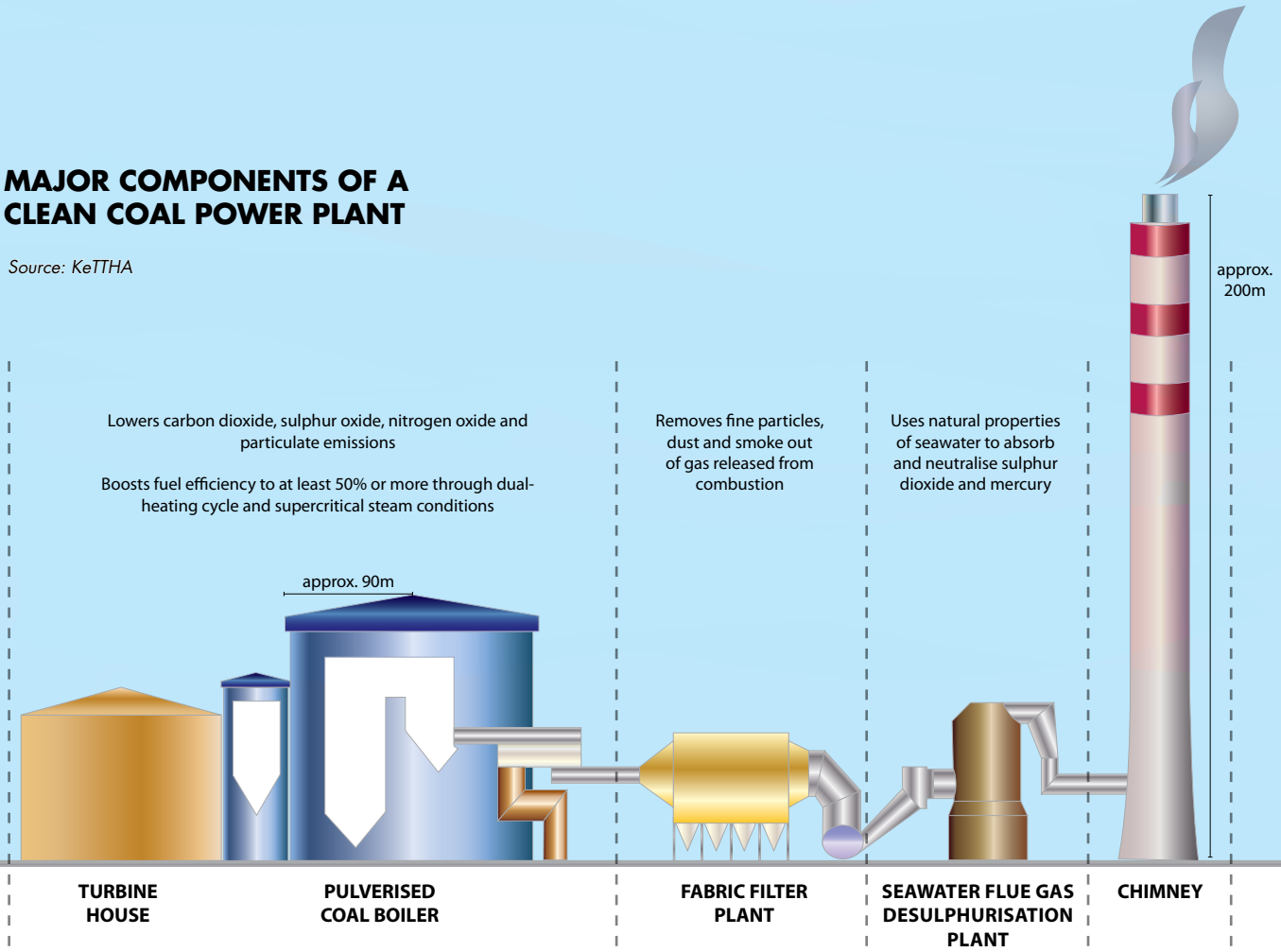
TOTAL: 29,252 kilotonnes of oil equivalent (ktoe)

COAL	**48.3%**	**= 14,128.716 ktoe**
NATURAL GAS	**39.4%**	**= 11,525.288 ktoe**
HYDRO	**7.4%**	**= 2,164.648 ktoe**
DIESEL	**2.8%**	**= 819.056 ktoe**
FUEL OIL	**1.9%**	**= 555.788 ktoe**
RENEWABLES	**0.2%**	**= 58.504 ktoe**

Source: Power Utilities & IPPs

MAJOR COMPONENTS OF A CLEAN COAL POWER PLANT

Source: KeTTHA



for its coal-fired boilers upon its completion in 2015, will generate 14% more power and remove up to 90% of sulphur oxide from the flue gas. This new 1,010MW project will provide additional capacity to power nearly 2 million Malaysian households while ensuring the environment is protected.

POWERING THE FUTURE

A World Coal Institute report found that achieving thermal efficiencies of up to 40% at existing power plants could reduce carbon dioxide emissions by as much as 22%. In developing countries, funding for such improvements should include equipment upgrading and the monitoring and diagnostics of boilers, turbines, condensers, and clean tech equipment, as encouraged by experts at the US National Energy Technology Laboratory.

With countries like Japan, US, Germany, and Denmark funding research and equipment design for clean coal technologies especially CCS, new plants are now able to achieve 43% – 47% efficiency, reduce greenhouse gas emissions and contain the temperature-rise effects of global climate change. However, the business case for using these technologies is not keeping pace.

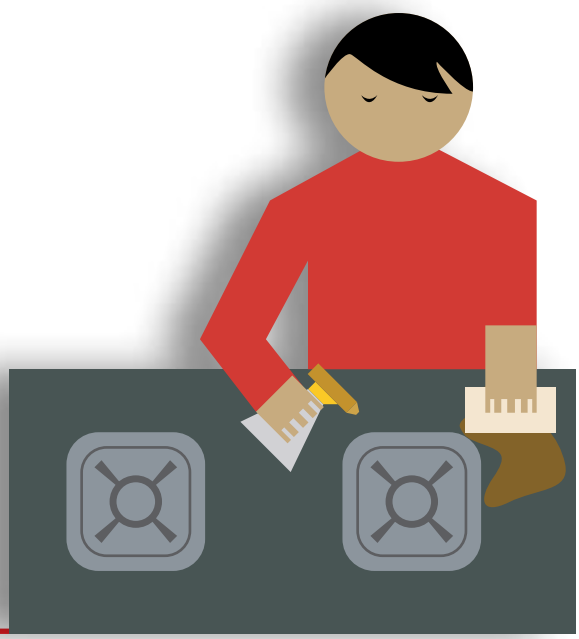
In order for coal to remain an energy option in a world affected by global warming, the funding for implementation of CCS, the leading clean coal technology, must increase. Otherwise, greenhouse gas emissions are expected to rise to levels of irreversible damage if the current rate of coal burning continues.

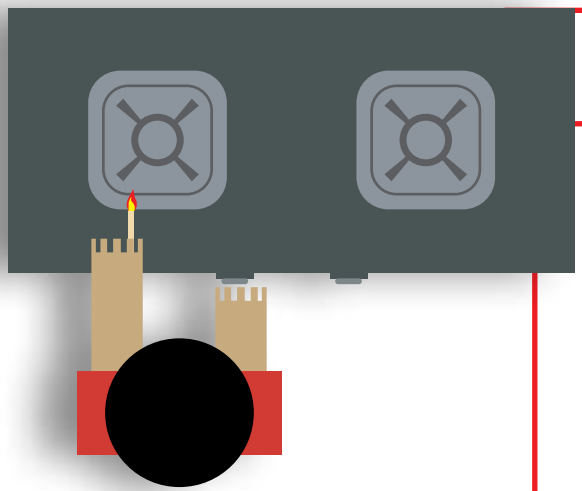
As clean coal technologies ensure that the world's enormous resources of coal can be utilised for future generations without contributing to global warming, challenges still lie ahead. These technologies must be commercialised so that coal use remains economically competitive in spite of achieving low, and eventually near-zero emissions. Greater efforts are also needed by governments and industries to deploy this developing novel technology so that coal becomes a much cleaner source of energy in the decades to come. As the agency tasked with promoting and assuring energy efficiency in the country, the Energy Commission is committed to ensuring that these technologies are explored and implemented where possible, to secure future energy needs without negatively impacting the environment.

Gas Safety at Home

With a majority of homes in Malaysia depending on gas for cooking through central piping or cylinders, and considering the chemical volatility of the commodity, safety should always be considered a priority for domestic consumers. The Energy Commission, in its capacity as the regulator of the piped gas industry in Peninsular Malaysia, highlights some tips for home owners.

1 Before lighting the stove, ensure that combustible materials are kept away from it. Additionally, food and oil spills – which could be flammable – should be cleaned immediately.





2 To light a stove properly, ignite a match and point the flame proximate to the burner before turning the valve on slowly. Ensure that the area is well-ventilated to enable complete combustion, never leave your burner unsupervised, and always turn off the gas valve after use.

3

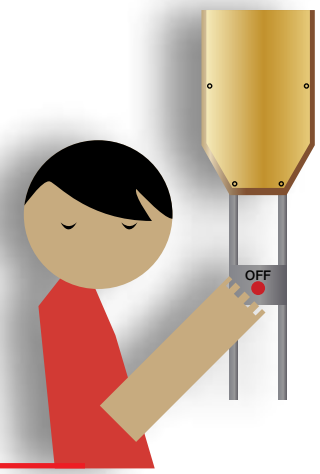
Do not use liquefied petroleum gas for stoves designed specifically for natural gas – check the labels on the stove and tank. If uncertain, ask a gas licensee licensed by the Energy Commission.

4

Gas hoses should be certified and approved by the Energy Commission and should be regularly checked and serviced by a certified gas-competent personnel who is attached to a gas contractor registered with the Energy Commission, to ensure that there are no leaks.

5

Never attempt to connect any gas piping yourself or perform any excavation work close to one. In the event of a suspected gas leak, ensure that all gas valves are turned off, all doors and windows are opened and notify the gas dealer or gas licensee licensed by the Energy Commission. Meanwhile, do not switch on or off any electrical appliance.



Receiving Recognition

Best Practice Award for Energy Commission

Rod Morrison, the Editor of PFI (far left), Lim Boon Heng, Chairman of Singapore State-Investment firm Temasek Holdings (5th from left), Moon Ming Seah, Deputy Chairman of International Enterprise (IE) Singapore (centre), Asma Aini Mohd Nadzri, Director of Corporate Services at the Energy Commission (4th from right) and other recipients at the Project Finance International (PFI) Asia Best Practice 2014 award ceremony in Singapore.

The Energy Commission of Malaysia was recently recognised for outstanding achievement in the Government Procurer category when it received the "PFI Asia Best Practice Citation" award. Held in Singapore on the 3rd of June, the inaugural Project Finance International (PFI) Asia Best Practice 2014 event acknowledges the contributions and successes of leading institutions in two categories – Government Procurer and Private Sector Developer. In addition, the region's top deals in Bonds, Infrastructure, Public-Private Partnership, Power and Renewables were also recognised.

The PFI Asia Best Practice Awards are co-organised by International Enterprise (IE) Singapore (the agency responsible for promoting Singapore's international trade and external economy) and PFI – a global project finance intelligence firm owned by multi-national media and information company Thomson Reuters. The event aims to boost the development, structuring, financing and execution of infrastructural projects in Asia.

Staying Secure

Promoting Electrical Safety in Homes

On the 10th of June, Energy Commission CEO Datuk Ir Ahmad Fauzi Hasan launched the "Be Safe, Test Your RCCB (Residual Current Circuit Breaker) Today" campaign at the Kuala Lumpur Convention Centre. An initiative by The Electrical and Electronics Association of Malaysia (TEEAM) – a representative body of electrical and electronics industries in the country, the campaign seeks to promote safety among electricity consumers by encouraging them to regularly test the RCCBs in their homes, to reduce cases of electric shock and electrocution.

Above: Ir Chew Shee Fuee, President of The Electrical and Electronics Association of Malaysia (TEEAM) presenting a token of appreciation to Datuk Ir Ahmad Fauzi Hasan, CEO of the Energy Commission of Malaysia (right) at the recent launch of a campaign to boost public awareness on self-testing their Residual Current Circuit Breakers (RCCBs) to increase electricity safety.

Left: (from left to right): Ir Chew Shee Fuee Kmn, President of The Electrical and Electronics Association of Malaysia (TEEAM), Datuk Ir Ahmad Fauzi Hasan, CEO of the Energy Commission of Malaysia and Dahari Mat Siran, Chairman of the National Campaign on Self-Testing RCCB demonstrate the testing procedures for RCCB (Residual Current Circuit Breaker).

An RCCB is an electromechanical device, installed in domestic electrical distribution boxes, that disconnects circuits when it detects current leakage. This is usually indicative of a flow of electricity through a grounded human body touching an exposed energised surface, leading to an often lethal electric shock. RCCBs are designed to disconnect quickly enough to prevent injury caused by such shocks. Studies conducted by the Energy Commission indicate that almost all deaths caused by electrocution which occur in homes are a direct result of faulty RCCB protection systems.

The testing process involves three simple steps, and requires residents to locate their RCCB and press the test button marked "T". The circuit breaker will automatically switch off power supply, and the resident just needs to restore the switch to its original position. However, if the power does not switch off, this means that the RCCB protection system is not working and an electrical contractor registered with the Energy Commission should be called immediately.

The campaign will run for 10 months – until the 30th of April 2015 – and include a variety of initiatives and events, such as road shows and exhibitions. It aims to have one million self-tested households by May 2015.

Ensuring Reliability

Energy Consultative Panel Meeting

On the 10th of June, the Energy Consultative Panel (*Panel Perundingan Tenaga*) discussed certain issues with the aim to elevate the energy supply industry and thus ensure a reliable and reasonably-priced electricity and gas supply in the country.

Above: Datuk Abdul Razak Abdul Majid, Chairman of the Energy Commission, during the Energy Consultative Panel Meeting at Sime-Darby Convention Centre.
Below: The consultative panel members discussed the three key issues which were raised in the meeting, in relevance to their aim to ensure reliability in the electricity and gas supply industry.

Held at the Sime-Darby Convention Centre, Bukit Kiara, the meeting discussed three key issues, namely the implementation of electricity imbalance cost pass through mechanism, the electricity supply and demand situation, and the gas supply situation in Peninsular Malaysia.

Representatives from 25 relevant organisations including the Malaysian International Chamber of Commerce and Industry (MICCI), The Electrical and Electronics Association of Malaysia (TEEAM), the Economic Planning Unit (EPU) and the Real Estate and Housing Developers Association Malaysia (REHDA) were among the consultative panel members who attended the meeting.

Established by the Commission on 29th April 2005, the consultative panel members are appointed by the Ministry of Energy, Green Technology and Water, and comprise representatives from the government and private sectors, professionals and consumers. The Chairman of Energy Commission, Datuk Abdul Razak Abdul Majid is also the chairman of this consultative body.

In Our Next Issue

Energy Malaysia looks at what the Energy Commission is doing to empower consumers.

Discover the **Performance Standards** that the Energy Commission has set for providers of electricity.

Learn about the measures implemented to screen the **Accuracy of Electricity Meters**, resulting in more transparent electricity bills.

And more...

...in Malaysia's Energy Sector Thought Leadership Magazine

Suruhanjaya Tenaga
Energy Commission

In order to further enhance the performance of the energy supply industry, the Malaysian Government established the Energy Commission of Malaysia (*Suruhanjaya Tenaga* - ST) under the *Energy Commission* Act 2001. It is a statutory body responsible for regulating the energy sector, particularly the electricity and piped gas supply industries in Peninsular Malaysia and Sabah. The Energy Commission ensures that the provision of electricity and piped gas to consumers is secure, reliable, safe and reasonably priced.

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