



OIL, GAS AND ENERGY

An aerial photograph of a large black LNG carrier ship docked at a long pier. The ship's deck is partially covered with a bright green tarp. The name 'MELI BELAWAN' is visible on the hull. The pier extends into a large body of water with other smaller vessels and structures in the distance. The sky is blue with scattered white clouds.

EMPOWERING ECONOMIC DIVERSIFICATION



YB DATUK SERI PANGLIMA DR. MAXIMUS JOHNITY ONGKILI
Minister of Energy, Green Technology and Water

Malaysia's electricity demand is met through a diversified fuel mix to ensure sustainability of supply and affordability for the rakyat. In 2017, gas and coal made up 46% and 42% of the total electricity generation respectively, leaving 11% of that from hydro power.

In line with our commitment to the 21st Conference of Parties (COP 21) in Paris to reduce 45% of greenhouse gas emissions by 2030, Malaysia is aggressively promoting the use of renewable energy, especially solar power, through the introduction of initiatives such as Feed-In-Tariff mechanism, Large Scale Solar programme and Net Energy Metering. This results in our renewable energy achieving 22.5% of the total capacity mix to date, against the ASEAN target of 23% by 2025.

Besides renewable energy, the Ministry of Energy, Green Technology and Water (KeTTHA) has taken steps to stimulate investments in cost-effective energy efficiency measures in buildings through the Energy Performance Contracting (EPC) mechanism. To assist Energy Service Companies (ESCOs) in obtaining funds from commercial financial institutions and strengthening their financial credit profile, the EPC Fund was set up in August 2017.

On the oil and gas (O&G) front, global oversupply in the recent decade continued to exert downward pressure on oil prices. As such, the Government must ensure growth in the industry through new, high value-added activities while sustaining domestic production. In 2017, the OGE NKEA contributed 15% of the total GNI in Malaysia (RM203.5 billion).

The O&G upstream sector is carefully optimised through various initiatives by PETRONAS and this has yielded commendable results in our production. PETRONAS

has also carried out extensive promotional efforts to attract Exploration & Production (E&P) players to invest and operate in Malaysia's O&G field.

Despite challenges faced by the Oil and Gas Services and Equipment (OGSE) sector after oil price depreciation, Malaysia continues to attract high-profile OGSE multinational corporations (MNCs). Indeed, our country has been the centre of OGSE activities in the Asia Pacific region since 2011, with 18 out of 50 top OGSE MNCs setting up headquarters here. Meanwhile, local OGSE companies are also venturing past Malaysian borders, testifying to an already strong O&G ecosystem for our players to thrive.

To pave the way for natural gas market liberalisation in Peninsular Malaysia, the Gas Supply Act (Amendment) 2016 was finally enforced on 16 January 2017. The passing and enforcement of the Act is timely, as global gas prices are converging amid an increase in liquefied natural gas (LNG) trades. The liberalised gas market, in turn, will witness more alternative gas supplies under the Third-Party Access arrangement and thus create a competitive natural gas market for Peninsular Malaysia. Furthermore, Peninsular Malaysia's electricity tariffs and natural gas tariffs will be market reflective, consistent with other high-income nations.

It is no doubt that the OGE industry remains critical to push Malaysia into high-income status by 2020, whilst not forsaking de-carbonising efforts to tackle climate change. These are, ultimately, only made possible via a robust collaboration between Government and private sectors.



PETRONAS Tangga Barat Central Processing Platform.

ENSURING SUSTAINABILITY OF PRODUCTION

Upstream initiatives under this NKEA aims to extend the life cycle of existing resources by optimising exploration, development and production activities to address declining domestic oil and gas (O&G) production. These efforts are led by PETRONAS and are closely tied to global market trends.

Globally, oil demand is expected to fall due to fuel efficiency improvements, the rise of renewable energy and its associated technologies, as well as weaker global economic growth. In the meantime, excess natural gas supply in the global market led to shifting new liquefied natural gas (LNG) contracts towards shorter durations and smaller volumes, making it difficult for oil companies to sanction large LNG projects globally. While natural gas demand is expected to grow, coal will likely remain a major competitor, being a cheaper fuel alternative for power generation. Additionally, LNG buyers are also becoming sellers, and collaborations among buyers are expected to intensify. The market will be challenging for traditional LNG sellers and O&G companies.

Meanwhile, in the upstream O&G exploration and production arena, low oil prices have heavily impacted the viability of projects to rejuvenate existing fields through Enhanced Oil Recovery (EOR) technologies, due to their smaller production volumes and higher production costs vis-à-vis non-depleting oil fields. In addition, the increased complexity of EOR projects requires specialised expertise and advanced technology. Low crude oil prices have pushed down the development of new marginal O&G fields due to reduced economic feasibility, compounded by the fact that production volumes typically decline faster than bigger fields. On the other hand, due to the current oil price environment, production sharing contract (PSC) contractors are cutting their spending on exploration activities, especially in low prospectivity areas.

Despite the challenging landscape, PETRONAS achieved significant milestones in 2017 for five EOR projects in Malaysia, while exceeding its targets for O&G production volume in marginal fields. In order to sustain domestic O&G production, PETRONAS will continue to competitively market exploration blocks through domestic bid rounds and international roadshows, and will ramp up promotional efforts to attract O&G exploration and production players to invest in Malaysian exploration activities.



THIRD-PARTY ACCESS ENABLING ENERGY MARKET LIBERALISATION

Current global market conditions impacting natural gas prices and the changing structure of LNG contracts have set the stage for the industry to cater to the latent demand for natural gas. This has enabled Peninsular Malaysia's natural gas market liberalisation through a gradual shift to applying market pricing and the entry of more third parties into the gas market.

To this end, the Energy Commission (EC) has introduced Third-Party Access and is focused on establishing the supporting framework to ensure its successful enforcement. The Gas Supply Act (Amendment) 2016 was enforced on 16 January 2017 and new licences have been issued to existing and new players. This marked the start of the liberalisation of the natural gas market in Peninsular Malaysia. Existing players who own regasification terminals are required to apply for regasification licences from the EC, while new players interested to import the gas molecules need to apply for shipping licences. The EC has also finalised the tariff determination guidelines for regasification, transmission and distribution facilities, which will be open for TPA under the new arrangement.

However, as TPA is a new concept in the Peninsular Malaysian natural gas market, one of the biggest challenges for the EC is to secure buy-in from existing and potential new players who are less aware of the new regulations and hence will require more time to adapt to the new regime. The EC is also facing challenges in streamlining the rules for access to natural gas facilities across the value chain (i.e. regasification terminal, transmission and distribution), which is a tremendous undertaking given Peninsular Malaysia's closed market structure.

In this respect, the EC has been engaging with existing and potential players on the TPA arrangements while streamlining the rules to create more flexibility in the utilisation of the gas facilities to cater for spot LNG cargoes and third-party supply. In the medium and long term, the creation of new gas demand remains as the utmost priority to attract new players to participate in the domestic market.

EXTRACTING GROWTH FROM THE DOWNSTREAM SEGMENT

Malaysia's experience and expertise in the O&G industry has enabled the development of a thriving downstream segment. Still, there remains plenty of room for growth, especially in capturing value from increasing international flows of crude oil, refined products and natural gas. There are also opportunities to extract value from demand for natural gas, which has been weighed down by a lack of supply.

To this end, the Pengerang Integrated Petroleum Complex (PIPC) is being constructed in Pengerang, Johor, representing the single largest downstream investment project in Malaysia. It currently houses PETRONAS' Pengerang Integrated Complex (PIC) and Pengerang Deepwater Terminal (PDT).

“To this end, the Pengerang Integrated Petroleum Complex (PIPC) is being constructed in Pengerang, Johor, representing the single largest downstream investment project in Malaysia.”

Effective functionality of the PIPC can only be achieved when the necessary supporting infrastructure and public amenities are in place. In this respect, the Federal and State Governments have planned 25 critical PIPC infrastructure projects worth approximately RM2.49 billion to meet the needs of the Complex. In order to ensure the effective delivery of these projects, the Federal Project Steering Committee (FPSC), chaired by the Chief Secretary to the Government, has been set up to provide the necessary support to Johor Petroleum Development Corporation (JPDC), the implementing agency for the development of infrastructure and public amenities, as well as to nine other implementing Federal Ministries and Federal/State support agencies. The governance structure enables effective issue escalation and intervention to ensure timely completion of all infrastructure projects.

PIPC infrastructure development reached significant milestones in 2017. These include the completion of a police station in Taman Bayu Damai at the end of the year and the construction of a dual-carriageway, four-lane road which enables road connections between Kampung Bukit Gelugor and Kampung Pengerang, which will enable safer and more comfortable commuting on that route. The upgrading of the road from Bandar Penawar to Sungai Rengit, located in and around Pengerang and the upgrading of Klinik Kesihatan Sungai Rengit to cater for more patients and provide better services for local citizens are expected to be completed in 2018.

As the agency in charge of promoting and securing investments to realise PIPC's vision as an integrated downstream O&G hub, JPDC in 2017 secured potential downstream investments amounting to RM2.3 billion via letters of intent (LOIs) from local and foreign companies.

As part of the efforts to elevate the competencies of the current skilled workforce to meet industry requirements, JPDC has also been working with the National Youth Skills Institute (Institut Kemahiran Belia Negara - IKBN) in Bandar Penawar to provide training for more than 300 students on site safety; scaffolding; health, safety and environment (HSE); welding; supervisory roles; and rigging and slinging. Trainees who complete this training are certified under the Industry Accreditation Programme, with the programme recording a 90% employability success rate.

Pengerang Integrated Complex pioneering large-scale downstream investment

PETRONAS's PIC is being constructed with the aim of boosting the Malaysian O&G downstream sector and reached 84% completion as at end-2017. It remains on track to begin operations in the first quarter of 2019.

The project made headlines in February 2017 with the signing of a Share Purchase Agreement (SPA) by oil giant Saudi Aramco to invest in the Refinery and Petrochemical Integrated Development (RAPID) project in PIC. The investment is historic for the industry due to the unique structure of two professionally run national oil companies in



YAB Dato' Mohamed Khaled Nordin, Chief Minister of Johor, Tan Sri Mohd Sidek Hassan, Chairman of PETRONAS and Tan Sri Wan Zulkiflee Wan Ariffin, President and Group Chief Executive Officer of PETRONAS officiated the Pengerang Co-generation Plant (PCP).

partnering on a world-scale greenfield project. It will create significant spin-off effects and boost the reputation of the PIPC, which will help in attracting further investments into the Complex.

Saudi Aramco is investing approximately US\$7 billion in RAPID, representing the largest ever foreign direct investment (FDI) inflow to Malaysia, while constituting Saudi Aramco's biggest investment outside the Kingdom of Saudi Arabia to date. This is a unique transaction, an integral part of which is equity participation in an integrated refining and petrochemical complex in RAPID. As such, it involves Saudi Aramco buying an equal equity interest in PETRONAS' units PRPC Polymers Sdn Bhd and PRPC RC Sdn Bhd.

Under this partnership, Saudi Aramco will supply up to 70% of the crude feedstock requirements of the refinery, which is expected to commence operations in 2020, with natural gas, power and other utilities to be supplied by PETRONAS. Having Saudi Aramco, a company with the largest reserves in the world, as a partner will help to ensure the security of crude supply to the refinery.

Indeed, Saudi Aramco, co-owner of SADARA Chemical Company (the largest petrochemical complex in the world), is one of the world's leading oil companies, with significant expertise in low-cost production. This partnership gives PETRONAS access to Saudi Aramco's vast



experience in execution, implementation and operation of similar large-scale and integrated petrochemical projects, making it a highly valuable partner to PETRONAS.

Apart from the investment from Saudi Aramco, PIC also achieved several operational milestones during the year, including the arrival of two modularised furnaces, or crude heaters, on 20 January 2017. The furnaces are an important component of the crude distillation unit within the refinery and are critical in providing feed for other process units of the refinery. The furnaces were also certified as the biggest heaters to ever land on Malaysian shores, with each weighing about 1,000 tonnes and possessing a processing capacity of 150,000 barrels per day (bpd).

Additionally, two modularised waste heat boilers were installed at the refinery on 21 March 2017. The boilers are an important component of the Residual Fluid Catalytic Cracking (RFCC) unit within the refinery, which function to crack hydro-treated atmospheric residue into feedstock for the Steam Cracker facility. Each waste heat boiler weighs about 2,000 tonnes and are the largest in Malaysia. The Complex also installed Malaysia's biggest Crude Distillation Unit (CDU) column on 10 June 2017. The CDU column is designed to process 300,000 bpd of medium-heavy sour crude oil in a single distillation column. The column also represents the heart of the refinery, as it is the first process unit to receive crude and is among the biggest single CDU column installations in the refining industry. The column was designed by Sinopec Engineering and fabricated by KNM Process Systems Sdn Bhd in Gebeng, Pahang. It spans almost 10 metres in width and 66 metres in height and weighs 1,300 tonnes.

RAPID comprises the Refinery, Steam Cracker and Petrochemical Complex, and is 82% completed with the major facilities having been installed. The petrochemical complex comprises various production units to add value to C2 and C3 from the refinery and steam cracker complex. It will capitalise on the region's high-growth differentiated commodity petrochemical products market, and will strengthen PETRONAS' position in the competitive petrochemicals industry.

The refinery is the main source of feedstock for the downstream Petrochemical Complex within RAPID and, as such, will be the cornerstone of the integrated nature of RAPID. The facility will position Malaysia as a leader in Asia's chemical products market and provide opportunities to venture into premium differentiated and specialty petrochemicals, as well as the rapidly developing automotive, pharmaceutical and consumer products markets. The refinery is poised for start-up within the first quarter of 2019.

The refinery, among the best in its class with a Nelson Complexity Index of 9.5 out of a possible score of 15, will be capable of producing large volumes of high-value products from crude oil. The index provides a simple metric for quantifying and ranking the complexity of refineries and units. A higher number on the index can be attributed to greater value of its end product. The Rapid refinery's capacity will be the largest in Malaysia and the fourth-largest in Southeast Asia.

“The RAPID refinery will position Malaysia as a leader in Asia's chemical products market.”

Progress for the 1,220 MW Pengerang Co-generation Plant (PCP) is similarly encouraging, with the first unit of four co-generation units having commenced operations in mid-October 2017, where 400 MW has been supplied to Peninsular Malaysia national electricity grid. To facilitate transmission to Tenaga Nasional Berhad (TNB), a 275-kV overhead Pengerang Transmission Line is in place, spanning 52 km from PCP to the TNB substation at Tanjung Langsat. PCP is designed as a stand-alone utility provider to RAPID, while also supplying 400 MW of power to TNB. Besides electricity generation, PCP will also provide reliable and continuous supply of steam of up to 1,480 tonnes per hour for plants within the Complex. The large amount of steam needed for process requirements in RAPID presents a unique opportunity to create the most efficient electricity production process in a co-generation configuration.

The Regasification Terminal 2 (RGT2) started commercial operations in October 2017 to provide primary gas supply to RAPID, PCP and the Peninsular Gas Utilisation (PGU) grid in a bid to augment the availability of gas in Peninsular Malaysia. It will offer facilities for LNG unloading/reloading, storage, handling, and regasification. The Terminal's regasification unit has a capacity of 3.5 million tonnes per annum (approximately 700 MMscfd) and will be connected to PGU via the Pengerang Gas Pipeline. It also includes two units of 200,000 m³ of LNG storage tanks, and one LNG Jetty Topside with LNG unloading/reloading facilities. RGT2 will not only play a critical role in Peninsular Malaysia's energy security, but also act as an additional entry point for third-party gas suppliers to penetrate the Peninsular Malaysia gas market, bringing it another step closer towards becoming a fully liberalised natural gas market.

Pengerang Deepwater Terminal expansion

The second phase of Pengerang Deepwater Terminal (PDT) is currently under construction and will add 2.1 million cubic m³ to the existing capacity of 1.3

million cubic m³ from PDT Phase 1. In September 2017, PDT's two crude tanks achieved Ready For Start-Up (RFSU) status. As of December 2017, PDT received more than 1,458 vessels with a total of 7 Very Large Crude Carriers (VLCCs) and has handled a total of 1.5 million tonnes (discharge/load) of petroleum products. In an effort to further expand the realised capacity of the oil storage terminals, the Government is working closely with the terminal storage operators to explore potential opportunities.

Meanwhile, the oil storage terminals in Southern Johor are benefiting from the newly introduced zero-rated GST policy which exempts services supplied to customers overseas, performed in connection with goods for export. This incentive underscores Malaysia's commitment in becoming a regional O&G storage hub. In 2016, the oil storage terminals located in Southern Johor such as Tanjung Bin, Tanjung Langsat, Far East Oil Terminal One (FEOTO) in Pasir Gudang, and Pengerang were admitted under the new FOB Straits pricing index by S&P Global Platts, recognising Malaysia's growing presence in this market.



The second phase of Pengerang Deepwater Terminal (PDT) will add 2.1 million m³ to the existing storage capacity in Pengerang.



CATALYSING OGSE ACTIVITY

To establish Malaysia as an Oil and Gas Services and Equipment (OGSE) hub, Malaysia Petroleum Resources Corporation (MPRC) has embarked on several initiatives, including facilitating local OGSE companies' expansion into Asia Pacific and beyond; building Malaysia's reputation as a regional hub by establishing a Malaysian presence in prominent O&G exhibitions globally; and attracting OGSE MNCs to set up regional headquarters in Malaysia. At present, the regional headquarters of the top five global OGSE MNCs and 18 out of the top 50 global OGSE MNCs are already in Malaysia. The Government targets to have half of the top OGSE MNCs' regional headquarters in Malaysia by 2020.

OGSE companies' investments, either as FDI or domestic direct investments (DDI), have been encouraging. As of December 2017, RM724.5 million has been netted, exceeding the year's target of RM650 million, while the cumulative figure from 2012 until December 2017 stood at RM7.7 billion, putting the sector on track to achieving its 2020 target of RM10 billion.

While the low oil price environment proved a dampener for upstream players, it enabled downstream players such as petrochemical refineries as well as methanol and LNG production facilities to thrive as operating costs stayed low and profit margins continued to improve. Of note, MPRC undertook a strategy recalibration and adjusted its focus to facilitate investments in the downstream segment,

allowing it to exceed its aim of securing RM736 million in investments in 2017. Notable investments in the year came from Hengyuan Refining Company Bhd (formerly known as Shell Refining Company Bhd) with RM609 million and Innochems Technologies Sdn Bhd with RM12 million. Despite the challenging environment, MPRC remains committed in supporting investments by upstream OGSE companies.

First-time bidders for international projects in new market segments are a good barometer of the competitiveness of locally domiciled firms. In 2017, eight companies successfully bid for global projects (see table for more details), bringing the cumulative total to 54, close to the 2020 target of 60.

Marketing/trade facilitations by MPRC via trade shows and specialised marketing missions with key Government agencies were actively organised in previous years, leading to reputational gains for Malaysian OGSE firms. Southeast Asia and the Middle East continue to present a trove of opportunities for OGSE companies to tap into, hence MPRC remains committed to assist OGSE companies in their venture to SEA and the Middle East. In recent months, OGSE companies are also looking to venture into South America, particularly Mexico and Brazil. With these two South American countries opening their markets to international OGSE companies, MPRC will also direct Malaysia's export development efforts to that region.

However, with the budget constraints among Government agencies, international export development activities such as trade missions and exhibitions at major conferences declined in 2017. This had some bearing on the robustness of MPRC's pipeline, impacting international awareness of

Company	Country	Solutions
Dyna Segmen Sdn Bhd	Iran	Online pipe repair (own technology/ Malaysian-manufactured)
Flytech Engineering Sdn Bhd	Thailand	Rubber flexible hose (own technology/ Malaysian-manufactured)
IEV Group Sdn Bhd	Iran	Marine growth control (own technology/ Malaysian-manufactured)
MISC Bhd	Brazil	FPO leasing and operations
MIT Innovation Sdn Bhd	Saudi	ICWD drilling tools (own technology/ Malaysian-manufactured)
MIT Innovation Sdn Bhd	Oman	ICWD drilling tools (own technology/ Malaysian-manufactured)
Sylmax Technology Resources Sdn Bhd	Vietnam	Helideck friction test
TRK Resources Sdn Bhd	Vietnam	Helideck Inspection Services (including helideck friction test)

Malaysia's OGSE capabilities, while Malaysian OGSE players continue to have insufficient information of middle to long-term views on international markets and projects.

In mitigating the above, plans are in the pipeline to leverage on MATRADE and Malaysia-based MNCs' international presence to identify global OGSE business opportunities, which will then be shared with local companies. MATRADE and MPRC will foster closer collaborations with Malaysian OGSE players to steer them to global clients in targeted markets. Promotional and marketing efforts to raise awareness of Malaysia's OGSE capabilities to global clients will also be ramped up.

During the year, MPRC observed an influx of OGSE companies from Europe, Australia, and China. At the same time, a growing number of engineering companies are setting up regional headquarters to capture downstream opportunities in Malaysia as well as capitalise on Asia Pacific's move into the downstream business.

In recent years, Malaysia has steadily attracted a growing number of services-based MNCs, as opposed to manufacturing firms. This is in line with the nation's transformation from a manufacturing economy to a service-based and high-income country. In terms of MNC investment in Malaysia either through merger or joint venture opportunities, all six targeted companies had set up shop in Malaysia in 2017, bringing the cumulative figure from 33 to 39 companies, close to the target of 50 by 2020. MNCs setting up regional headquarters in

Malaysia in 2017 included an offshore and onshore welding company from France, Serimax which relocated from Singapore. Three companies also established new headquarters here: Global SCS, an asset integrity inspection services company from Aberdeen; Maire Tecnimont, a construction engineering firm from Milan; and EM&I, an asset integrity inspection and specialised maintenance firm from the UK. Additionally, Serba Dinamik Holdings Bhd has signed an agreement with Monadelphous, an Australian engineering group, to establish a joint venture for a shutdown and turnaround business.

The Government has long emphasised the need for the industry to diversify its product range and head further downstream. With oil prices staying in the doldrums, more international and local OGSE companies that were hitherto predominantly in upstream businesses are training their focus on downstream opportunities in Malaysia.

With the reduction in operator-led projects, the OGSE industry will need to embrace scale, innovation and cutting-edge technology, higher standards, as well as integrated and value-added services to be more competitive. There is also acknowledgement among market players that the O&G downturn will weed out non-competitive players, while stronger firms will adjust and survive. To ensure longer-term sustainability, OGSE companies will need to regularly review and restructure their strategies, organisations and financials to adapt to the new realities of lower oil prices over the longer term.



YB Dato Seri Hamzah Zainudin, Minister of Domestic Trade, Co-operatives and Consumerism, and Hengyuan officials at the groundbreaking ceremony of its new complex for Euro 4M gasoline production in August 2017.



ENSURING ENERGY SUSTAINABILITY

The Government remains committed to promote energy efficiency in line with environmental concerns and ensuring sustainability. In 2017, the Government successfully encouraged 500 energy-intensive companies with electricity consumption of 3 million kWh to be more energy efficient via the Efficient Management of Electrical Energy Regulations (EMEER) 2008. The companies have since reduced their total consumption to 14,455.86 GWh in 2017, which is 2.67% or 355.42 GWh lower than the baseline 2015 annual consumption of 14,811.28 GWh.

Under the 11th Malaysia Plan, KeTTHA also reduced the Special Industrial Tariff (SIT) by 2%, continuing the effort from the previous year to incentivise the energy-intensive industries to be more energy efficient by implementing appropriate conservation measures. Furthermore, the Government continues to promote conditional energy audit grants for industrial and commercial buildings to spur the adoption of energy-efficient measures in the private sector. In 2017, 25 commercial and 30 industrial buildings underwent the energy audit, exceeding the target set by the Ministry. Approved grant applications registered at 65 commercial and 90 industrial buildings for 2016 and 2017. The energy audit and retrofitting exercises to be conducted by the applicants will enable energy savings of 295 GWh, or RM106 million, which would also translate 218 ktCO₂, which measures the amount of carbon that would be saved from the retrofit and audit exercise.

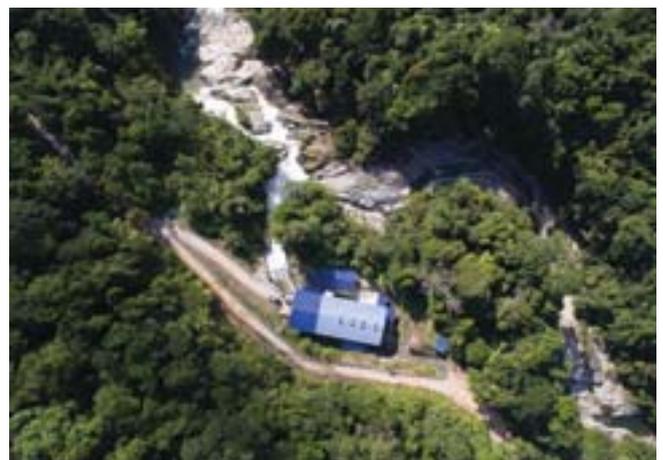
At the Green Technology and Climate Change Council (MTHPI) 2017 event held on 2 March 2017, the YAB Prime Minister approved the establishment of the Energy Performance Contracting (EPC) fund to catalyse growth in the nascent local energy-efficiency service industry. Malaysia Debt Ventures Bhd (MDV), a Minister of Finance Incorporated entity, has provided up to RM200 million in financing and is tasked to manage the financing programme. Meanwhile, the EPC will also be supported by a credit guarantee fund contributed by KeTTHA and the JKR-Building Sector Energy Efficiency Project (BSEEP) funded by the United Nations Development Program-Global Environment

Facility (UNDP-GEF). Additionally, KeTTHA will provide an interest rate subsidy of 1% per annum to successful applicants. To date, RM20.7 million funds have been committed with 10 EPC projects financed. The fund will spur the implementation of energy-efficiency projects in the building sector and assist energy service companies (ESCOs) to overcome difficulties in securing financing from commercial financial institutions.

“Since its inception in 2011, the Feed-in Tariff Programme (FiT) has continued to contribute to the increase in renewable energy capacity, where a cumulative total of 528.06 MW has been installed as of December 2017.”

The Government hopes that the success of this EPC financing model will enhance commercial financial institutions' confidence in financing ESCOs' implementation of more energy-efficiency projects through the EPC method, thereby growing the industry.

Adding to ongoing efforts to decouple Malaysia's electricity generation from conventional fossil fuels is the Government's expansion of total renewable energy capacity to 7,271.74 MW, ranging from large hydro-power plants to off-grid solar panels, which comprises 21.67% of total installed electricity capacity in Malaysia. Since its inception in 2011, the Feed-in Tariff Programme (FiT) has continued to contribute to the increase in renewable energy



Amcorp Perting Hydro 6MW, Bentong, Pahang.

PIPC – upskilling the community, raising living standards

The Pengerang Integrated Petroleum Complex (PIPC) mega project, under the Oil, Gas and Energy NKEA, is not just making waves for the value it is adding to the downstream oil & gas value chain in Johor and Malaysia, but is also changing for the better of everyday lives of many in the district and state.

With the numerous job opportunities being offered by the Complex throughout its various stages of completion, the mega project serves as a catalyst for the upskilling of talent in its surrounding areas, directly and effectively supporting the Government’s drive to raise the competency levels of the country’s labour force. Johor Petroleum Development Corporation Berhad (JPDC) is, in this respect, a close partner and enabler of the PIPC project, supporting its talent needs through its provision of a variety of training and development courses that aim to upskill the human capital needed for the project’s smooth running.

Nurul Amri Sa’adon, 38 years of age, is one such beneficiary of JPDC’s talent improvement initiative. The Pengerang resident undertook the Site Safety Course, an oil and gas industry-oriented skill development training led by JPDC at Kolej

Komuniti Bandar Penawar, and has successfully secured employment with PIPC as a Site Safety Supervisor.

“I am most grateful for the world of opportunities opened up to me by this Site Safety Course. Aside from serving as a refresher course for the job aspects I have already been exposed to, I learned various new concepts and became more proficient in the area of ensuring site safety,” said Nurul Amri, who previously held project and safety management roles in other prominent firms. Thirty-year-old Mohd Suffian Mohd Yunos, who is part of Nurul Amri’s cohort, also gained his current employment upon completing the same course. Having worked 10 years in the building and oil and gas industries, the native from Sungai Rengit, Johor found the course enlightening as it provided him with the exact competencies required for employment as a Site Safety Supervisor.

Both Johorians’ assessment of the Site Safety Course were also positive because it was conveniently conducted in Johor. “Prior to JPDC’s provision of training, oil and gas industry-oriented skill development training could only be more commonly found in other states like Institut Teknologi Petroleum PETRONAS (INSTEP) in Terengganu,” Nurul Amri shared.



Regasification Terminal 2 (RGT2) in Pengerang started commercial operations at the end of 2017.



PETRONAS Refinery and Petrochemical Integrated Development (RAPID) in Pengerang.

In terms of content, Nurul Amri sees the course as having achieved an enviable balance between exploring theoretical concepts and implementing those concepts in practical ways at the workplace. “This balance is crucial in ensuring that course participants not only gain an appreciation for the theoretical frameworks that underlie their job functions, but are also able to perform at a higher level in the workplace with the knowledge gained from the course,” Nurul Amri explained. This sentiment was shared by Mohd Suffian, who added that the benefits accrued to course participants “would be compounded with self-motivation and focus – two key elements for success in many other endeavours.”

Nevertheless, Nurul Amri believes that the training can still be improved in several ways. “It would be good if JPDC could offer more sponsorships to enable locals to undertake oil and gas-related professional education in Johor. This way, there is no need for them to leave for other states, which could help mitigate the brain drain in the state’s oil and gas sector,” he explained. Additionally, the provision of official course certificates could serve as documentary evidence of course participants’ improved proficiencies and hence lead to greater employability in the international job market. Whilst Mohd Suffian views the current

training as sufficiently meeting its objectives, he believes that its continued success requires having dedicated and suitably qualified trainers to conduct the training programme.

Mohd Suffian opines that industry-academia alignment is crucial. “Talent needs are great and will only increase going forward as Malaysia forges ahead in the competitive world of oil and gas. Industry competency needs must be met, and the academic world would do well to facilitate this outcome through frequent engagements and/or collaborations with industry players.”

Both Johorians credit their present occupations to JPDC’s training and are banking on it to continue providing a solid foundation for their future career prospects. Nurul Amri specifically pointed out his optimism in securing a permanent position after his contract expires later this year. “I am confident that with the training by JPDC that I have undertaken, combined with the practical experience I am gaining at my present position that in itself was made possible by the aforementioned training, will enable me to secure a permanent occupation upon the expiry of my contract,” he shared.

capacity. A cumulative total of 528.06 MW has been installed as of December 2017. Under FiT, the number of solar PV service providers overseen by SEDA grew from only 30 players before the formation of SEDA in 2011 to 120 players by 2017. With their formidable experience, financial backing and expertise gained from their participation in FiT, some of these service providers have ventured into solar farms in local and overseas markets.

Launched in October 2016 and implemented in November 2016, Net Energy Metering (NEM) paved the way for Malaysian consumers to take part in the movement towards greater adoption of renewable energy. NEM has come a long way since the first year of its implementation, with total approved NEM capacity for 2017 standing at 6,114.48 kW. However, adoption by the public and businesses is lower than for FiT projects, despite a comparatively generous allocation of 90 MW and 10 MW for Peninsular Malaysia and Sabah, respectively. The low adoption is mainly due to users' unfamiliarity with this new initiative and the lower sell-back tariffs to TNB, as NEM encourages self-consumption of the electricity generated via the solar PV instead of selling the self-generated energy. Hence the Ministry is working with the EC and other agencies to strengthen the NEM operating model and increase promotional efforts to improve the NEM take-up rate in the coming years.

Meanwhile, the Large-Scale Solar (LSS) programme has completed its first year of implementation. The 2-MW LSS, a direct award in Sabah was completed on 15 September 2017, while another 48-MW project

in Sabah and 200 MW in Peninsular are expected to be completed in 2018.

The EC has also conducted two cycles of open bidding for LSS for commercial operation in 2017 to 2020. The first cycle of open bidding for the 2017-2018 period was concluded in December 2016 with a total capacity of 401 MW offered to 18 developers throughout Peninsular Malaysia, Sabah and Labuan. The first plant is expected to be commissioned on 1 January 2018, and more projects are expected to be completed throughout the year such as LSS Fast Track Semenanjung – Quantum Solar Park (Malaysia) Sdn Bhd, with installed capacity of 150 MW; LSS Fast Track Semenanjung – Edra Solar Sdn Bhd, with installed capacity of 50 MW; LSS Fast Track Sabah – Tadau Energy Sdn Bhd with installed capacity of 48 MW; in addition to the 401 MW LSS First Cycle Open Bidding project.

The second cycle of open bidding for 2019-2020 period is in the final evaluation stage and is scheduled to be concluded by end of 2017.

However, successful bidders faced difficulties in securing financing from commercial financial institutions due to the latter's unfamiliarity with the LSS programme, causing delays in the implementation of LSS projects. With the collective effort by KeTTHA, Bank Negara Malaysia, and other related agencies, Malaysia successfully introduced green sukuk to address funding gaps in green financing. KeTTHA is also working closely with the EC to monitor and ensure the timely completion of the LSS projects. In July 2017, the Securities Commission (SC) introduced the first green sukuk under its Sustainable & Responsible Investment (SRI) initiative to address the funding gap in green financing. The framework underlying this green sukuk was the result of collaboration between the SC, Bank Negara Malaysia and the World Bank Group. The fostering of a conducive funding ecosystem is an important part of the Government's efforts to fulfil Malaysia's commitment towards the reduction of its greenhouse gas emission intensity, in accordance with the COP 21 Paris Agreement. On 27 July 2017, the world's first green sukuk worth RM250 million was issued by Tadau Energy Sdn Bhd, followed by the world's largest green sukuk issuance of RM1 billion by Quantum Solar Park Sdn Bhd. Both sukuk are to finance the construction of large-scale solar photovoltaic projects in Malaysia.



Fortune 11 Sdn Bhd's 5 MW solar farm in Sepang, Selangor.



MOVING FORWARD ▶▶

Although oil prices gradually recovered in the fourth quarter of 2017 following the output-cut extension by OPEC and non-OPEC producers, it is widely believed that oil prices will maintain at the current level for the near future. Nevertheless, Malaysia's experienced O&G players are better positioned than before to weather this challenge, having built up their competencies and expertise over the years.

As aforementioned, the Peninsular Malaysia natural gas market liberalisation will be supported by low global natural gas prices. However, all parties need to step up their efforts to establish the supporting framework for the enforcement of TPA and facilitate the entry of new players into the Peninsular Malaysia natural gas market. This is crucial, as a liberalised market will contribute to stronger energy security and economic prosperity.

Moving forward, an upgrade of the PIPC Development Masterplan may consist of a plastic and fine chemicals park, a downstream finished products zone, as well as a medium and light industries hub with the overall investment target rising from US\$29.5 billion to US\$84.6 billion. Pengerang Deepwater Terminal's (PDT) total storage capacity is expected to increase to 3.2 million m³ by 2020, and discussions have been in place to explore its potential as a strategic oil reserve storage. In the long-run, the growth of infrastructure, investments in storage facilities and the new petrochemical refining complex is expected to realise Malaysia's vision of becoming a regional O&G downstream hub, complementing Singapore's capabilities as one of the world's oil refining and trading hubs.

Marketing efforts will be intensified to attract MNCs to relocate or establish their regional operations in Malaysia. New O&G investment, especially large-scale investments from China, Russia and the Middle East; as well as high-quality investments such as high-end manufacturing and centres of excellence for complex engineering will establish Malaysia as an OGSE hub. Nevertheless, awareness of Malaysia's home-grown technologies and expertise in the international market remains crucial to realise Malaysia's aspiration.

The Government will continue to focus on energy efficiency and renewable energy initiatives to meet the 11th Malaysia Plan's targets as well as fulfil the country's commitment to COP 21. All parties need to embrace energy-efficient measures and join the green movement, preserving the environment for the future generations so that Malaysia can be on par with other developed and developing countries globally in moving towards cleaner energy for the nation.
