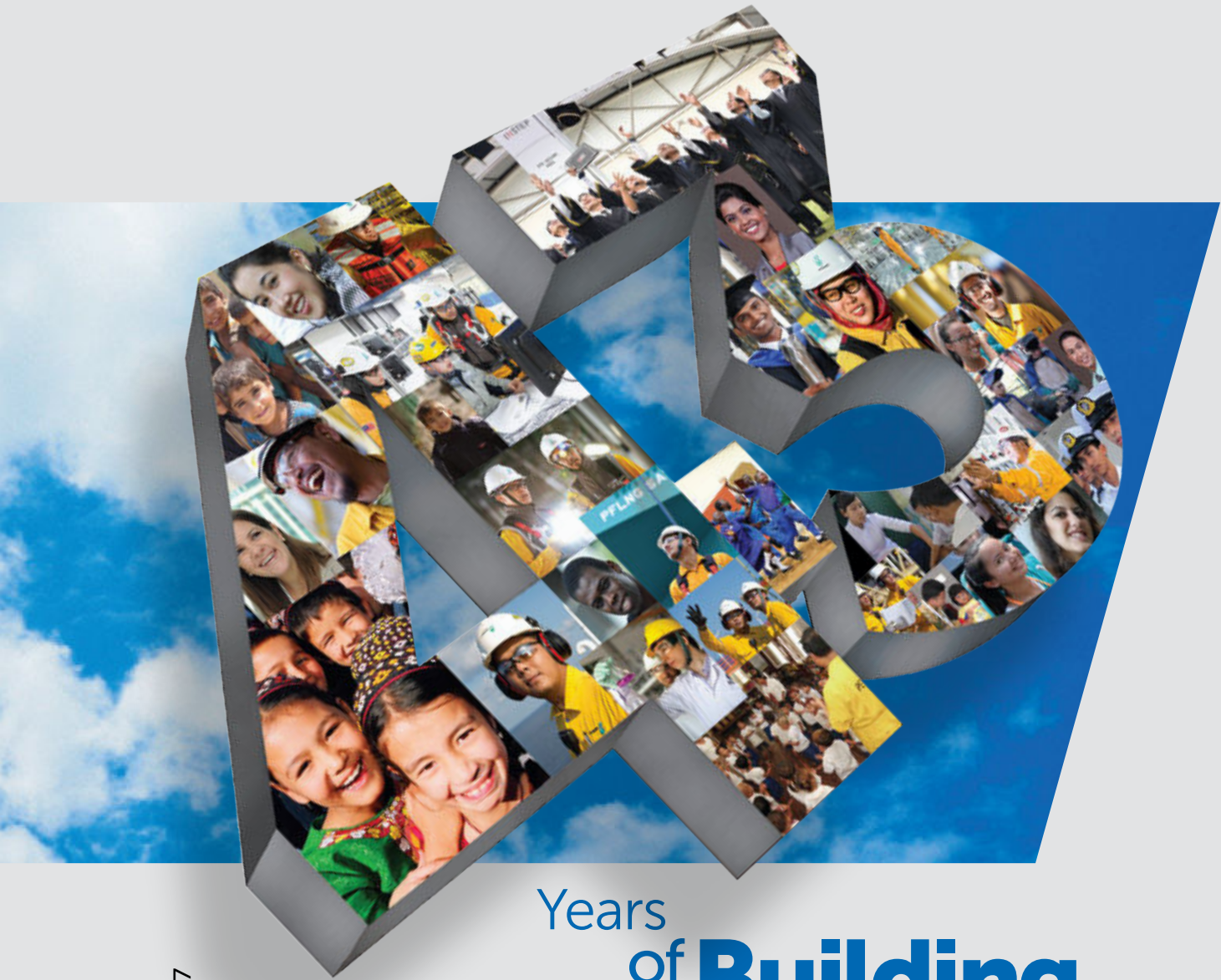


Flow



Issue 2, 2017

Years of **Building Legacies**

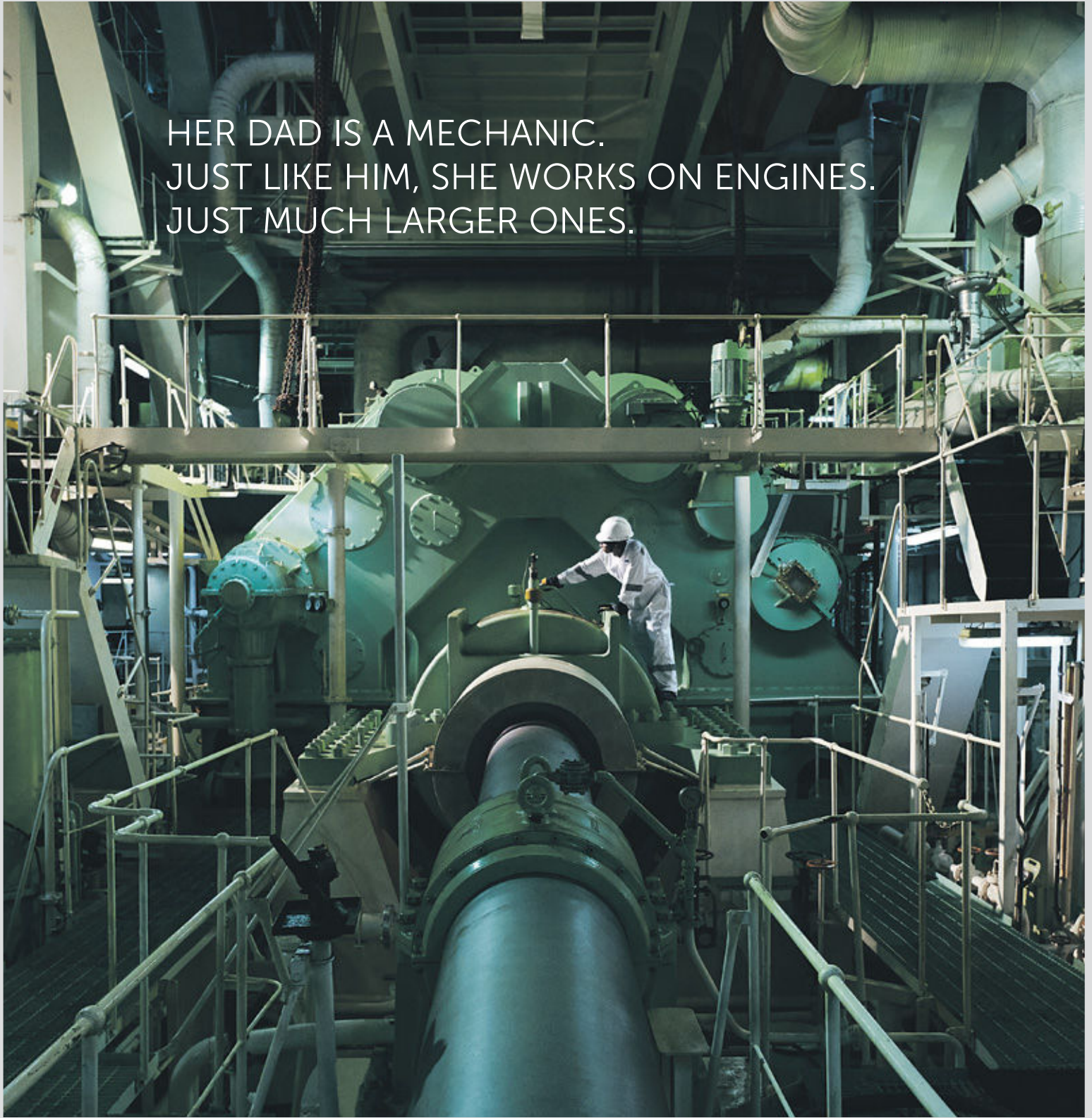
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HER DAD IS A MECHANIC.
JUST LIKE HIM, SHE WORKS ON ENGINES.
JUST MUCH LARGER ONES.



Hasivini Manaogaran
PETRONAS

Hasivini Manaogaran is in a select team of seafaring women who ply the seas to deliver LNG to East Asia.

Growing up, she wanted to become an engineer. So, when MISC Berhad opened its doors to new recruits, she seized the opportunity to be trained at the Malaysian Maritime Academy (ALAM).

Today, as a young engineer aboard Puteri Zamrud, she travels thousands of miles and back every week, braving the seas to deliver vital energy from Bintulu to Taiwan, Japan, China and Korea.

The challenges are plenty. But passion and dedication raise her above them all. **Empowering Lives™.**

Watch the full story of **#EmpoweringLives** at www.petronasofficial.com

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Petroliam Nasional Berhad



PETRONASofficial



ON THE COVER

To mark our 43-year anniversary, we pay homage to the states, countries and communities that have made PETRONAS and its people, a part of their journey.

Editor-in-Chief

Zahariah (Liza) Abdul Rahman

Editorial Committee

Lita Osman • Nik Sunita Azura A Rahim • Azura Hashim Kamal • Praevitriana Yuliawiratman • Lili Suryani M Idris
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Contributors

Sreerema Banoo • Jacqueline Pereira • Brigitte Rozario



GREETINGS

In this issue, we commemorate PETRONAS' 43rd anniversary and celebrate the company's journey from a fledgling nobody in the oil and gas industry into a FORTUNE Global 500® company and a globally recognised brand. The journey of PETRONAS is very much entwined with the socio-economic journey of Malaysia. It is a story of endless possibilities and opportunities unleashed with Malaysia gaining control of its sovereign resources.

In 43 years, the company has left indelible imprints wherever it went, creating legacies that enriched economies and communities. In this issue we present PETRONAS' legacies in business, technology, conservation and community development.

Also in this issue, our story on Japan market reflects the almost four decades of business relationship between PETRONAS and Japanese customers whilst examining the changing dynamics of this relationship. The story also looks at the creation of new synergies and collaborations for new opportunities in the emerging markets.

When it comes to gender diversity, oil and gas is the least diverse industry compared to others. According to a 2015 LinkedIn analysis, women make up just 26.7 per cent of the oil and gas industry. On PETRONAS' part, we have been continuously pushing for gender diversity but it is a long road ahead. Do read about our geologist Naqzatul Shima, who talks about making it in the male-dominated field of petroleum geology.

Our technology story features Distributed Acoustic Imaging technology which uses fibre-optics for seismic data acquisition without having to shut down production. This would mean considerable cost savings for oil and gas companies.

We hope that you not only enjoy the story but also get to know PETRONAS a little better. Do send your feedback to **flow@petronas.com**

Editor-in-Chief
Zahariah (Liza) Abdul Rahman

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**Building Legacies
Under One Sky**



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By Sreerema Banoo

It started its journey as an industry nobody; 43 years later, PETRONAS is a FORTUNE Global 500® company with operations across the globe and legacies in the commercial, social and environmental spheres.

Founded on 17 August 1974, during the global energy crisis of the 1970s, Petroliaam Nasional Bhd (PETRONAS) has in the decades since grown into a fully integrated oil and gas multinational corporation. An instantly recognisable brand in Malaysia, it has been on FORTUNE Global 500® for two decades.

PETRONAS began with seed money of just RM10 million. Driving the birth of the start-up was a group of 18 civil servants. These pioneers and the leaders who followed have steered the company to its many successes and milestones.

One of the company's first milestones was the signing of its maiden Production Sharing Contract (PSC) in 1976. This transformed the concession system governing the oil exploration and exploitation to a more equitable PSC system, and later heralded the birth of PETRONAS Carigali Sdn Bhd, PETRONAS' upstream exploration and production arm.

PETRONAS' first successful international upstream venture was in Vietnam and has since encompassed 23 countries. It was amongst the earliest National Oil Companies (NOCs) to venture globally, inspiring many other NOCs to do the same, thus changing

the landscape of the oil and gas industry.

Today, the oil and gas industry contributes some 20 per cent to Malaysia's gross domestic product. PETRONAS has to date contributed more than RM880 billion to the government in the form of dividends, royalties, duties and taxes.

Beyond these contributions, PETRONAS has also built meaningful legacies. These extend from Malaysia to the four corners of the world in which it does business. We take a look at some of these legacies and their impacts on communities, industries and economies.



FEATURE STORY

Bill makes provision for direct control by the Prime Minister over corporation

Over to Petro nas: ALL oil rights

REFINERIES

FROM Section 6 of the Petroleum Development Bill, 1974: Notwithstanding the provisions of any other written law, no business of processing or refining of petroleum or manufacturing of petro-chemical products from petroleum, may be carried out by any person or body of persons or company other than Petronas unless there is in respect of any such business a permission given by the Prime Minister... Any person, body of persons or company carrying on any such business may continue to do so but shall, not later than six months from the date of the commencement of this Act, apply in writing to the Prime Minister for his permission.

LEASES

FROM Sections 8 and 9 of the Bill: The Petroleum Mining Act, 1966, shall not apply to the Corporation... Any exploration licences issued and any petroleum agreements entered into pursuant to the Petroleum Mining Act, 1966, and any mining leases to petroleum shall continue to be in force for a period of six months from the date of the coming into force of this Act or for such extended period as the Prime Minister may allow.

CONTROL

FROM Section 3 of the Bill: The Corporation shall be subject to the control and direction of the Prime Minister.

The Council, whose members will be appointed by the Prime Minister.

The Council will advise the Prime Minister on the affairs of Petronas in the light of the national policy and interest.

The Bill also provides for Petronas to process or refine petroleum and manufacture petro-chemical products from petroleum. Other persons or companies must obtain permission from the Prime Minister to carry out any such business.

Refineries

The two refineries in Malaysia, for instance, are not the only ones that are...

and exposition of petroleum reserves in oil companies will continue to exist only for a period of six months extended by the Prime Minister. The intention being negotiations with a view to changing the terms and conditions of these rights will be completed.

The ownership and the exclusive rights and other powers and privileges vested in Petronas will be irrevocable. The Bill also makes provision for the Prime Minister to issue directions in time as he may deem fit and to make regulations for the purposes of carrying into effect the provisions of the Bill.

Kuala Lumpur's Eclectic Charm

No mention of the Kuala Lumpur landscape and skyline would be complete without including the PETRONAS Twin Towers. The architectural marvel has placed KL on the map of globally recognisable cities. Standing at a height of 451.9 metres, the 88-storey twin towers have become a symbol of this modern city. They epitomise the growth of PETRONAS and Malaysia.

The towers are located within the Kuala Lumpur City Centre or KLCC, which was envisaged as the city's new central business district. With its completion in 1998, the PETRONAS Twin Towers and KLCC have had a catalytic effect on the growth of KL's city centre – its landscape, playing a huge role in KL's journey of becoming a world-class city.

Within the same address, and equally breath taking is the KLCC Park. The green lung is a tropical oasis of trees and palms that were carefully chosen – offering visitors a sanctuary from the hustle and bustle of the city.



“ The cradle for many PETRONAS' technological advancements, Terengganu is also home to multiple education and environmental conservation programmes. ”



Terengganu's Tipping Point

Once a sleepy hollow on the shores of the South China Sea, Kertih is later known as the cradle of petroleum industry for Malaysia. It began offshore, with the discovery of the Duyong gas field and later in 1982, the Dulang oil field 130 km offshore - the biggest oil discovery at the time with an estimate of 300 million barrels of gross recoverable oil.

It didn't take long for Kertih to grow with an airport, schools, housing developments and a port of its own to export crude and chemical products. Kertih Integrated Petrochemical Complex (KIPC), PETRONAS Chemicals Group Berhad (PCG)'s first and largest integrated manufacturing plant today produces some six million metric tonnes per annum (mtpa) out of PCG's total combined production capacity of 12.7 million mtpa. PCG has grown too, being listed on the Main Board of Bursa Malaysia and being Asia Pacific's largest and the world's fourth largest Methanol producer.

KIPC recently employed a proprietary Membrane Contactor technology in its Terengganu Gas Terminal (TGAST) facility - with advanced CO₂ removal capabilities to deliver much cleaner gas and energy resource. Whereas in Dulang field, the world's first Water Alternating Gas injection took place. This became a catalyst for PETRONAS' advancement in Enhance Oil Recovery (EOR) - from developing a proprietary chemical for Chemical EOR to realising a joint venture for the world's first offshore EOR project in Tapis oil field, also in offshore Terengganu. Once depleted oil fields are given a new lease on life with resource recovery by more than 50 per cent for the next 20 years.

PETRONAS is also involved in numerous Corporate Social Investment initiatives. Where education is concerned, it entered into a strategic partnership with Yayasan Terengganu for the state-led TREGLISH programme. The programme is aimed to spur English proficiency

amongst students from 50 TREGLISH schools. In collaboration with Ministry of Education and a philanthropic foundation, Yayasan AMIR, 10 schools across the state are currently adopted by PETRONAS under the Trust School Programme focusing on excellence and holistic student outcomes.

Along the banks of the Kertih River, thousands of mangrove trees planted by PCG through its ecoCare programme can be seen, with an Environment Education Centre built for locals and tourists, young and old to participate in conserving the river's biodiversity. River conservation is also seen along the Paka River, where 300 mangrove trees are being planted by another PETRONAS' subsidiary, PETRONAS Gas Berhad (PGB). Additionally, about 1,000 mud balls are thrown into the river under PGB's "Sayangi Sungai Paka" programme to help improve the water quality as well as rehabilitate the river ecosystem.



The Talent Melting Pot in Perak and All Around

Every September, excitement brims on the faces of hundreds of young adults as they take their first steps through the doors of Universiti Teknologi PETRONAS (UTP). Much of this anticipation stems from the prospect that these are the first steps in their journey towards a career in the oil and gas industry.

In 1997, the first oil and gas focused university, Universiti Teknologi PETRONAS (UTP) was established in the heart of Bandar Seri Iskandar which is a part of an ongoing effort to create a sustainable supply of high quality local industry talent.

UTP complements various other training facilities such as Akademi Laut Malaysia in Melaka, Institut Teknologi Petroleum PETRONAS (INSTEP) in Terengganu, Kimanis Training Centre in Sabah and PETRONAS Leadership Centre in Selangor, which cater to the development of technical and managerial talent, for oil and gas and related industries.

The university boasts strong linkages and partnerships with other global industry players. Including Shell, Schlumberger, Halliburton and Baker Hughes a GE company, to name a few. Its graduates are highly sought-after by oil and gas companies with 95 per cent of them gaining employment within six months of graduation.

To date, UTP has produced more than 14,000 graduates and currently has an enrolment of almost 6,000 undergraduates and 1,500 postgraduates from 60 countries around the world. It is the only private university in Malaysia ranked in the Top 160 in Asia under the Quacquarelli Symonds (QS) University Rankings. It is also the first and only private university with a 6 star rating - the highest performance level accorded by Malaysia Research Assessment for its research, development and commercialisation efforts.





“ Highly sought-after graduates with 95 per cent gaining employment within six months of graduation. ”





**“ ALAM
provides an
ideal training
ground to
produce
industry-
ready and
capable
maritime
leaders.
”**

The Gates of Melaka Open



Natural gas is recognised as the cleaner, affordable, reliable, efficient and secure of all fossil fuels. In Malaysia, it has played a crucial role in the country's development – meeting almost two-thirds of the country's energy growth needs in the last three decades. So there is no denying the important role of natural gas in ensuring the country's energy security. For natural gas to fulfill its role, investment in infrastructure is key.

It was against such a backdrop that the country's first Liquefied Natural Gas (LNG) Regasification Terminal (RGT) was launched in 2012. Its commissioning the following year marked an important milestone for Malaysia's oil and gas industry.

Located 3 km offshore Sungai Udang in Melaka, the RGT comprises the world's first-of-its-kind

regasification unit on an island jetty, two floating storage units and a 3 km subsea pipeline.

The subsea pipeline is linked to a new 30 km onshore pipeline that connects to PETRONAS Gas Bhd's Peninsular Gas Utilisation (PGU) pipeline network. The PGU, which comprises more than 2,500 km of main and lateral pipelines, transmits gas to consumers in the power, industrial and commercial sectors. It is also linked to the Trans Thailand-Malaysia Gas Pipeline system in the north.

The RGT is also an important step towards the gas market liberalisation as it opens access to other gas suppliers to deliver gas into Peninsular Malaysia via the Third Party Access framework.



“The mega project in the making has already created multiplier benefits to surrounding communities.”

Taking Johor to Greater Heights

Big things are coming to Pengerang, previously little known area at the southeast tip of Peninsular Malaysia. A fishing village surrounded by oil palm and rubber plantations, it will soon be home to Malaysia's largest oil and gas hub, the Pengerang Integrated Complex (PIC).

Covering a size equivalent to 3,500 football fields, PIC comprises Refinery, Steam Cracker, Petrochemical Plants and supported by six Associated Facilities including Projek Air Mentah RAPID (PAMER), Pengerang Deepwater Terminal 2 (PDT2), Air Separation Unit (ASU), Pengerang Co-generation Plant (PCP), Regasification Terminal 2 (RGT2) as well as centralised Utilities and Facilities (UF).

The project is a game changer for Asia Pacific's chemical market and makes the perfect blending formula for Malaysia's next level of growth.

Earlier this year, Saudi Aramco has signed a 50:50 joint venture interest with total investment of USD7 billion, and scheduled to be ready for start-up in 2019. The refinery complex has the capacity to refine 300,000 barrels of crude per day, producing petroleum and petrochemical products including differentiated and specialty chemicals.

This mega project will also bring substantial multiplier and spin-off benefits to the surrounding communities. Working hand-in-hand with the state government, over 60

programmes were implemented from 2012 to 2016. This includes the #ForPengerang initiative with investment already totalling to RM8 million and another RM1.1 million allocated in 2017.

The focus is on elevating economic livelihood through entrepreneurship and education alongside other Corporate Social Investment (CSI) efforts. Through cooperatives such as Koperasi Pengerang Jaya Johor Berhad (KOPEJA), locals are exposed to business management where 90 per cent of the memberships are made of communities from surrounding areas, empowered to manage the onsite commercial fuel station on behalf of PETRONAS Dagangan Berhad.

Propelling Sarawak's Progress



Tanjung Kidurong on the outskirts of Bintulu, is where one of the largest integrated complex at a single site, PETRONAS LNG Complex (PLC) resides. Occupying an area of about 300 hectares and stretching more than 7 km in length, the PLC is home to two of the oldest Liquefied Natural Gas (LNG) plants in the world - Malaysia's first LNG plant, which was commissioned in 1983, and MLNG Dua in 1993.

With nine LNG trains lined up today, it carries LNG production capacity of approximately 30 million tonnes per annum (MTPA) – accounting for 80 per cent of PETRONAS' LNG production capacity. It also plays a significant role in the economy of Sarawak - contributing to about 50 per cent of Sarawak's gross domestic export.

Offshore Bintulu is also home to the country's - and the world's - first floating LNG facility - a 365 metre-long structure comprising production, processing and offloading facilities. Through this technological marvel, PETRONAS is able to unlock small and stranded gas fields once uneconomical to explore. Apty named, the maiden vessel has already loaded its cargoes from April 2017 destined to India, Taiwan and Korea.

Beneath the waters of Similajau National Park in Bintulu, 1,500 artificial reef balls have been deployed from year 2013 - 2015 to build sustainable homes for marine life. In partnership with Sarawak Forestry Corporation, PETRONAS' eco-marine conservation is extended to the Miri-Sibuti Coral Reefs National Park. The project upon completion in year 2019 will see another 1,750 units of reef balls being deployed. The marine habitat protection effort aims to deter illegal trawlers, ensure sustainable livelihood for fishermen and create a new eco-tourism destination in the region.

“ Multiple collaborations are forged to build capabilities and propel Sarawak's growth aspirations. ”

Long-term commitments are in place to continuously improve the education system and promote academic and non-academic excellence. This is done through collaboration with established partners in the education landscape such as with Yayasan Amir under the Trust School Programme. Aside to offering annual education sponsorships to deserving students, PETRONAS collaborates with Majlis Amanah Rakyat to provide quality education at MRSM schools in Sarawak. Through the VISTA programme, multiple collaborations are forged with vocational institutions to build technical expertise amongst Sarawakians, which will be key in empowering Sarawak to propel its growth aspirations.



Protecting Sabah's Treasures

In the heart of Sabah, about 300 km southeast of Kota Kinabalu lies the Imbak Canyon Conservation Area (ICCA). The 25 km-long self-contained valley, about half the size of Singapore, is the last remaining parts of Sabah relatively unexplored. Here lies Sabah's largest remaining untouched lowland dipterocarp forest and the headwater for the Kinabatangan River and its tributaries. The ICCA is also home to diverse flora and fauna including medicinal plants.

Massive conservation works are taking place here – PETRONAS and Yayasan Sabah built a bridge and held upskilling programmes for local communities, in preparation for an influx of tourists and researchers coming to the Imbak Canyon Studies Centre. Meanwhile in remote villages around Pitas and Kota Marudu, clean water is flowing, thanks to the gravity-fed water system, part of the "Planting Tomorrow" programme to elevate community wellbeing.

Sabah youths are not excluded in contributing to the socioeconomic development of their beloved home state. It can be seen when a



A brighter tomorrow beckons with Sabahan youths eager to participate in the state's socioeconomic development.

group of them recently won the National Innovation Competition for the National Blue Ocean Strategy. The award was for their innovative invention, a flood alert system installed at the Tamparuli Bridge and Riverbug Kiulu using PETRONAS' All About Youth (AAY) programme grant. Besides AAY, PETRONAS' VISTA programme that initiates collaboration with vocational institutions are already equipping over 2,000 trainees with skillsets to partake the oil and gas industry.

The honed skills are timely with the Sabah Ammonia Urea (SAMUR) project, Sipitang poised to be the next boomtown in the state. The project is expected to act as a catalyst for the growth of Sipitang and the surrounding areas by widening manufacturing activities and creating more jobs.

The project comprises an ammonia plant, a urea plant, a granulation plant, utilities and jetty facilities. The ammonia plant is expected to produce some 740,000 metric tonnes of liquid ammonia per annum, with the lion's share headed to Japan.







“ A picturesque view of Erb West Field, offshore Sabah against the golden sky. ”

Racing with an Italian Arm

By all accounts, the 9th of July 2017 was a great day for Valtteri Bottas – not only did he begin the day at pole position of the Austrian Grand Prix but the win for the determined Finn, put him in the thick of the Formula One title fight. High hopes afloat for the new addition to the three consecutive year World Constructors' Champion team, PETRONAS Mercedes-AMG Motorsport, to continue placing the Company and by extension brand Malaysia on the podium top with him.

Two years prior to being the Technical Partner to the motorsport team where the fluids are put to the ultimate test, PETRONAS made its move to set up PETRONAS Lubricants International (PLI). PLI's acquisition of Italy-based FL Selenia strengthens PETRONAS' experience in fuel technology. A Fluid Technology Solutions™ approach was developed through synergy by two world class R&D centres, one in Bangi, Malaysia and another in Turin, Italy – transferring the precision of the formula to 10 advanced blending plants across continents.

From race tracks - to labs - to roads, concoctions include the Primax 95 fuel, sold not only at over 1,000 PETRONAS stations across Malaysia, but also at ENGEN stations in South Africa and sub Saharan African countries. It is the same formula that powered the Mercedes-AMG PETRONAS Motorsport Team win whilst consuming 30 per cent less fuel. Other bespoke creations are the PRIMAX 97 Euro 4 fuel proven to accelerate drive by more than 2 per cent and PETRONAS Syntium lubricant with CoolTech™ which shows up to 72 per cent better resistance to wear compared to some of the highest industry standards.

To reduce sluggishness in bike engines, PETRONAS Sprinta with UltraFlex™ outperforms conventional oil in deposit control. Heavy machineries also benefit with prolonged engine life, with PETRONAS Urania with ViscGuard™, preventing build-ups and performing 89 per cent better in soot-induced viscosity compared to industry limit.

With superior products covering over 100 markets globally, PLI is not too ambitious to jump its place from currently being the world's top 10 to top five in the markets.





“ From race tracks - to labs - to roads, the winning formula can be found at over 1,000 PETRONAS stations across Malaysia, and at ENGEN stations in South Africa and Sub Saharan African countries. ”





Trials and Triumphs in South Sudan



In Juba, the capital of the Republic of South Sudan, pupils at the Atlabara East Primary School are wearing eager, bright smiles. They, and the teachers have a renewed passion for learning. This is thanks to the school's refurbishment. Having deteriorated following years of conflict in the country, the building of new classrooms and better facilities through a PETRONAS sponsorship has given the school and the community, a new lease on life.

This initiative is but one of many undertaken to assist in resuscitating lives and empowering the communities in which PETRONAS operates. In South Sudan, as in other countries, community projects such as clean water supply, mobile health clinics and training programmes go hand-in-hand with exploration and production activities.

PETRONAS' operations in the Republic of South Sudan began in 1995 when the country was still part of the Republic of Sudan. At the time, PETRONAS was one of the latter's earliest foreign investors.

In 2012, following the secession of the Republic of South Sudan in July 2011, PETRONAS agreed to continue operations in the upstream blocks in South Sudan previously awarded by the Government of the Republic of Sudan. And despite several periodic shutdowns between 2012 and 2013, PETRONAS was able to get its facilities up and running by the start of 2013.

From the start, capacity building was a priority in South Sudan. Prior to the secession, most of the company's workers had come from the north, and once they returned home following the split, there was a talent vacuum that had to be filled.

Today however, 70 per cent of its workforce in South Sudan comprises locals. Efforts are also in place to train South Sudanese geologists, operators and technicians.





Creating an Oasis of Opportunities for Iraq

Located in Thi Qar Province in southern Iraq, the onshore oil field is estimated to hold 1.3 billion barrels of oil reserves. Current production at Garraf stands at 100,000 bopd with peak production of 230,000 bopd targeted by 2018. In Iraq, PETRONAS also has interests in the Majnoon and Badra oil fields, and the Halfaya oil field, operated by PetroChina, which started production in the middle of 2012.

Since 2010, PETRONAS has embarked on several sustainable long-term projects with a core focus on education, capability building and skill development. School refurbishment projects aimed at creating a more conducive learning environment have also benefitted thousands of children.

PETRONAS also contributed new desks to the Al-Sahza Secondary Girls School in Rifa'l – aiding 900 students. Seven cabins were built for Sumer University to support and encourage higher education within the community. PETRONAS also established the Garraf Vocational Training Centre to provide vocational training to more than 150 locals per year in various trades to increase their employability.

Through the Garraf Mobile Basic Health Care Services, PETRONAS has enabled more than 1,000 people to receive free medical check-ups. Clean water access was also given to the 4,000 people living in the al-Dela and al-Ibrahim villages through two reverse osmosis water stations.

PETRONAS also undertook road construction and reconstruction in Garraf to provide the local community with more than 100 km of asphalt roads, and as of 2015, 20 new roads have been completed.



PETRONAS' journey in Iraq began in 2010 when it won the bid – as part of a consortium that also included Japan Petroleum Exploration Co Ltd and Iraq's North Oil Company – to develop the Garraf oil field. Weathering Iraq's challenging environment through perseverance and strong partnerships, drilling works commenced in 2011. First oil was achieved in August 2013 at the rate of 35,000 barrels of oil per day (bopd).

“ Since 2010, PETRONAS has embarked on several sustainable long-term projects with a core focus on education, capability building and skill development. ”





Making a Difference in Myanmar



One of the leading oil and gas operators in Myanmar, PETRONAS' presence in this country for almost three decades extends beyond the energy sector. Its socioeconomic programme prioritising education, healthcare, skills training and providing basic infrastructure such as school, library, water supply, road upgrading have played a significant role in transforming the lives of various communities in Myanmar.



From the first Production Sharing Contract (PSC) it signed with Myanmar Oil and Gas Enterprise in 1990, PETRONAS has to date sealed seven PSCs and one Improved Petroleum Recovery Contract in Myanmar, and currently holds operatorship of five oil and gas blocks in various stages of development across the country.

PETRONAS is also a joint-venture partner in the Yetagun Gas Project and the Taninthayi Pipeline - a cross-border pipeline transporting gas from the Yetagun Gas field to Thailand.

On the socioeconomic front, PETRONAS runs the Yetagun Socio-Economic Programme, working with disadvantaged communities living along the pipeline area in Kanbauk and also in Yangon. The programme focuses mainly on education, nutrition and primary healthcare, especially for children and youth.

Since 1997, 53 Early Childhood Care and Development (ECCD) centres were built across Myanmar to support early years of children development. Computer training was also given along with other holistic skills to develop youth under the Yetagun Youth Programme.



From 2004, scholarships are granted to students to further their studies in Universiti Teknologi PETRONAS. Students are also sponsored to pursue their vocational training at the Government Technical High School and subsequently, Technology University. The Dawn micro-financing programme was also rolled out to empower women to run their own small businesses.





One of the most intriguing and enigmatic Central Asian countries, Turkmenistan was one of the stops along the ancient Silk Road. Although the bazaars and caravanserais may still exist, the Turkmenistan of today has its sights trained on the future. Having the world's fourth largest natural gas resources means that Turkmenistan's oil and gas industry is the driving force behind the

country's economy and growth. And PETRONAS has been an important partner in that growth journey.

In 1996, PETRONAS signed a Production Sharing Contract (PSC) with Turkmenistan – becoming the first foreign company

engaged in the development of the Turkmen shelf of the Caspian Sea. It's been a partnership in the field of exploration and production, infrastructure, and capability building.

The milestones achieved by PETRONAS in Turkmenistan are also significant moments for this landlocked country. In 1998 when PETRONAS spudded its first well, Magtymguly-1X (East Livanov), this also marked the first offshore exploration well drilled in Turkmenistan since its independence in 1991. The start of commercial crude oil production in 2009 from the Diyarbekir field and natural gas production in 2011 from Magtymguly field, established PETRONAS as a major oil producer and supplier of natural gas in Turkmenistan.

First oil at the West Diyarbekir (WDDP-A) platform on 9 April 2015 marked another milestone for PETRONAS in increasing its crude oil production. PETRONAS' significant role in Turkmenistan's oil and gas industry has also prompted the country to encourage the company's participation in downstream activities.

Exploring Turkmenistan's True Potential

Since 1998 Turkmen scholars benefitted from PETRONAS scholarship awards to further their studies at Universiti Teknologi PETRONAS.

Over 200 Turkmen have also benefitted from the PETRONAS' Technical Training Programme aimed at nurturing capable and reliable operators and technicians for its onshore and offshore oil and gas facilities.

Sharing Aspirations with Indonesia



PETRONAS' presence in Indonesia's upstream oil and gas industry dates back to year 2000 and it is today involved in 11 Production Sharing Contracts in Indonesia, and operates three oil and gas blocks in various stages of development. Downstream, PETRONAS is involved in the marketing and retailing of lubricants, commercial and retail fuel, and the sales and marketing of petrochemical products.

Capacity building and empowering local talents remain the cornerstones of PETRONAS' operations in Indonesia. Competent operators are given specially designed On-the-Job-Training programme to prepare them for production phase.

Deserving students are also given the opportunity to further their studies at the Universiti Teknologi PETRONAS through PETRONAS' scholarship awards since 2003.

In improving livelihood of disadvantaged communities, PETRONAS became a sponsor for the Kesatria programme in Sampang and Gresik regencies. The entrepreneurship programme which began in 2014 offers Indonesian youth trainings on skills such as motorcycle and mobile phone repair. The upskilling initiative was done concurrently with improvement efforts made in water supply and sanitation facilities at surrounding areas.

The Inroads into India



The blending plant in Patalganga is coming on stream by 2018.



“ The magnetic effect of India’s growth has seen PETRONAS and Indian companies evolving together through the decades. ”

On the outskirts of Mumbai, not far from the Patalganga River in the state of Maharashtra, a new lubricant plant is taking shape. When it is operational in the first quarter of 2018 this plant is anticipated to be the most advanced fully automated blending and filling facility with a production capacity of 110 million litres.

The plant is a testament to PETRONAS and India’s long-standing and enduring relationship – from the first Malaysian Crude Oil (MCO) term contract with Indian Oil Corporation Limited (IOCL) followed by Bharat Petroleum Corporation Limited (BPCL)

and Hindustan Petroleum Corporation Limited (HPCL). It was in 1998, that PETRONAS via a joint venture with IOCL made foray into India’s liquefied petroleum gas (LPG) market. In the space of two decades IndianOil PETRONAS Private Limited (IPPL) has already notched several milestones. To date, IPPL has built two fully automated terminals at Ennore in Tamil Nadu and Haldia in West Bengal, 27 auto LPG dispensing stations across India – handling 40 per cent of India’s total LPG imports.

The opening of PETRONAS Energy India Pvt Ltd in early 2017 cements India’s importance as a key engine of growth for the company.

It signals the company’s commitment to exploring business growth opportunities across all segments of India’s oil and gas value chain.

India is one of the most competitive economies and the fourth largest Liquefied Natural Gas (LNG) market in the world. India’s significance to PETRONAS is further demonstrated by the delivery of PFLNG SATU’S maiden cargo in April 2017 to India’s Dhabol LNG Terminal. In years to come, it is expected that the promotion of LNG as a fuel for vehicles - part of India’s move towards a cleaner energy future – will present a vast potential for PETRONAS.



“ **Founded on mutual trust and respect, PETRONAS and Japanese companies have come a long way from ensuring energy demand is met, to further adding value to hydrocarbon resources.** ”

Joining Hands with Japan

PETRONAS' bond with Japan is not only strong but has endured the test of time and events. Apart from being one of its earliest customers for crude, Japanese companies played a critical role in PETRONAS' LNG journey since the establishment of Malaysia LNG Sdn Bhd in 1978.

Four decades and eight more LNG trains later, PETRONAS with various Japanese partners and customers formed a legacy for Malaysia in building a reputation as a reliable LNG supplier – the world's third largest. Successful partnerships sparked

more collaborations across the value chain from the production of chemicals to distribution of lubricants.

Founded on mutual trust and respect, relationship dynamics have evolved - from collaboration for LPG transportation to exploration of new frontiers. It comes to no surprise that the two forces are continuing to join hands. After all, since 1987, rice plantations in Japan are grown with reliable quality of PETRONAS' granular urea - with supply expected to reach a 2 million-metric-tonne mark by 2018.

Energy Mix

Japan is the world's largest LNG importer, leading the industry with 36 per cent of worldwide imports. Its market for electricity generation is the world's sixth-largest and Asia's third-largest after China and India. The East Asian island nation has always been at the forefront of natural gas usage, and was the first country to import LNG in 1969 from Alaska.

Japan turned to nuclear energy in the late 1960s to transform itself into a global power house. With the aid of advanced technology and the support of expanding industries, almost 30 per cent of its electricity came from nuclear energy prior to the Fukushima Daiichi nuclear incident. As a result of the 2011 incident, Japan had to reconfigure its energy mix; Japan's dependence on gas for electricity rose from about 17 per cent to 25 per cent.

Consequently, Japan's power industry bounced back, as a result of numerous initiatives by the government led by the Ministry of Economy, Trade and Industry (METI), one of which being the establishment of JERA - a product of business integration between Tokyo Electric and Chubu Electric.

Since 2015, fossil fuel has dominated the energy mix for Japan, with LNG contributing 44 per cent of that figure.

LNG offsets the loss of nuclear power in Japan, playing a crucial role post-Fukushima as the balancer of Japan's energy mix. LNG imports in Japan increased by 25 per cent from 2010 to 2014 despite a 50 per cent price increase.



A vibrant autumn scene in Japan, featuring a large, dark tree trunk in the foreground that arches over a pond. The background is filled with trees displaying brilliant autumn foliage in shades of yellow, orange, and red. A wooden bridge spans the pond, with a few people walking across it. The overall atmosphere is serene and picturesque.

JAPAN: Standing the Test of Time

In heralding autumn in Japan, the 'red leaf' phenomenon Koyo is particularly significant. Acknowledging the transitory essence of nature, people gather to view the changing colour of leaves all in their resplendent glory. This centuries-old practice not only demonstrates nature's divinity, but also causes pause for reflection.

Similarly, amid the unprecedented remolding of the energy landscape, the Malaysian-Japanese relationship, built on reliance and credence, is poised to further strengthen through collaboration and innovation.

Building Partnerships



Signing of a Joint Venture Agreement to set up Malaysia LNG Sdn Bhd.

Japan has always played a vital role in Malaysia's energy industry beginning in 1976 when Taiyo Oil became the first term Malaysian Crude Oil (MCO) lifter.

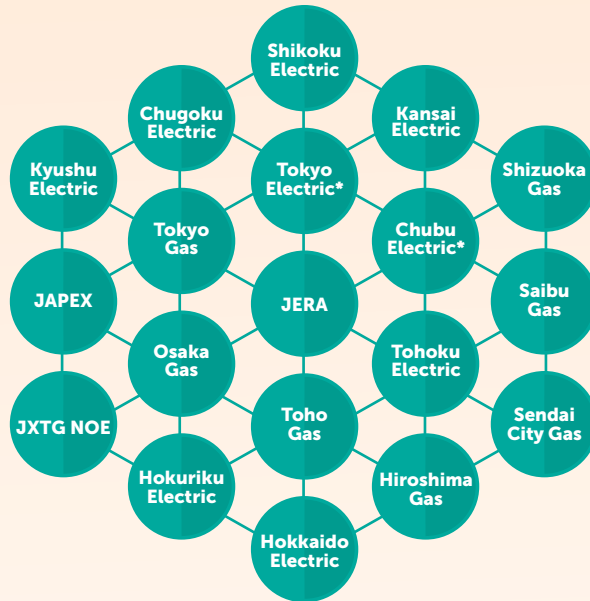
PETRONAS then embarked on the LNG journey through the establishment of Malaysia LNG Sdn Bhd (MLNG) in 1978 with Mitsubishi Corporation being one of three joint venture partners. The then new venture's first two customers were Tokyo Electric and Tokyo Gas, with sale and purchase agreement concluded even before the first gas was extracted. MLNG delivered its first cargo on 29 January 1983, marking the beginning of a 34-year relationship built on supply security, reliability and trust.



First LNG shipment to Japan via Tenaga Satu.

After the successful formation of the first MLNG plant, PETRONAS expanded its LNG business through the establishment of MLNG Dua Sdn Bhd (MLNG Dua) in 1992 and MLNG Tiga Sdn Bhd (MLNG Tiga) in 1995, which were joined by Japanese corporations such as Mitsubishi Corporation and Nippon Oil - now known as JXTG NOE.

Portfolio of LNG Buyers in Japan



*Note: Tokyo Electric and Chubu Electric have officially novated their contracts to a single entity known as JERA

Subsequently, PETRONAS' LNG business expanded in Japan, with new sale and purchase agreements with power and gas companies, making PETRONAS the LNG supplier with the widest market coverage in the country.

PETRONAS continues to ensure security of supply through the incorporation of PETRONAS LNG 9 Sdn Bhd (PL9SB), for the ninth LNG liquefaction train at the PETRONAS LNG Complex (PLC), with JXTG NOE owning 10 per cent equity stake in the plant.

Relationship established with Japanese companies from crude to LNG opened doors to numerous collaborations in the downstream sector - such as with Idemitsu Kosan for the production of Ethylene and Styrene Monomer; Mitsubishi Corporation and Japan Energy for the production of PETRONAS Chemicals' Aromatics; PETROPLAN for distribution of lubricant and ZEN-NOH for the distribution of granular urea into Japan. The collaboration with Tokyo Gas in 1992 resulted in the formation of Gas Malaysia, a key supplier

of Natural Gas and Liquefied Petroleum Gas to homes, commercial businesses and industries. LPG imports into Japan grew to 1 million tonnes by 1999, mainly attributed to Iwatani Corporation, which recently celebrated its 25th long-term partnership with PETRONAS. Together with Itochu Corporation, PETRONAS paved new inroads into LPG markets in India and Indonesia.

PETRONAS via a collaboration with Mitsubishi Corporation, a partner during its infancy in LNG also installed solar panels on the rooftops of KLCC Shopping Centre and a PETRONAS station with the capacity of 660KW and 140KW, respectively.

"Our business relationship with Japan has been shaped by these enduring partnerships that have allowed for both parties to leverage on each other's strengths to move forward. We, at PETRONAS would like to take these partnerships further through the creation of new value propositions, especially in clean energy solutions, for Japan and other markets," said PETRONAS' Country Chairman (Japan), Ahmad Nazri Wahab.

Transforming Relationships

Japan's limited energy resources has never impeded its energy companies from successfully exporting crucial oil and gas industry skills in every aspect, from engineering to finance.

Their companies' expert global contributions include energy sector equipment and government-supported R&D programmes. Its expertise in downstream and mid-stream markets, such as operating LNG terminals and gas pipelines, is an advantage in establishing a value chain for natural gas.



PETRONAS Integrated LNG Complex in Bintulu is still one of the world's largest of such facility at a single site.

New Opportunities, Tokyo Gas

A long-standing relationship since 1983, PETRONAS and Tokyo Gas have mutually gained invaluable knowledge and expertise in the energy business. Besides being the foundation buyer of MLNG, Tokyo Gas is the only LNG buyer purchasing from all - MLNG, MLNG Dua, and MLNG Tiga projects.

In 2016, business relationship between PETRONAS and Tokyo Gas transcended from being the conventional buyer-seller to a more dynamic partnership in exploring new business opportunities globally.



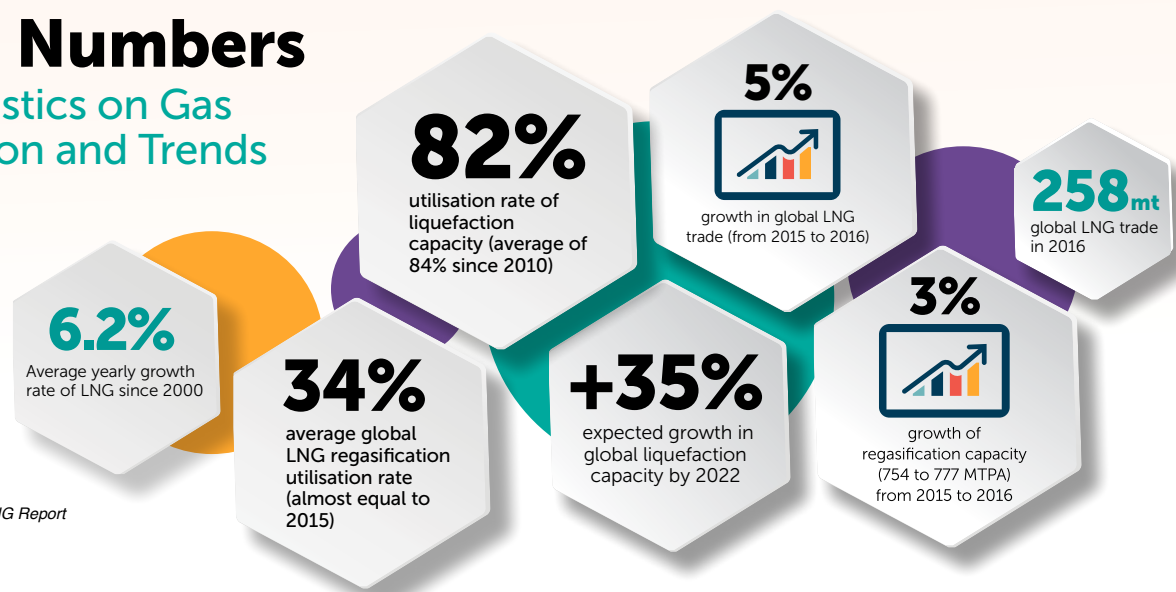
Joint exploration of Garraf oil field in Iraq.

Exploring Iraq, Japan Petroleum Exploration Co Ltd (JAPEX)

Seven years after JAPEX's venture into Malaysia's oil and gas industry as an MLNG Tiga buyer, it joined forces with PETRONAS to explore Iraq. In 2009, both exploration companies acquired the development and production service contract of Iraq's Garraf oil field, producing its first oil in August 2013.

Noting Numbers

Global Statistics on Gas Consumption and Trends



*Source: IGU 2017 World LNG Report



One of PETRONAS' youngest moss-type LNG ships.

Ever since PETRONAS and its partners embarked on their LNG journey in 1978, the priority has always been to provide the finest LNG liquefaction, export and delivery services to customers. Until today, PETRONAS has maintained an unblemished record in delivery of LNG cargoes, sealing its reputation as one of the world's most reliable LNG suppliers.

Malaysia is currently the world's third-largest LNG exporter, after Qatar and Australia. Japan remains Malaysia's largest LNG buyer, accounting for 62 per cent of its LNG exports in 2016. The long-term relationship with buyers throughout Japan is a testimony to

a partnership built on trust that has survived several great challenges over the years.

However, the LNG market landscape is evolving fast - with tenures becoming shorter, buyers pushing for greater flexibility and with buyers turning into sellers, there is a need to relook at how we respond to market dynamics and create more value for our LNG molecules.

A task that calls for collaboration made of a solid partnership and a shared vision for a sustainable future.

Changing Dynamics

Perfect Chemistry for Changing Needs



PETRONAS focuses on high-value chemicals, allowing access to new materials and valuable resources to boost production in a more efficient, greener and cost-effective manner. Technological advancement authorises delivering chemical solutions that are not only affordable, but robust enough to withstand harsh environments, overcoming the logistical challenges of operating from remote locations.

Material Substitute for Modern Industries

Precipitated Calcium Carbonate (PCC), a synthetic, high grade stable compound

derived by combining captured CO₂ with calcium hydroxide (or slaked lime), makes an ideal starting material for a host of industry products such as paint, pharmaceutical, plastic and rubber.

The Non-Metallic Pipe (NMP) is a corrosion resistant composite material suitable for both brown and green field applications. The innovative solution for pipeline and downhole tubing rehabilitation eases installation, at a fraction of the cost.

Combined Strengths for New Capacity

ASEAN's first 2-Ethylhexanoic Acid (2-EHAcid) is a chemical intermediate used as a compound. Examples of its use include synthetic lubricants, oil additives and functional fluids like automotive coolants, metal salts for paint dryers, plasticisers, stabilisers, catalysts and other applications in various industries.

BASF and PETRONAS Chemicals Group Berhad (PCG) jointly built a new

worldscale production plant for high-purity 2-EHAcid. This plant will serve growing demand in Asia-Pacific, using the combined strengths of skilled human resources, technology and overall molecule integration to optimise the value chain.



BASF has also partnered with PETRONAS Chemicals Group (PCG) to develop a BASF Isononanol plant worth RM1.9 billion at the Pengerang Integrated Complex. Under this partnership BASF will provide its licensed INA production technology to PCG – its first production technology license to a third party.



BIGGER CAPACITY, GREATER VARIETY

Pengerang Integrated Complex (PIC) is strategically located along the world's busiest shipping lanes and international trading hubs.

Upon completion, customers can expect new, high-value, high demand products and various grades of polymers and glycols for packaging films, automotive, polyester fibre and plastic industries.

Japan

Rice Bowl

Rice has been central to Japan's economy and culture for centuries, providing the basis of a proud agrarian heritage that forms the nation's spiritual core. Japan is the world's tenth-largest rice producer, with the crop grown on more than half of its intensively cultivated land.

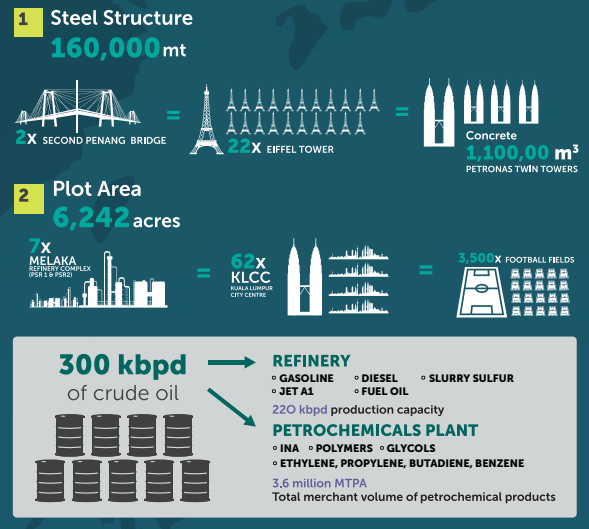
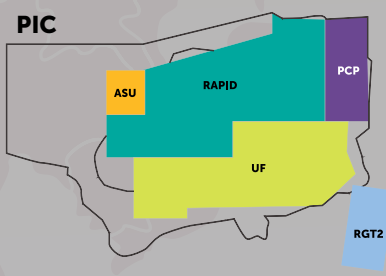
Rice is a staple for nearly half of the world's seven billion people, with more than 90 per cent of it consumed in Asia. Fertilisers are a necessary feature of modern paddy cultivation. The market for fertiliser is driven by increasing demand for fertiliser spurred by global food production and development in fertiliser manufacturing technologies.

The fertiliser market is projected to grow at a Compound Annual Growth Rate (CAGR) of 2.6 per cent from 2016, to reach USD2.91 billion by 2021.

Urea, the most commonly used nitrogen fertiliser and the preferred choice for farmers, accounted for the largest segment share in 2015. In 2016 Malaysia became the second-largest urea producer in Southeast Asia with full utilisation of the Sabah Ammonia Urea (SAMUR) plant. As of April 2017, a total of 148,813 tonnes of ammonia and 187,300 tonnes of urea had been produced. The SAMUR Project represents PETRONAS' continuous effort to meet market demand for urea, especially in the Southeast Asia region.

Currently Malaysia holds the largest market share with 90 per cent in granular urea exports to Japan.

- PIC : Pengerang Integrated Complex
- RAPID : Refinery and Petrochemical Integrated Development
- PCP : Pengerang Co-generation Plant
- ASU : Air Separation Unit
- UF : Utilities and Facilities
- PDT2 : Pengerang Deepwater Terminal 2
- RGT2 : Regasification Terminal 2



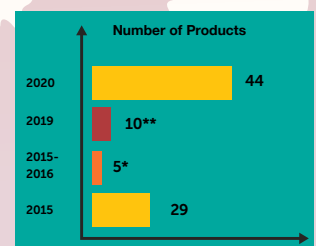
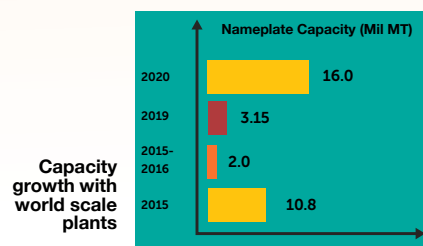
Malaysia

Pengerang

PETRONAS has grown to be a regional market leader for petrochemical products



PETRONAS Chemicals Group has been growing significantly to gain stronger foothold in South East Asia



PCG SAMUR & Specialties Projects RAPID

NOTES: New Products *Specialties Projects **RAPID

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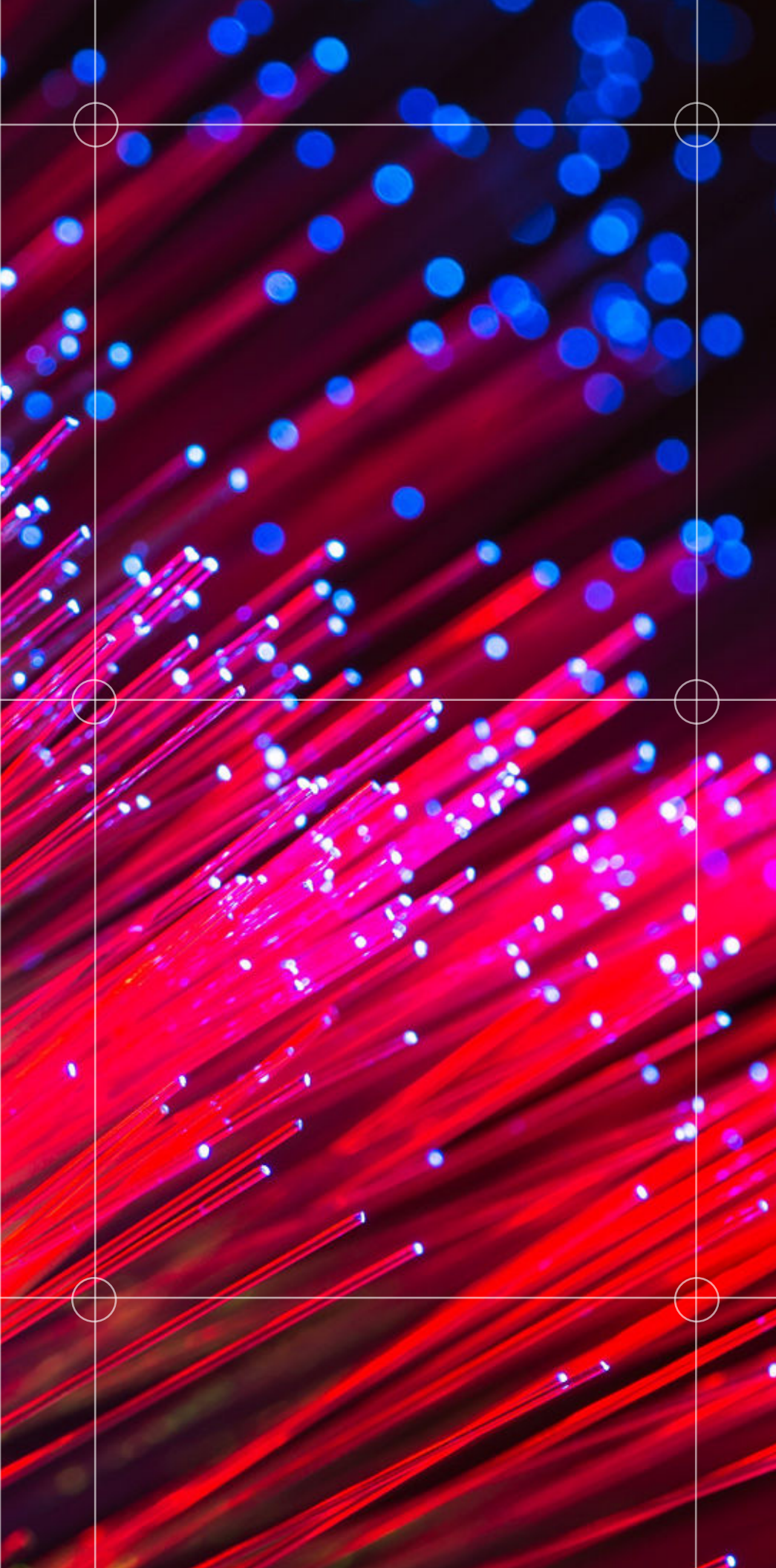
Seri Camellia



Ears on Wells

By Sreerema Banoo

The Distributed Acoustic Sensing Technology presents the unique ability to monitor real-time behaviour and performance of reservoirs by listening to it. This breakthrough technology addresses cost-related challenges in reservoir monitoring and management.



Mention fibre-optic technology, and the first thing that comes to mind is its use in the telecommunications industry. After all, these fragile strands of glass fibres support a large part of the world's internet, entertainment and telephone systems, and have transformed the way we network and communicate. Let's face it, without fibre-optic technology the Netflix we know today would not exist.

The application of fibre-optic technology also goes beyond the communication or data transmission sectors. In the medical field for example, fibre-optic technology allows doctors to diagnose, monitor and treat patients more easily and at greater comfort for patients.

Although fibre-optics has already been used in the oil and gas industry in the form of distributed temperature sensing (which is already an established well monitoring technique), there are other ways it can be applied as part of the industry's continuous quest to explore and produce hydrocarbons safely and efficiently, with as little environmental impacts as possible. At a time when the industry is faced with challenges on all fronts, technological breakthroughs are a boon.

A breakthrough in subsurface surveillance

The most recent of these applications is the utilisation of fibre-optics for distributed acoustic sensing, or in simple terms, as listening devices along the wall of a well or pipeline.

Head of R&D Exploration Technology at PETRONAS Group Research and Technology, Dr Ahmad Riza Ghazali says distributed acoustic sensing heralds a breakthrough in subsurface surveillance and monitoring. "Fibre-optic cables can be installed inside a well and along pipelines – allowing us to monitor in real time the flow of hydrocarbons, if there is bypass oil, and detect leakages or problems on the pipeline by pinpointing the exact location of the leak or problem area," he says.

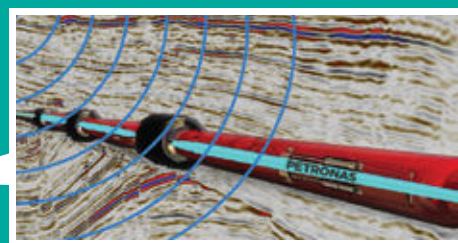
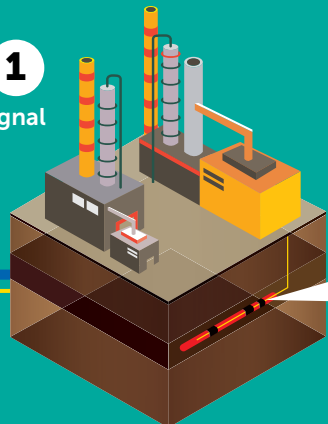
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Interrogator Unit (IU): generates and transmits laser light pulses into the fibre-optic cable.



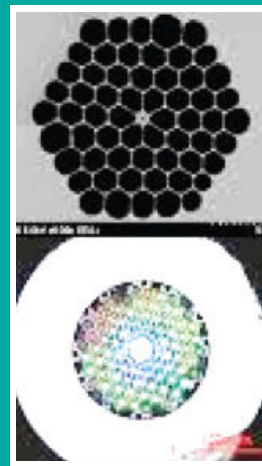
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Source Signal



4

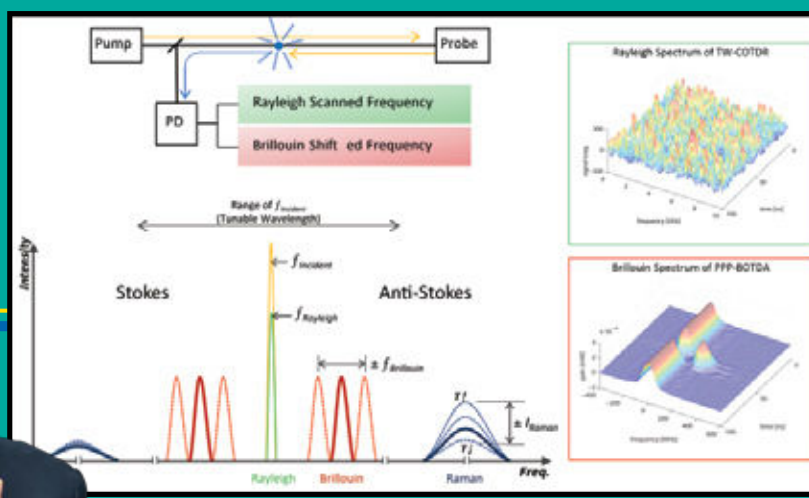
Acoustic-modulated light pulse is backscattered and recorded in the IU as VSP data.



Source Signal deforms the fibres installed along the borehole.

CAPTURe : Fibre-Optic Distributed Acoustic Sensor

3



< Dr Ahmad Riza Ghazali

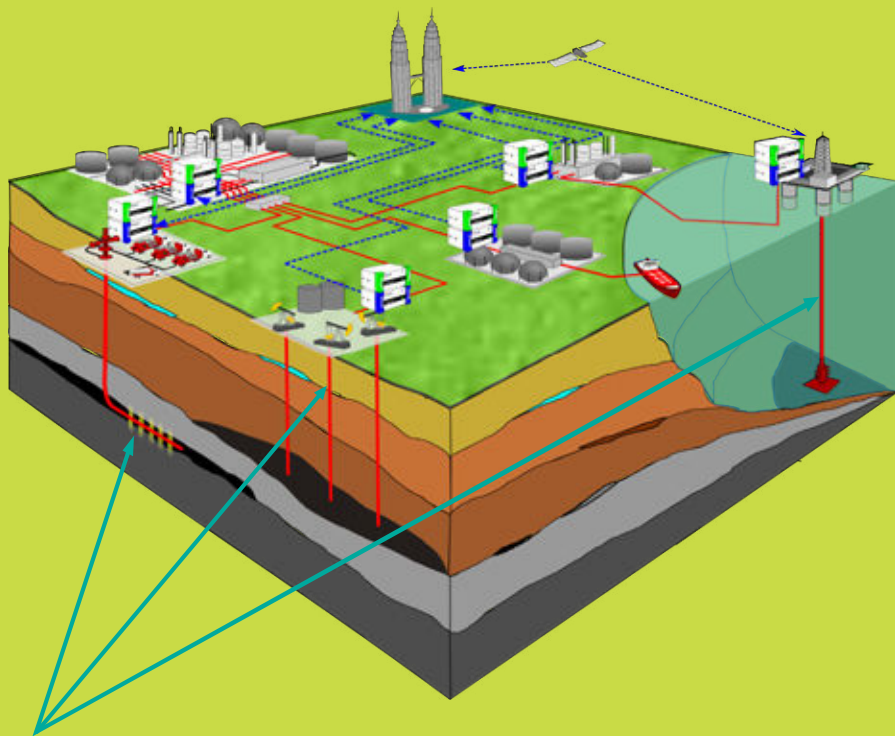
Data obtained is critical in reducing exploration and development risk. It also helps manage costs by identifying oil and gas prospects more accurately, trimming drilling costs, and placing wells more effectively.

Placed along the length of a well or pipeline, distributed acoustic sensing essentially turns fibre-optic cables into millions of tiny microphones that allow the operator to listen to what's happening along the length of that well or pipeline.

Acoustic sensing works by sending laser energy pulses to the optical fibres and analysing the naturally occurring Rayleigh backscatter (which is scattered light that returns directly to the source).

Light pulses, interact with the materials that make up the optical fibres as they travel – creating small changes in the amount of light that is reflected within the optical fibres. This change in the reflected light can be measured and quantified to indicate both the specific location along the fibre where the change in reflection occurred and the magnitude of its change – allowing for precise measurements.

PETRONAS uses integrated sensors to monitor and optimise reservoir performance, subsurface imaging and assure asset integrity.



PETRONAS Fibre-Optic Multi-Sensor

“There are essentially three components involved in distributed acoustic sensing – an interrogator unit, the fibre-optic cable and the subsurface being analysed,” explains Ahmad Riza. During a seismic survey, the interrogator unit will be coupled to the fibres under test – which acts as a kind of receiver – and optical or laser pulses will be sent to the optical fibres. “Due to the impurities in the

fibres a small amount of light from a pulse will create backscatter from every location along the length of the fibres, which is then carried back to the interrogator unit,” he describes. Because vibrations or disturbances – indicating leaks, for example – along the length of the fibres will change the characteristics of the backscatter, these changes can then be recorded and analysed.

A key tool in multiple initiatives

At PETRONAS, distributed acoustic sensing was deployed in April 2016 at the Bokor field in Sarawak, to resounding success, says Ahmad Riza. Fibre-optic cables were installed in three wells and over a period of one and a half months 56,000 marine airgun pulses were sent onto the fibre-optic cables, and the resulting backscatter received and recorded. “The data was then processed and subsurface images produced,” he continues.

➤ **The tests conducted by PETRONAS, according to Ahmad Riza, demonstrated that the seismic data could be acquired without having to shut down production. In an industry where time is money, that the tests were conducted successfully without any loss in production is certainly a feather in PETRONAS’ cap.**

For PETRONAS, distributed acoustic sensing marks a milestone in its seismic imaging capabilities. The use of distributed acoustic sensing will allow for more effective reservoir monitoring. This includes evaluating and monitoring the reservoir’s properties and productivity as well as integrating it into the shutdown prevention and maintenance plan.

For example, the technology can be used to mitigate imaging problems related to the so-called gas clouds. A gas cloud is an area where there is gas accumulation in the subsurface, which can result in poor subsurface seismic images.

“This will also be a key tool in our production monitoring, enhanced oil recovery and CO₂ management activities,” Ahmad Riza adds.

Going forward, he says there are plans to develop multi-sensor fibre-optic specialty cables to measure elastic wavefield, temperature, pressure, chemical, resistivity and acquire seismic data. PETRONAS is working with strategic technology partners in developing this new multi-sensor specialty fibre-optics. He adds that distributed acoustic sensing can also be applied at surface pipelines or within a chemical complex to detect leaks, as well as be deployed at its unconventional oil and gas fields.

Currently, other than advancement on the distributed acoustic sensing, PETRONAS is developing the real-time proactive monitoring based on this photonic technologies. The full integrated system comprises an advanced interrogator unit and specialty multi-sensory armoured fibre-optic cables. Behind the box, there are hundreds of advanced algorithms ready for future fields.

Featuring the highly anticipated Technical Gurus at APGCE 2017



Prof Paul Tapponnier
*Professor,
Earth Observatory of Singapore,
Singapore.*



Prof Robert Hall
*Professor and Director of SE Asia Group,
Royal Holloway University of London,
United Kingdom.*



Ian Longley
*Geologist/Director,
GIS-PAX Ltd.,
Australia.*



Dries Gisolf
*Director,
R&D, Delft Inversion,
Netherlands.*



Prof Richard Swarbrick
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Prof Don Lawton
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ASIA PETROLEUM GEOSCIENCE CONFERENCE & EXHIBITION (APGCE) 2017: COLLABORATIVE SOLUTIONS. SHARING SUCCESS.

The focus of 2017 Asia Petroleum Geoscience Conference & Exhibition (APGCE) is the evolving standards and practices amongst the geoscience fraternity. Widely recognised as Asia's premier Geoscience conference, it will explore lessons learnt, value creation as well as solutions to overcome significant challenges in unlocking the exciting potential of Asian basins. APGCE will be held on November 20 and 21 at the Kuala Lumpur Convention Centre.

Hosted by PETRONAS, this biennial conference attracts more than 2,000 international and local conference delegates, exhibitors and visitors. The 2017 APGCE which carries the theme, *Collaborative Solutions. Sharing Success*, will once again feature the anticipated deliberation of new plays and prospects by technical *gurus*, industry experts and business leaders.

Revolving around Southeast Asia acreages, the Event also provides informative platforms such as Technical Sessions, Special Sessions, Oral Sessions, Poster Sessions and Core Sessions. There will also be planned presentations by government officials and business captains in the Executive Programme as well as young and future geoscience enthusiasts being mentored by preselected experts through the EAGE Student Programme.

APGCE 2017 will feature influential speakers and experts such as Professor Paul Tapponnier, Professor Robert Hall and Professor Richard Swarbrick, amongst others.

Distinguished as the foremost scientist of his generation in the field of neotectonics (the study of motions of the Earth's crust), Paul Tapponnier is a Professor at Earth Observatory of Singapore. He also pioneered the use of satellite imagery in tectonics research, which has greatly influenced modern methods of research into the movements of the earth.

Professor Robert Hall is renowned for his field-based research into geology of Southeast Asia and the Western Pacific as well as many investigations into island arc origin and evolution, plate tectonic reconstructions and seismic tomography. He has also completed many studies in mantle processes and tectonics of the region, tropical sedimentation and links to provenance, climate and tectonics in addition to implications of plate tectonics for the biogeography of Southeast Asia.

Richard Swarbrick is currently an independent consultant and trainer specialising in sub-surface pressures, mainly for the oil and gas industry. He



Gathering of minds at the exhibition.



Participants during a field trip.

was the principal investigator of GeoPOP (GEOsciences Project into OverPressure), a multi-disciplinary research group funded by 17 oil and gas companies. The research led to many publications related to overpressure mechanisms, pore pressure prediction methods, modelling pressure through time in basins and the influence of overpressure on the petroleum system. He is a Fellow of Geological Society of London since 1982, and member of the European Association of Geoscientists & Engineers, the American Association of Petroleum Geologists and Petroleum Exploration Society of Great Britain.

Another returning highlight is the highly anticipated Core Display and session which features a variety of carbon-based samples from Malaysian basins.

Adding even more value, APGCE 2017 offers planned field trips to the Kota Kinabalu – Kudat regions of Sabah and Pekan Delta in Pahang from 15 – 18 November.

The objective of the field trips is to gain better understanding of the tectono-sedimentary history and stratigraphic evolution, basic depositional processes, facies development, controls on sedimentation patterns and depositional environment, reservoir geometry and architecture and structural changes. It further aims to integrate different scales of observation and interpretation in basin exploration.

Further to these field trips, there are also exclusive short courses conducted by Technical Gurus that will be held from 22 to 23 November. There will also be the APGCE 2017 Golf competition lined up for the Event, allowing for further networking opportunities between the delegates.

Expecting the participation of who's who of the industry comprising oil and gas top management executives, geoscientists, geologists, geophysicists, technologists, engineers, analysts, stratigraphers, industry experts and managers, Asia's Premier Geoscience Event is definitely one you cannot afford to miss!



MOPU SEPAT



GARRAF

MAIN OFFICE

By BRIGITTE ROZARIO

Walking Tall & Breaking Barriers



She found herself sitting in a bullet-proof vehicle on a five-hour journey from the airport to the Garraf Base Camp in Iraq. The view outside was bleak and she was weighed down by a bullet-proof vest. Geologist Naqzatul Shima Hashim had left her four small children, aged two to six, at home for this new life on an Iraqi base camp.

"I was part of the petroleum engineering team and I was the only woman amongst 15 men. When I got to Garraf, I was largely ignored. They were nice guys, but they didn't feel that I belonged there and they didn't talk much with me. After all, in the base camp there were only five women and about 300 men."

"If I was lucky, I could meet the other girls for lunch but, mostly I was alone," explains Shima, who spent six months in Iraq after one-and-a-half years in Dubai with PETRONAS Carigali Iraq.

When it came to the work, Shima had to prove her worth. It was often difficult to be heard in a room full of men.



"I had to stand as tall as them and my voice needed to be as loud as theirs. I had to be very rough and very tough," she recalls.

Shima is amongst the new wave of female geologists breaking old barriers for women in oil and gas.

A 2015 LinkedIn analysis found that in the oil and gas industry, women only make up 26.7 per cent of the workforce, behind healthcare (59.8 per cent) and technology (30.6 per cent). Amongst the 12 industries the social networking website examined, oil and gas had the lowest percentage.

Raised in Kuala Lumpur by a policeman father and a housewife mother, Shima's upbringing was typical for anyone growing up in Malaysia. When not in school, she cycled around and played in the neighbourhood park. With her four older brothers, Shima preferred playing outdoors.

She originally wanted to go into engineering but her results denied her that opportunity. When she was offered a place in Universiti Kebangsaan Malaysia (UKM) to study geology, Shima was reluctant at first. But she changed her mind as she started learning about the planet and how it has evolved.

Her tenacity saw her landing at PETRONAS' front door. Being in geology is tough, what more in the male-dominated oil and gas sector. However, Shima is undaunted. It was her perseverance that helped find oil in Sepat, which is now the third largest oil field in Malaysia.

Sepat was originally a gas field which was relinquished to PETRONAS, with no potential oil perceived. When Shima came onboard, she was a part-timer who was absorbed into the Field Development Planning (FDP) team and then found herself the sole geologist on the project taking after two seniors.

She made some mistakes, like finding a dry well and getting the wrong core sample, but at the end of the one-year fast-track FDP and eight wells, the team found a lot of hydrocarbons and additional reservoirs.

"We worked like crazy, day and night, to realise this target and yes, we did it. So, we had our first oil for Sepat in 2011. We were given a year to do it and we achieved it in 363 days ... just in time!"

"If we were not pushed, it would have taken about two years because it takes time to build the platform itself. To cut it short we took the MOPU (mobile offshore production unit)," adds Shima.

Sepat was a turning point and a highlight in her career. From there, she gained the trust of management and proved her mettle.

She is now Staff Reservoir Geologist and Manager for Peninsular Malaysia projects in the Reservoir Geology Department, Upstream. She may have proven her capabilities and skills, but in some circles she is still questioned and doubted.

Often when she attends meetings abroad, she is the only woman in a room full of men. She has become used to the quizzical looks and hesitant reactions.

"The only way to handle it is to prove myself. I have to speak up and challenge them technically and explain the basis for my points and arguments. Only then, would they understand my level of technical competency," she explains.

Shima believes that traditionally the prospect of working on an oil rig for months and being away from the family might have posed a deterrent to girls looking for a career, but the industry is changing and women working away from home is no longer an anomaly. Women now work on oil rigs and even base camps in foreign countries.

"In Iraq, where we worked side by side for 12 hours and I was the only geologist, I would sometimes have my decisions questioned. Going into meetings, I had to be on my toes because questions would come from anyone, anywhere and at any time. It was challenging," admits Shima, smiling.

Like any other job and industry, there are many obstacles and challenges, but Shima's passion for exploring keeps her going. She enjoys the satisfaction of seeing the development of oil fields based on her findings, hard work and analysis.

"Young girls wanting to go into geology just need to be persistent and trust themselves. They need to make their voice heard and not be shy. There are no right or wrong answers; it's okay to ask silly questions. They just need to persevere and keep trying. People do make mistakes, like me, but just keep on going because, in the end, what really matters is the experience you gain."

BRINGING CHANGE TO THE COMMUNITIES WE OPERATE IN.



PETROLIUM NASIONAL BERHAD (PETRONAS) (20076-K)



Bacho Pilog
PETRONAS

Bacho Pilog hails from a small island off the coast of Sabah. Hard work, determination and with a scholarship from PETRONAS, prepared him for a task he never dreamt off as a young island boy.

After graduating from the University of Texas, he was sent to South Sudan, one of PETRONAS' earliest energy partners. Bacho Pilog, as head of operations, went to produce oil by the invitation of the government. But he achieved far more than that. He helped start and maintain a relationship between the two countries. Things that enrich the life of communities in the countries where PETRONAS operates. **Empowering Lives™.**

Watch the full story of **#EmpoweringLives** at www.petronasofficial.com

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PETRONAS AT A GLANCE

Petroleum Nasional Berhad (PETRONAS) is one of the few national oil companies in the world that has transformed itself into being a leading oil and gas multinational of choice and is now ranked amongst the largest corporations on FORTUNE Global 500®.

Since our establishment in 1974, we have not stopped pursuing new solutions and pushing boundaries across the entire oil and gas value chain. We continue to strengthen our portfolio through technological advancements, operational excellence and by being a responsible corporate citizen wherever we are.

Unlocking potentials and adding value to oil and gas resources are what our diverse, resilient and competent workforce strives to deliver each day.

This is because we continue to be inspired to meet the world's growing energy needs.

UPSTREAM

TOTAL LNG SALES VOLUME OF

30.11

MILLION METRIC TONNES

420 BCE LNG LOADABLE

DELIVERED FROM PETRONAS LNG COMPLEX IN BINTULU

AVERAGE PRODUCTION

2,363 kboe/d

4 EXPLORATION DISCOVERIES

DOWNSTREAM

86.3% Downstream Plant Utilisation

95.2% Overall Equipment Effectiveness (OEE)

98.2% Downstream Reliability

60% Pengerang Integrated Complex Completion

ENGEN RECORDED HIGHEST REPLACEMENT PROFIT AFTER TAX (PAT) OF ZAR **3.1** BILLION

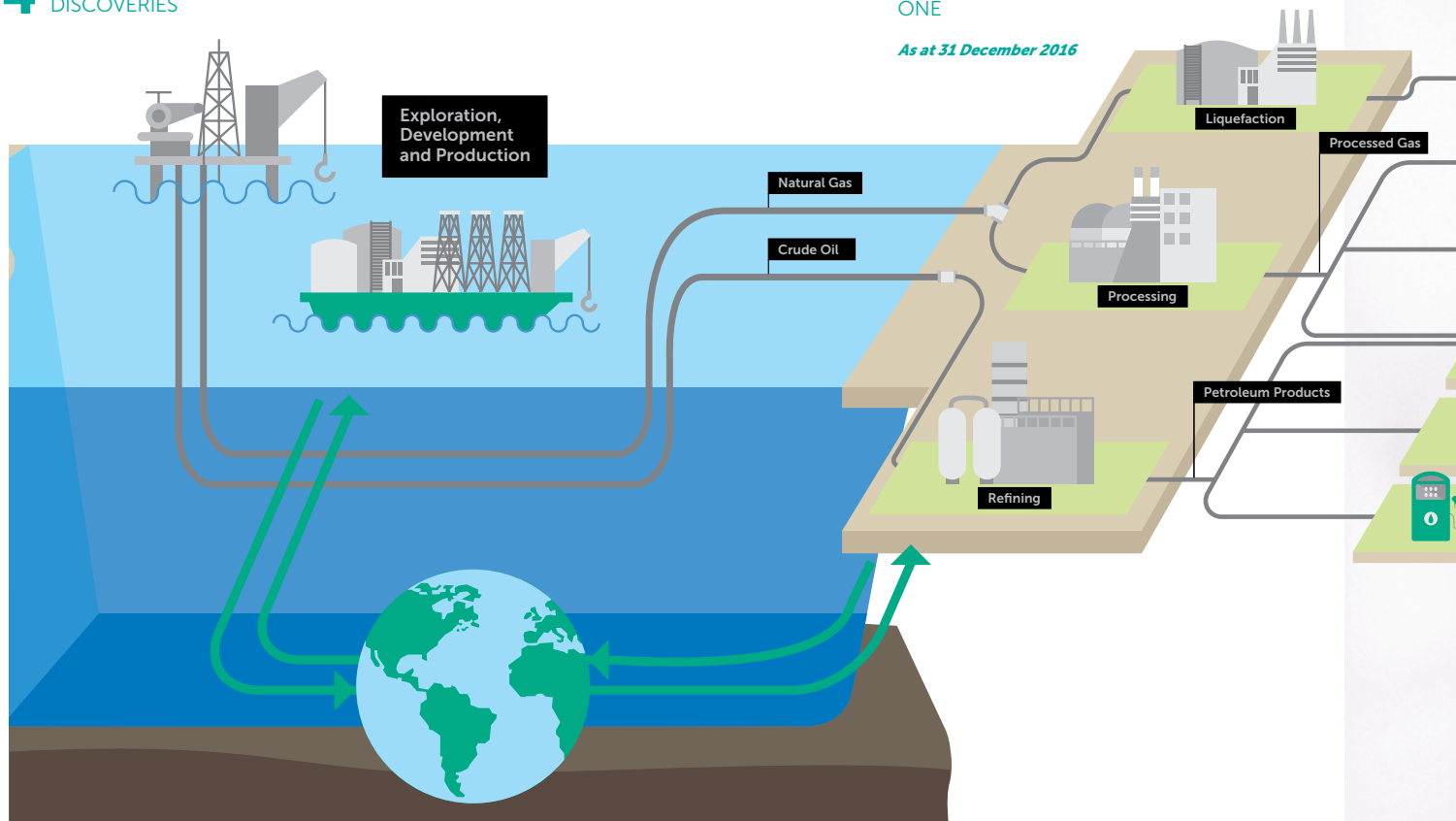
PETRONAS DAGANGAN BERHAD RECORDED HIGHEST RETAIL VOLUME FOR PETROL OF 15.2 BILLION LITRES AND **PROFIT BEFORE TAX (PBT) OF RM1.2** BILLION

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A Leading Oil and Gas Multinational of Choice



OUR MISSION

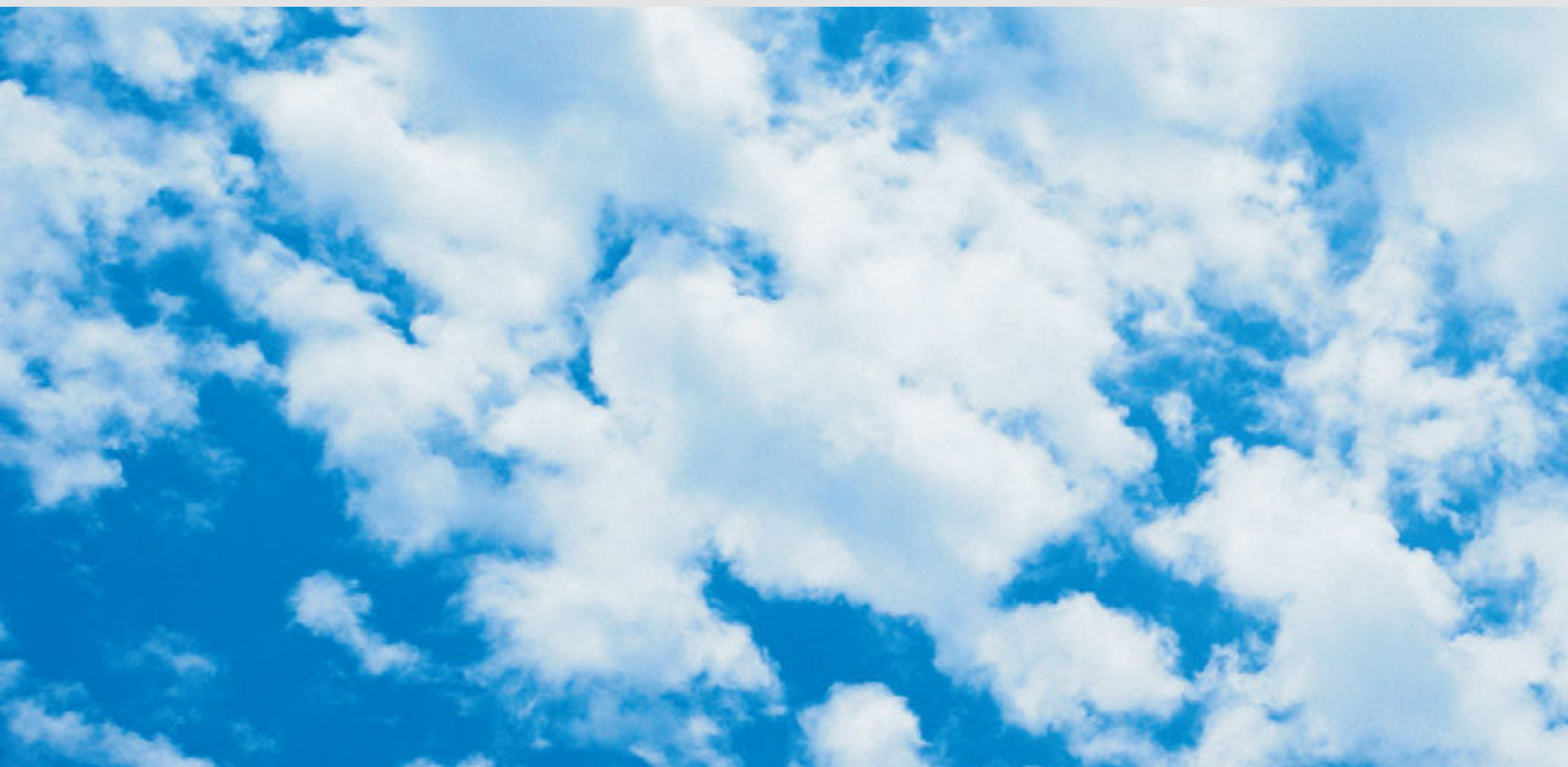
We are a business entity
Oil and Gas is our core business
We add value to this resource
We contribute to the wellbeing of society



SHARED VALUES

PROFESSIONALISM - Strive for excellence
LOYALTY - Loyal to corporation
INTEGRITY - Honest and upright
COHESIVENESS - United, trust and respect for each other





PETROLIAM NASIONAL BERHAD (PETRONAS) (20076-K)
Tower 1, PETRONAS Twin Towers, Kuala Lumpur City Centre
50088 Kuala Lumpur, Malaysia
Tel: +603 2051 5000

www.petronas.com