



PETRONAS

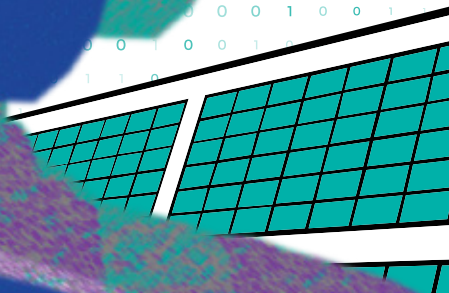
PETRONAS Activity Outlook

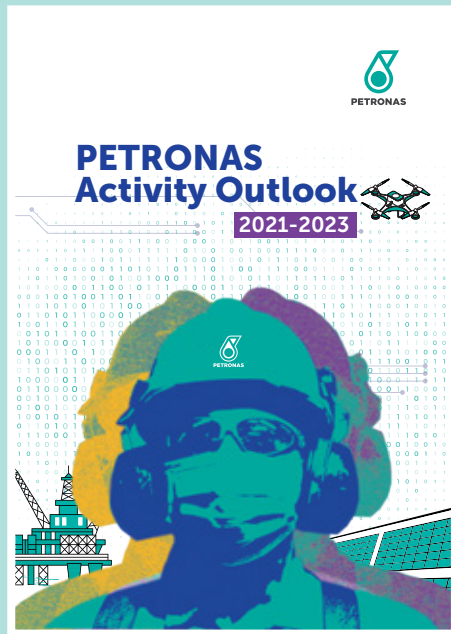


2021-2023



PETRONAS





Our story

The New Normal

The industry needs to brace itself against the dual impact of a low oil price environment combined with the COVID-19 pandemic. We must remain resilient and ready to respond to disruptions as we adapt to what is now regarded as “the new normal”.

The year 2020 ushered in a “great reset” for the oil and gas sector given the acceleration of the energy transition. With the rise in renewable energy, industry players must continue to acquire new capabilities and knowledge through digital and analytics, technology adoption, and creative partnerships to unlock new opportunities and move ahead with courage into a sustainable future.

Cautionary Statement

This report was developed based on currently available information from internal and external sources. PETRONAS believes that the expectations of its Management as reflected by such forward-looking statements are reasonable based on information currently available to it. PETRONAS makes no representation on the accuracy or completeness of any information provided in this report and expressly disclaims any liability whatsoever arising from, or in reliance upon, the whole or any part of its contents. PETRONAS undertakes no obligation to update or revise any of them, whether as a result of new information, future developments or otherwise.

Accordingly, readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date they were made.

Images are for illustrative purposes only.

Released in December 2020.

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A Great Reset

President and Group Chief
Executive Officer
PETRONAS

Imbak Canyon Conservation Area, Sabah

Esteemed partners,

We are pleased to present this year's edition of the PETRONAS Activity Outlook, covering insights for the industry and demand outlook from 2021 to 2023.

The outlook for the industry remains challenging due to emerging fresh waves in the number of COVID-19 cases and prevailing uncertainties over OPEC+ production cuts in 2021. The effects of the pandemic are difficult to estimate, while their impact cannot be overstated as the industry continues to face the dual impact of demand destruction combined with an oil price rout due to the supply glut. Therefore, we believe the industry is now contending with a Great Reset. This is an undeniable and unavoidable imperative, requiring immediate reforms along the whole value chain. Collectively, as an industry, we must step up from doing business as usual and compel innovation at all levels - implementing new ways of working with focused execution at pace.

Against this backdrop, PETRONAS has undertaken purposeful measures to strengthen our resilience and steer the organisation towards a path to recovery. We are committed to being relentless in our pursuit of becoming a more cost-efficient producer. At the same time, we have little choice but to continue taking steps to further de-risk our investments, focusing on areas of our business that will both deliver quicker cash returns and are less volatile, as well as to embark into more innovative solutions while pivoting our portfolio. This will all be centred around evolving into a stronger, more customer-centric workforce, committed towards the pursuit of our growth strategies.

The measured steps taken also demonstrate our stronger commitment to Sustainability as we take cognisance of the acceleration of the global energy transition, heightened by stakeholder expectations and its vast opportunities. Built on PETRONAS' desire to drive a fundamental shift in the way energy is produced, we announced our aspiration to achieve net zero carbon emissions by 2050 as part of our holistic approach to Sustainability that balances Environment, Social and Governance (ESG) considerations across our value chain.

With this target, PETRONAS intends to continue intensifying efforts towards reducing Scope 1 and Scope 2 greenhouse gas (GHG) emissions from our assets through continuous improvements in operational excellence, and by deploying innovative operations and technologies. Together with these efforts, the Group will also pursue new avenues of revenue creation via investments in nature-based solutions as well as establish greater accessibility to cleaner energy solutions.

As an industry that is vulnerable to cyclical swings, I believe that we should never waste a crisis. The challenges we face today must be seen as an opportunity to shift towards greater digitalisation and for companies to make the switch in providing greater technology-driven solutions. Digital tools present valuable opportunities to realise significant improvements in planning, operational efficiencies and optimisation of resources - all of which are critical elements in order to remain resilient amid ever-intensifying global competition. Inevitably, companies within this industry must continue to drive the next wave of operational effectiveness through technology such as automation and robotics to unlock value and deliver sustainable solutions for our industry.

Arguably, the most important facet of all is that as an industry that inherently contends with many risks, we must reinforce and strengthen our commitment to undertake proactive, effective hazard and risk assessments in our day to day work. It is our shared responsibility to create a conducive and safe working environment where preventive health and safety measures are enforced to ensure that our employees, customers and contractors can keep each other safe.

As the industry continues to navigate challenging market conditions and sets its sights on increasingly daunting targets, I wish to take this opportunity to reiterate **there can be no compromises where safety is concerned.**

On behalf of PETRONAS, we look forward to building on the strong partnership with our industry partners for the shared prosperity of the country and the industry.



Tengku Muhammad Taufik

President and Group Chief Executive Officer
PETRONAS



Shifting Norms

Vice President, Group Procurement
PETRONAS



Dear Partners,

The current crisis presents us with the need to remain resilient and agile, taking decisive measures in weathering the market volatility and energy transition. On this note, PETRONAS has taken measures to optimise production to preserve its integrated value chain, exercise tighter fiscal discipline and continue to drive down costs to mitigate the negative impact to its profitability and liquidity.

All facets of the ecosystem must react, and it is imperative for industry players to adapt and embrace the new normal. Working with tighter margins require industry players to shift the norms, and embrace digitalisation, technology advancement and creative partnership to unlock opportunities. Industry players are encouraged to be cognisant of opportunities in renewable energy and for oil and gas players to diversify and acquire new capabilities in enhancing the industry's competitiveness and agility, as well as to sustain relevancy. We will continuously collaborate with industry players and move forward in achieving this intent.

As shared in our previous editions, we have embarked on various transformation and industry initiatives. New developments and changes in our procurement system as well as industry initiatives are shared through our "Be Our Partner" page in the PETRONAS website.

PETRONAS is committed to uphold zero tolerance against any form of bribery and corruption, in line with our Code of Conduct and Business Ethics (CoBE). We advocate all our partners to adopt and embrace the Corporate Liability Provision of Section 17A of the Malaysian Anti-Corruption Commission (MACC) (Amendment) Act 2018 which came into effect on 1 June 2020. Partners including their supporting contractors and agents must proactively implement adequate anti-bribery and corruption measures within their respective organisations. Integrity must always be placed as an important element in the conduct of doing business.

To this end, together we shall foster stronger collaboration and emerge fitter to face current and future challenges.



Freida Amat

Vice President, Group Procurement
PETRONAS



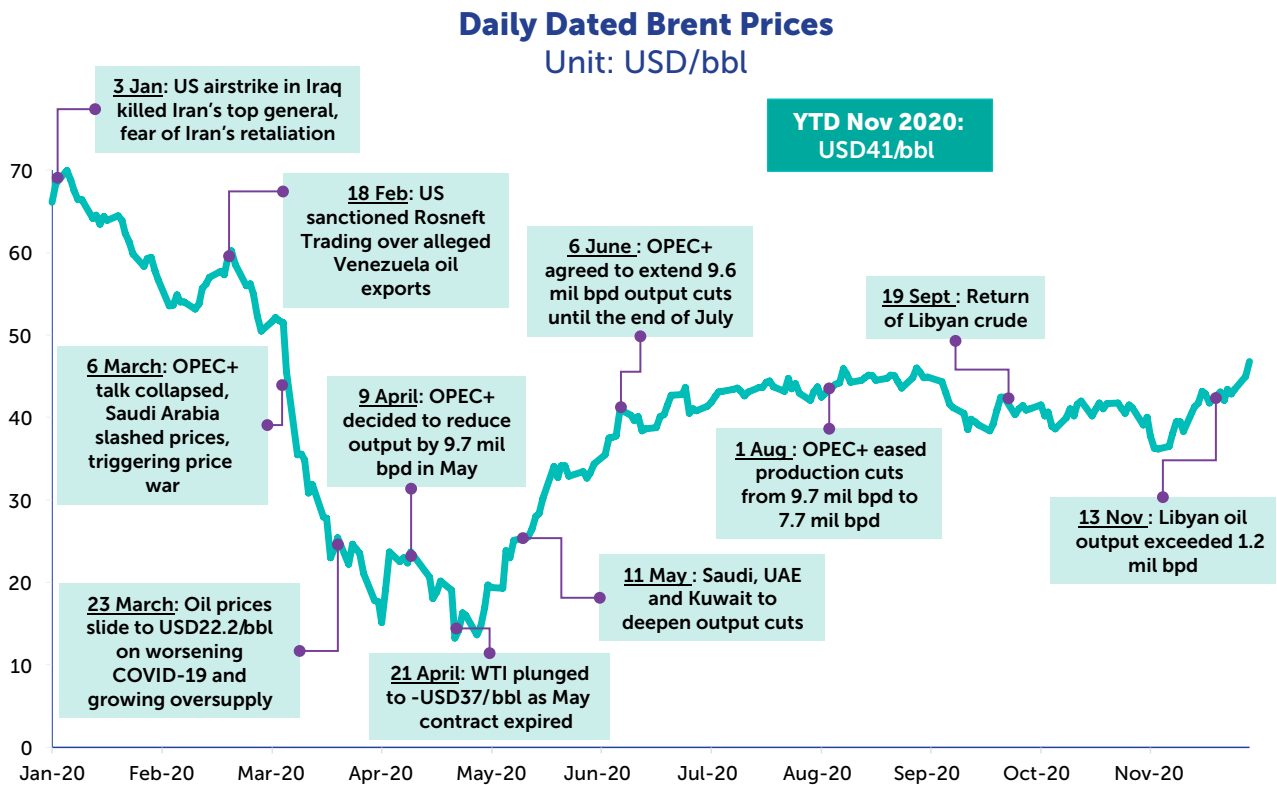
Industry Overview

Malaysian Refining Company Sdn Bhd

Not a Normal Boom and Bust Cycle

The oil market has always been exposed to market volatilities and uncertainties. This is driven not only by geopolitical events but also structural shifts in the oil market, such as the surge in unconventional oil supply from the United States (US) which impacted the market in 2016 and the recent unprecedented demand destruction from COVID-19. The impact from COVID-19 was further exacerbated by the fallout between Russia and Saudi Arabia that triggered the oil producers' move to maximise production to capture a bigger market share. The unrestrained production amid weak demand resulted in US West Texas Intermediate (WTI) prices falling into negative territory for the first time in history. Brent prices fell to a two-decade low of USD13 per barrel on 21 April 2020.

Oil price is currently hovering above USD40 per barrel level, supported by expectation of demand recovery and OPEC+ production curtailment.



Source: Argus, PETRONAS internal analysis

Bullish Factor
Worldwide availability of vaccine, high conformance to OPEC+ production curtailment

Bearish Factor
Growth of non-OPEC supply including the US and ease of sanctions on Iran and Venezuela

COVID-19 has resulted in far-reaching consequences for most sectors of businesses, including the energy sector, societies, economies and governments.

Transition to a Low-Carbon Future

The COVID-19 pandemic and the collapse in oil prices have hastened the transition towards a low-carbon economy, spurring policy intervention and global collaboration across industries. Investments in clean energy is estimated to have increased by 5 per cent in the first half of 2020 as opposed to 2019. This is further supported by the rapidly falling costs of renewable energy, which is now half of the cost of coal-fired generation, making it a favourable source of cleaner power.

Favourable Policies for Low-Carbon Economy



Countries and companies are embedding the United Nations Sustainable Development Goals (SDGs) as part of their aspirations amid rising calls from stakeholders for actions to address climate change. More and more governments are translating these into national strategy, setting out visions of a carbon-neutral future.

Across the industry, oil and gas companies have set net zero carbon emissions aspirations moving towards 2050.



Banks and lenders have included elements of sustainability as part of their financing criteria, contributing to the establishment of an ecosystem that demands accountability in emissions. Without the accountability, companies stand to lose their social license to operate.



Automotive manufacturers across the world are now increasingly widening their range of offerings of electric models that would change the shape and size of the global car fleet in the next decade. This is supported by falling cost of battery.



Airlines are prioritising investment in more fuel-efficient aircraft and the development of sustainable aviation fuels.



The leading players in the shipping industry have pledged to continuously reduce emissions to meet the more stringent regulations by International Maritime Organisation (IMO). The sector agreed to halve emissions by 2050.

Decarbonisation of Oil and Gas Companies

Heightened pressure by regulators, investors, financiers and societies have led to oil and gas companies pledging to lower their carbon footprint and setting net zero carbon emissions goals. As there is no single pathway to a low-emissions future, companies are adopting various measures to decarbonise.



Technology Adoption

Vapour Recovery Unit (VRU) and Carbon Capture, Utilisation and Sequestration (CCUS) are examples of mainstream technologies that are deployed to reduce carbon emissions. Digitally enabled Leak Detection and Repair (LDAR) also helps process optimisation efficiency via timely and accurate leak detection, and repair.

Goal Setting

Six International Oil Companies (IOCs) have announced their target for net zero carbon emissions by 2050 while at least 20 others are pledging to lower their emissions.

**NET
ZERO** 
2050



Changing Power Source

Solar Photovoltaics (PV) and batteries, as well as offshore and onshore wind farms have gradually gained recognition as alternative power sources for rigs and production facilities.

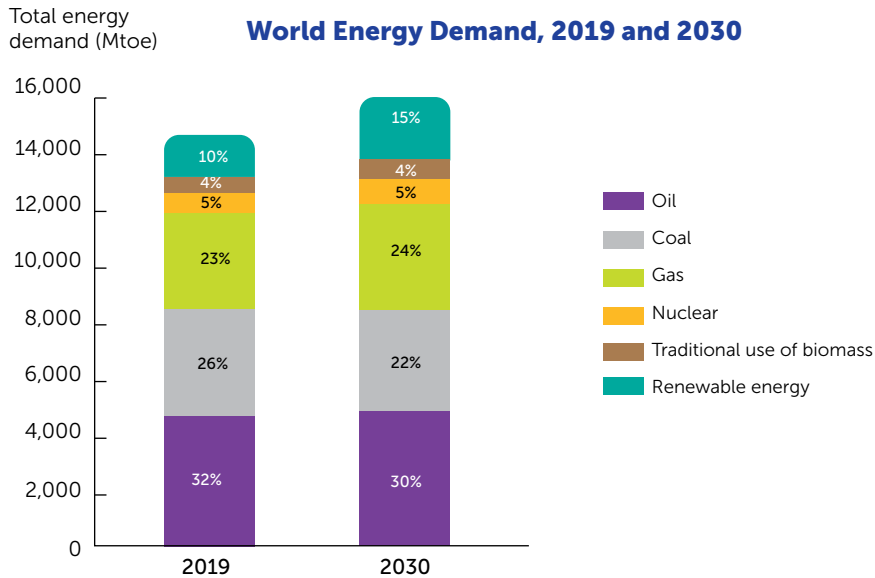
Portfolio Decarbonisation

In view of high costs associated with high carbon resources such as oil, companies are also rebalancing their portfolio to capture opportunities arising from the acceleration in energy transition.

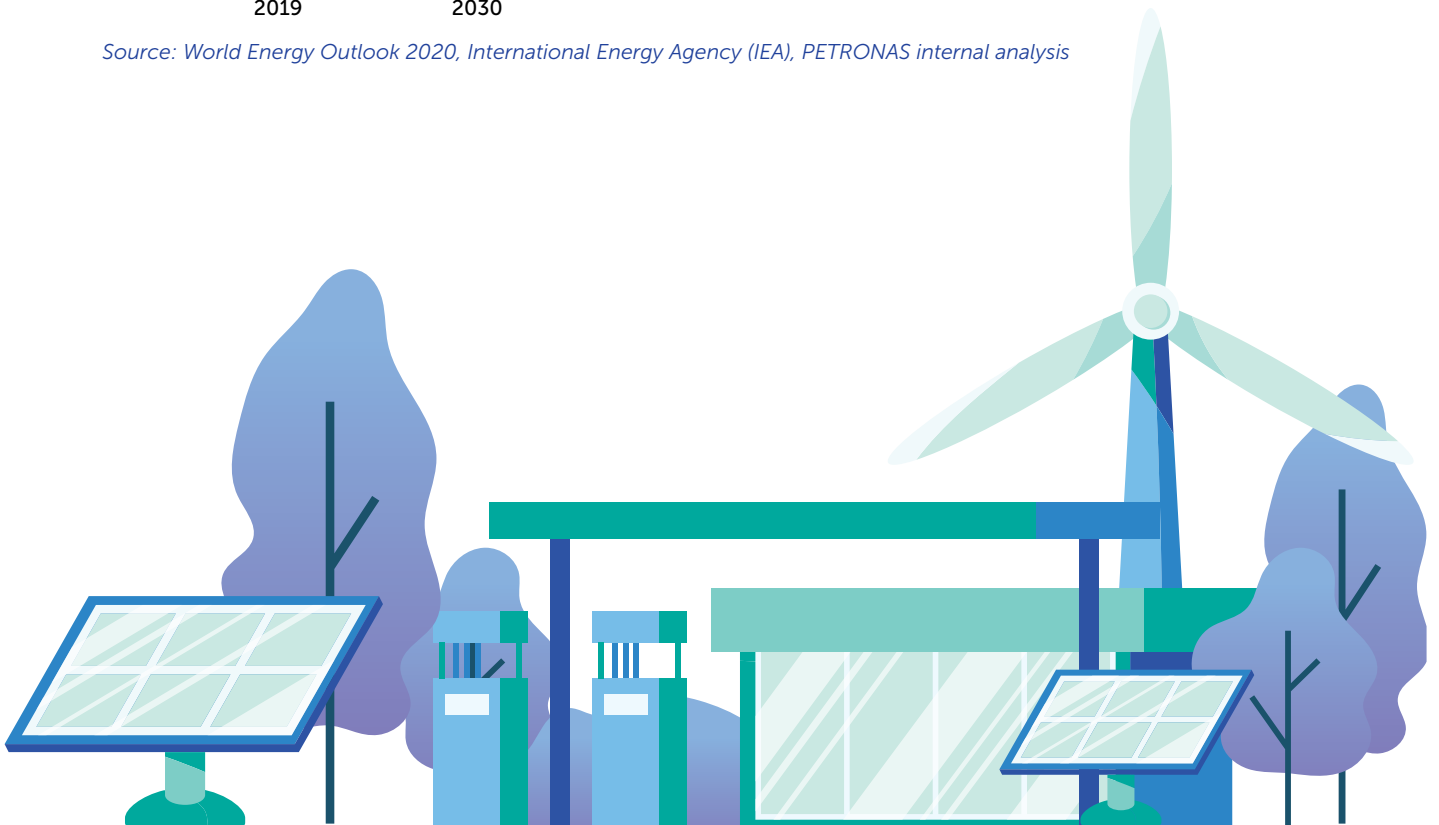


Rise of Renewable Energy

Oil and gas will continue to account for around 50 per cent of global energy demand over the next 10 years. However, renewable energy, led by wind and solar power, will be the fastest growing source of energy. Oil and gas companies, including traditional Oil and Gas Services and Equipment (OGSE) players are now venturing into providing solutions in the renewable sector, in an effort to future-proof their portfolios to remain resilient in the low-carbon world.



Source: World Energy Outlook 2020, International Energy Agency (IEA), PETRONAS internal analysis



Leveraging Digitalisation and Technology to Increase Competitiveness

Leveraging digitalisation to achieve operational intelligence has proven to deliver a significant and rapid impact to companies' bottom-line through production and resource optimisation. As the industry generates and leverages big data, advances in analytics including machine learning and artificial intelligence (AI) provide new ways of interpreting data, revealing previously undiscovered insights. Digital transformation has also enabled remote operations, creating a safer and more efficient work environment.

Repetitive and hazardous tasks are replaced with automation and robotics, improving safety at the workplace and reducing operating costs to create a sustainable way of working. Oil and gas companies are looking into non-traditional partnerships, for example with technology, transportation and commercial companies to develop cost-effective solutions across their supply chains.



The move towards automation and robotics has undoubtedly changed the skills that companies are looking for in workers. Skillsets such as design and development of hardware and software in relation to robotics system, field operations and maintenance, troubleshooting, use of electrical controls and electric motors, to name a few, will be in great demand.

As the world transitions to a low-carbon future, technologies to decarbonise fossil fuels and its by-products will be in higher demand. Given the increasing complexity of extracting hydrocarbon resources and prevailing market volatility, oil and gas operators are pursuing innovative technologies to enable the monetisation of oil and gas resources with low or zero carbon emissions.



PETRONAS Floating LNG DUA



In the Spotlight



Hello, New Energy

Open Access Solar Farm, Gadag, Karnataka, India

Hello, New Energy

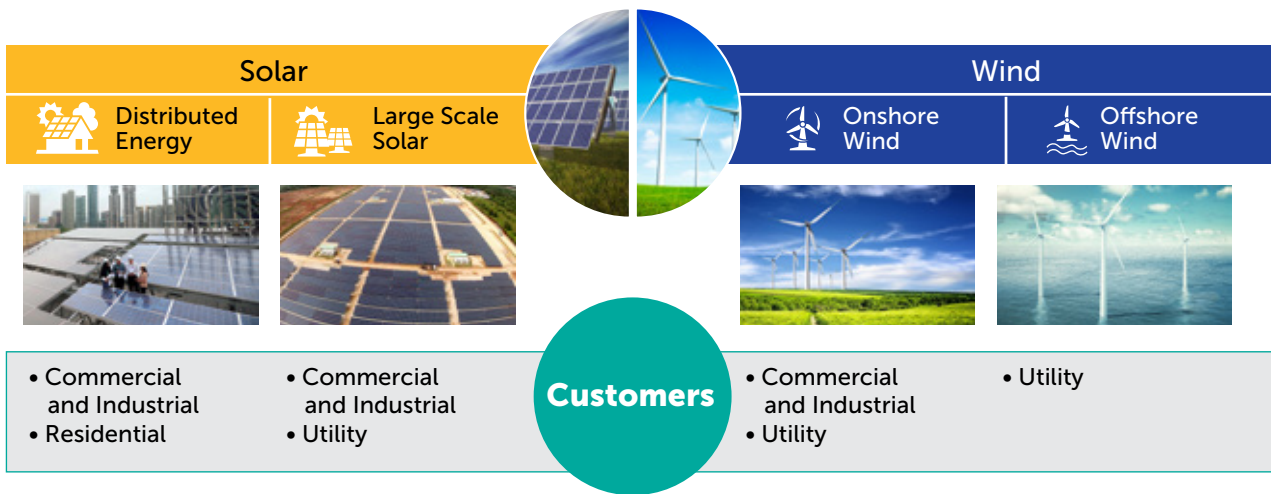
The World Is Changing

The world is undergoing an energy transition, driven by climate change, which has accelerated the shift of energy sources from fossil-based to renewables. Global energy consumption is expected to grow by 19 per cent in the next 20 years, driven primarily by rising economic activities, growing population and higher income. A single path to decarbonise the energy mix does not exist in this day and age. A combination of primarily gas and renewables is the surest route towards the energy transition, securing the supply of affordable, clean energy leading up to mid-century.

Diversifying to Meet Energy Demands

The Malaysian government has aggressive climate change targets in place. By 2025, 20 per cent of the country's electricity is to be generated by renewable sources, which currently is only at 2 per cent. Hence, it will need all key players in the country to play a role in meeting that target. While fossil fuel remains core to the global energy mix, PETRONAS is redefining its energy offerings by pushing for the increased use of natural gas as a cleaner source of fuel in the energy transition while building capabilities in renewable energy for the security and sustainability of our supply.

PETRONAS' acquisition of Amplus Energy Solutions Pte Ltd (Amplus), a leading distributed solar energy solutions provider and developer across India is to provide the capabilities and expertise for wider offerings in solar energy. It is also a vehicle to explore opportunities in onshore and offshore wind energy generation for other Southeast Asian countries, with an aspiration to generate 3 GW of renewable energy capacity by 2024.



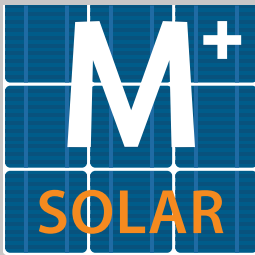
A Strong Foundation in Renewable Energy

To date, PETRONAS is generating over 800 MWp of renewable energy annually to power over 200 commercial and industrial customers across India, the Middle East and Southeast Asia.



Solar Solutions Powering Business and Residential Assets

M+ Solar by PETRONAS provides end-to-end solar solutions to commercial and industrial assets at zero CAPEX.



by **PETRONAS**

CUSTOMISED
SOLAR
SOLUTIONS

On-Site Solar

Off-Site Solar

Battery Storage and Hybrid Solutions

Hawk AI Energy and Data Monitoring Solution



Special Staff Residential Solar Programme: HomeScape by PETRONAS provides solar solutions packages with competitive price and attractive financing to employees' residences, through collaboration with Maybank and Sols Energy.

In our commitment to the SDGs, and in line with our target of achieving net zero carbon emissions by 2050, these solutions have been deployed to PETRONAS' facilities and assets, such as PETRONAS retail stations and PETRONAS Research Sdn Bhd (PRSB). We are also in the process of installing solar solutions at Malaysia Marine and Heavy Engineering Holdings Bhd (MMHE), Universiti Teknologi PETRONAS (UTP), Institut Teknologi Petroleum PETRONAS (INSTEP) and employees' residential homes, among others.

Opportunities for Collaboration

PETRONAS encourages OGSE industry players to step out and consider opportunities in New Energy for diversification. For example, creative partnerships with local solar Engineering, Procurement, Construction and Commissioning (EPCC) contractors may help in accelerating capability development in what could be considered as a non-native segment to the OGSE sector.

New Energy service providers can reach out through the email below:

neprocurement@petronas.com

Levelling up With Digital and Technology



Levelling up With Digital and Technology

Going digital is about improving human and machine performances by combining information with technology in an innovative way.

As one of the leading oil and gas players in the industry, PETRONAS established new ways of working since the beginning of its digital journey in 2017. Through its efforts to orchestrate digital transformation across the organisation, PETRONAS aims to ultimately become a data-driven organisation, adopting new ways of working to deliver new value.

In order to be better prepared to not only adapt to disruptions, but to drive step change across the industry and unlock full value from digital, PETRONAS adopts a systematic approach in executing its digital strategy by being outcome-led and user-centric; leveraging **digital technologies, expertise** and **infrastructure** to achieve the desired business outcomes supported by the right culture and mindset.

This is achieved by creating an environment that enables failing fast but small and graduating from pilot implementation to full-scale programme across different parts of the business. Anchored on solving specific and prioritised business pain points, the quest continues to develop and iterate solutions that are scalable across PETRONAS, where data flows freely, and where experiences are seamless for its customers, suppliers and vendors.

End-to-End Visibility

Transparency of data and information across the value chain, breaking silos and enabling timely planning and better-informed decision-making



Workforce Productivity

Digital tools to automate manual tasks, freeing up teams across the business to focus on high-value output that is both creative and innovative



Safety and Efficiency





Leveraging historical, current and near real-time data to take more effective action and promote more timely and accurate intervention



Customer Experience

Focusing on customer frictions to develop out-of-the-box solutions that delight customers and create a higher rate of customer returns

PETRONAS' digital projects span across its value chain, from wells to plants, to customer-facing businesses. Digital Procurement is an example of the transformation set out to push boundaries and for us to adopt new ways of working. PETRONAS continues its journey to digitally transform and elevate other segments within the organisation to be **future-ready**:

			
<p>Cybersecure Organisation Embed cyber security standards and governance within our business processes, and enhance capabilities to monitor and preempt cyber threats/risks</p>	<p>Data-Driven Organisation Streamline the way data is captured, curated and consumed, in a fast-growing, complex data landscape across digital platforms; with a robust data science practice to derive maximum benefit from data analytics</p>	<p>Enterprise Building Blocks Cloud computing, cloud-ready systems and infrastructure for enhanced connectivity at all locations, i.e. downstream plants, offshore platforms and offices to enable deployment of more digital tools and platforms</p>	<p>Capability Building Beyond transformation, efforts to upskill and reskill staff are undertaken to ensure the ability to better scale and sustain digital efforts, as well as to be responsive to evolution in digital and technology</p>

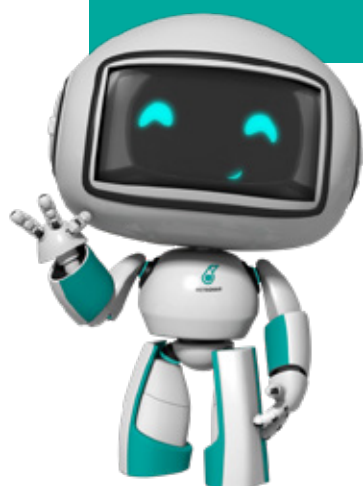
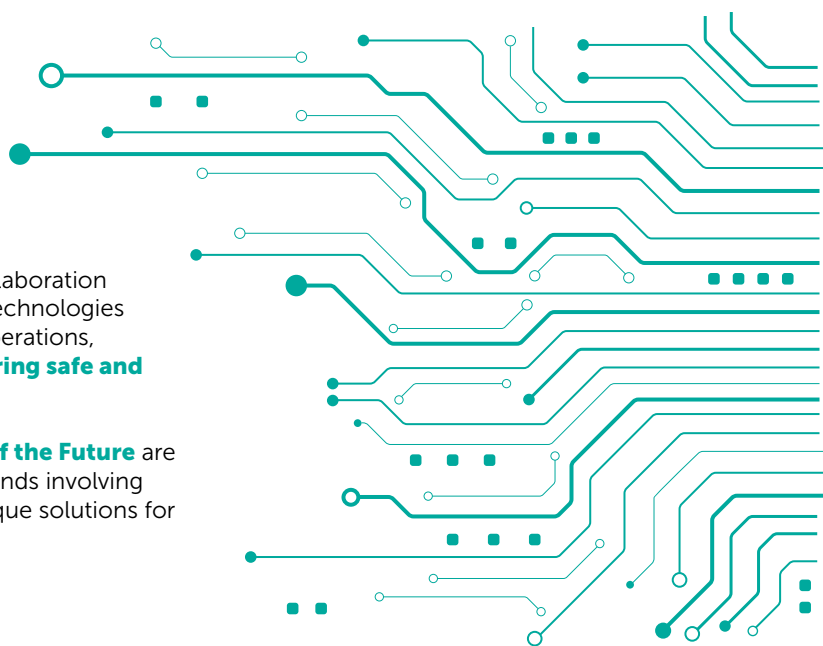


Image: PETRONAS' key digital focus areas in 2020

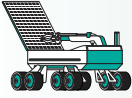
PETRONAS' digital journey continues, enhanced by collaboration with technology partners to mature digitally-enabled technologies for remote applications in our onshore and offshore operations, strengthening the fundamentals and focusing on **ensuring safe and secure operations** to thrive in the new normal.

The exploration and implementation of the **Facilities of the Future** are well underway, as we extend our reach to areas and trends involving innovative design concepts, new technologies and unique solutions for the next generation.




Digitally-Enabled Technologies

PETRONAS has been working with leading partners to develop sophisticated technologies for integration with daily operations, towards building Facilities of the Future. Having been tested in our facilities, PETRONAS aspires for these and other similar technologies to be adopted by vendors when performing their jobs at our facilities.




BIKE – Inspection Robot
Magnetic legs enable crawling and climbing on internal and external surfaces including confined spaces

ANYmal – Operation Robot
Extreme mobility and advanced sensing allow autonomous checking, testing and routine surveillance in unmanned facilities



Drones
Agile and fast response, the use of drones enables:

- Remote inspections in hard-to-reach areas
- Aerial transfer of materials
- Accurate personnel surveillance



Deployment of these technologies to our operations results in:

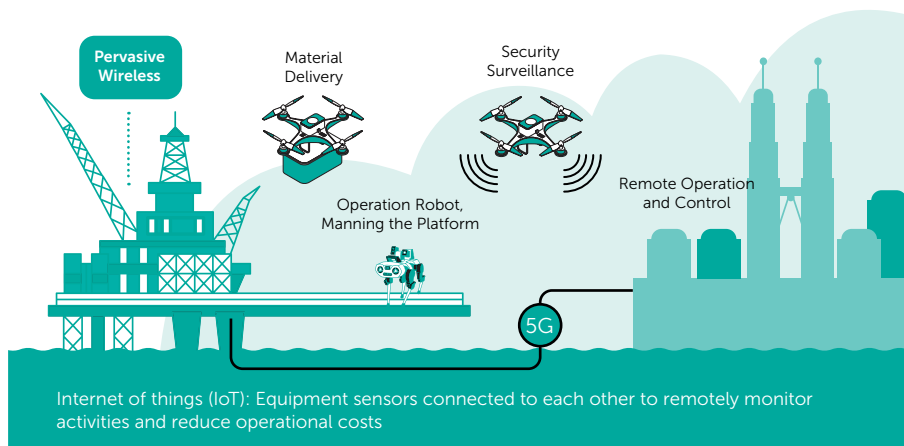
-  Reduction in activity cost through resources optimisation
-  Reduction in operational HSE risks to site workers
-  Elimination of human errors through online transmission and storage

Resak – An Intelligent Facility

The Resak platform located at offshore Kertih, Terengganu will be the first platform in Malaysia to be remotely controlled from land. Currently operated as a manned platform, it is being converted into a remotely controlled facility thanks to the swift technological advancements in automation, robotics and AI. The platform will be undergoing transition from full board offshore manning to lean manning and eventually total unmanned operation.

	2020	2021	2022	2023
Manpower	Manned Operation	Lean Manned Operation	Lean Manned Operation	Unmanned Operation
Control	Conventional	Conventional + Remote	Conventional + Remote	Remote
Technology	No Automation	Semi-Automation	Semi-Automation	Full-Automation

To ensure seamless transition and integration with the relevant technologies, the manpower required to operate both offshore and onshore sites are going for technical upskilling. Upon successful implementation, it will then be replicated at other platforms, demonstrating PETRONAS' commitment in realising remote and autonomous operation throughout its facilities.



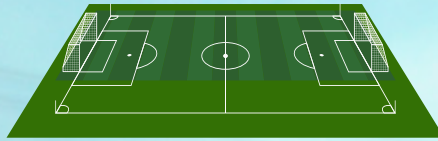
Did You Know?

70%



70 per cent of the 3,000 plants identified to be active against cancer cells by the US National Cancer Institute come from rainforests.

-48



Every year, the earth loses about 48 football-field sized forests. Along with them are the flora and fauna, nature's rare species and herbal medicines.

83 Mil



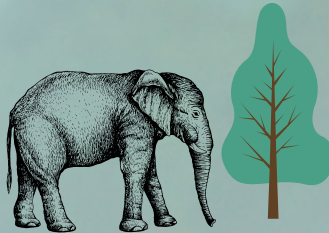
PETRONAS has contributed RM83 million since 2010 to the preservation of Imbak Canyon, including the construction of the 27-hectare Imbak Canyon Studies Centre (ICSC).

69



In 2004, a scientific expedition in the Imbak Canyon Conservation Area (ICCA) recorded 69 plant species used by local communities for medicinal purposes.

600



So far, around 600 species of plants and animals have been recorded in Imbak Canyon.

Class 1



In 2009, the Sabah government gazetted Imbak Canyon as a Class 1 (Protection) Forest Reserve.



Imbak Canyon is an important wildlife corridor linking Danum Valley and the Maliau Basin.

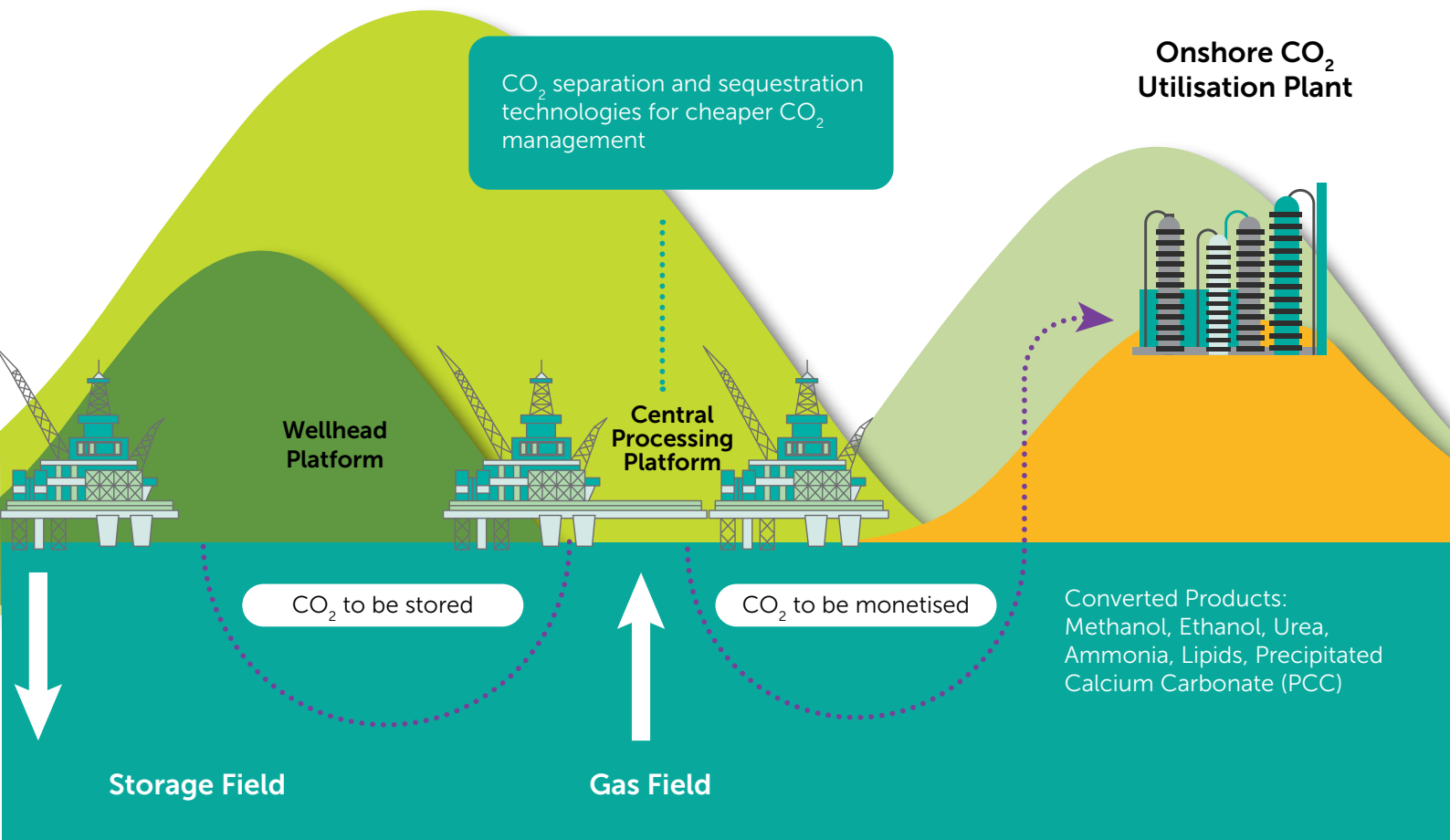
Going Green

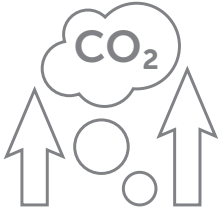
Today, changes in the operating environment require PETRONAS to innovate and further leverage technology to respond to challenges and meet the needs of the industry. Applied technologies and innovation can help us reach our sustainability aspirations of achieving net zero carbon emissions by 2050. This can be realised by reducing carbon emissions from existing and newly designed facilities, incorporating carbon capture, utilisation and sequestration technologies in our new production facilities and increasing energy efficiency.

Carbon Capture, Utilisation and Sequestration

PETRONAS intensifies its efforts to reduce carbon emissions from its operations. Having incorporated carbon capture in offshore and onshore processing facilities for over 10 years, PETRONAS is embarking on its first complete Carbon Capture, Utilisation and Sequestration (CCUS) project through offshore Carbon Capture and Sequestration (CCS) implementation, while maturing technologies for onshore processing plants to utilise CO₂ and convert it into petrochemical products.

PETRONAS' first CCS project is underway and upon completion in 2025, it will be the world's largest offshore CCS project to date.





Offshore Floating Wind Turbines: Green Electricity for Platforms

Despite low wind speed in Malaysia, PETRONAS has stepped up its efforts to develop a cost-effective wind turbine system that caters for low wind speed regions via strategic partnerships and collaborations with technology partners. Pilot implementation is expected to commence at one of our fields in 2021.

Gas Turbine Generators x 2



Lower carbon emission due to reduction in number of gas turbine



Lower maintenance cost



Additional gas revenues



Running

Standby



PETRONAS urges all industry players to collaborate in research and technologies that support the move towards a more sustainable future. Sustainability is fast becoming the license to operate and industry players must act now. We are confident that taking this bold step will make PETRONAS a sustainability beacon in Malaysia and beyond, enabling growth of businesses and societies for decades to come.

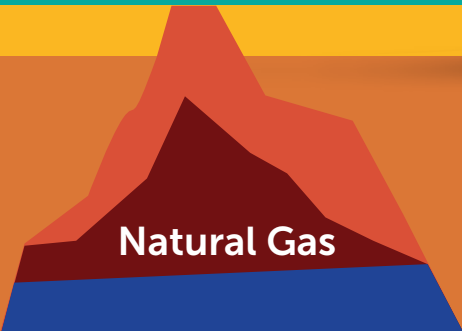


Processed Gas



LNG FACILITY

Hybrid Offshore Power Generation



Natural Gas



PETRONAS Twin Towers, Kuala Lumpur



Business Overview

Upstream

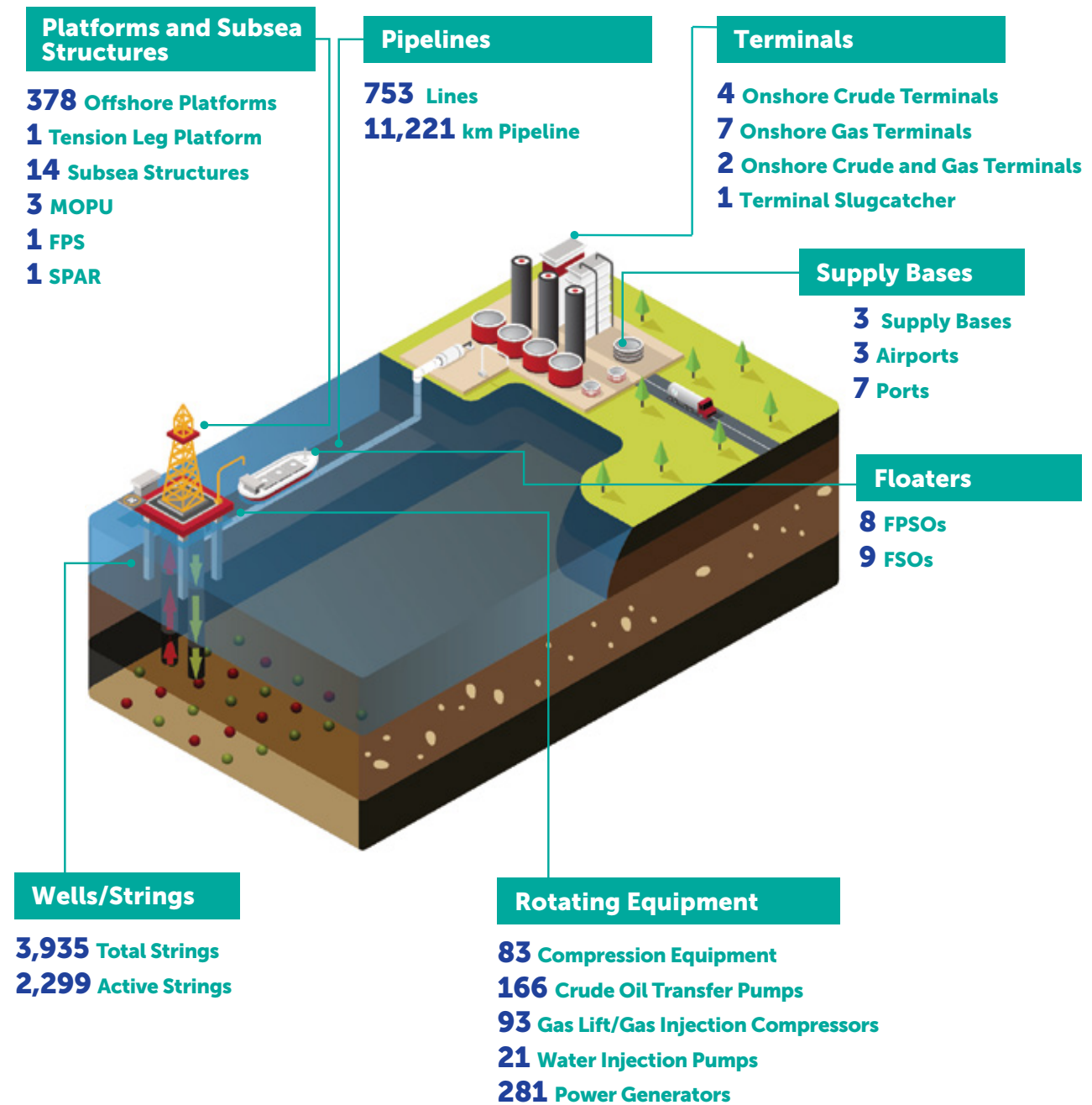


NC-3 Platform, off Sarawak Waters

Upstream Overview

As the custodian of Malaysia's petroleum resources, PETRONAS is focused on pursuing sustainable value-driven production growth, monetising oil and gas resources, strengthening core capabilities and building niche competencies.

Below is a snapshot of Upstream Malaysia's facilities dimension, operated by 30 Petroleum Arrangement Contractors (PACs) as at October 2020.



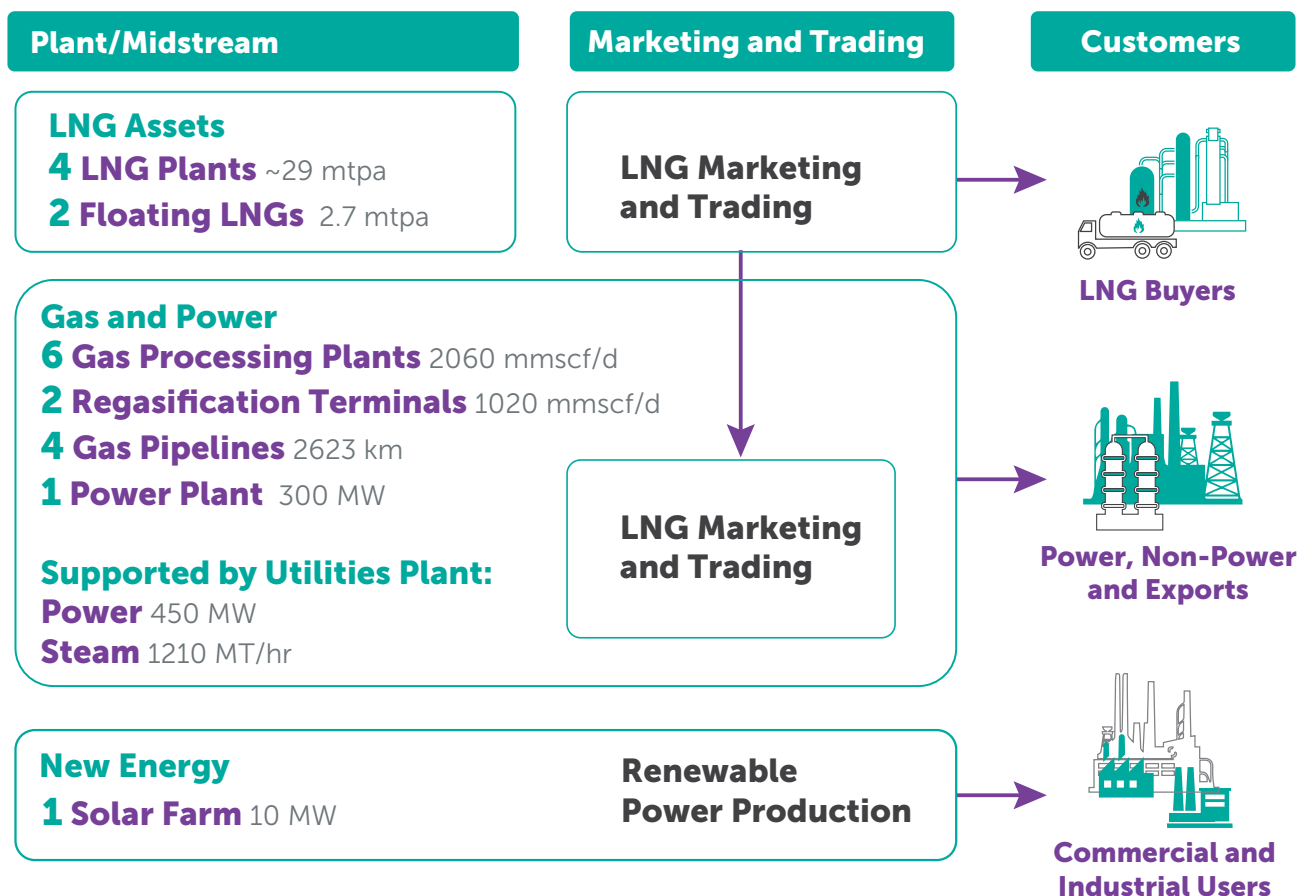
Gas and New Energy



LNG Break Bulking Ship-to-Ship Solution

Gas and New Energy Overview

The Gas and New Energy portfolio reflects our intent in PETRONAS' Statement of Purpose that places an emphasis on sustainability. The illustration below depicts the spectrum of domestic value chain for the Gas and New Energy business.



We are now one step closer to achieving our aspiration to power the world with cleaner energy

MV Avenir Advantage, PETRONAS' first LNG Bunkering Vessel (LBV)

Downstream



PETRONAS Chemicals Methanol, Labuan

Downstream Overview

Downstream business comprises multiple businesses and plays a strategic role in enhancing the value of molecules through an integrated operation, on the foundation of operational and commercial excellence. The diverse activities include refining, trading, and marketing of crude oil and petroleum products as well as manufacturing and marketing of petrochemical products for both local and international markets.

1

- 2 Refineries**
 - 1 Melaka ~298 kbpd
 - 1 Terengganu ~125 kbpd
- Trading Office**
 - HQ in Kuala Lumpur

2

- 17 Petrochemical Processing Plants**
 - Marketing Office
 - HQ in Kuala Lumpur

3

- >1,000 Retail Stations**
- 1 Lube Oil Blending Facilities**
- 6 JV Depots and Facilities**
- 12 Bunkering Facilities**
- 38 Terminals**
 - 17 Fuel Terminals
 - 13 Aviation Terminals
 - 8 LPG Terminals and Bottling Facilities

4

- PENGERANG INTEGRATED COMPLEX (PIC)**
 - 1 Refinery Complex ~300 kbpd
 - 1 Petrochemical Complex ~3.3 MTPA
- Supported by 6 Associated Facilities**

PAMER
Water Supply Facility

ASU
Air Separation Unit

**RGT2
PGPP**
Regasification Terminal and Pengerang Gas Pipeline Project

UF
Utilities and Facilities

**PCP
PTL**
Pengerang Cogen Plant and Pengerang Transmission Line

PDT2
Pengerang Deep Water Terminal

- 1 Refining and Trading**
- 2 Petrochemical**
- 3 Marketing**
- 4 Pengerang Integrated Complex**

Activity Outlook

PETRONAS Floating LNG SATU

Methodology

Scope of Coverage

This section provides the activity outlook for core categories, serving as leading indicators to many other supporting services. The interdependencies create multiplier effects across the value chain.

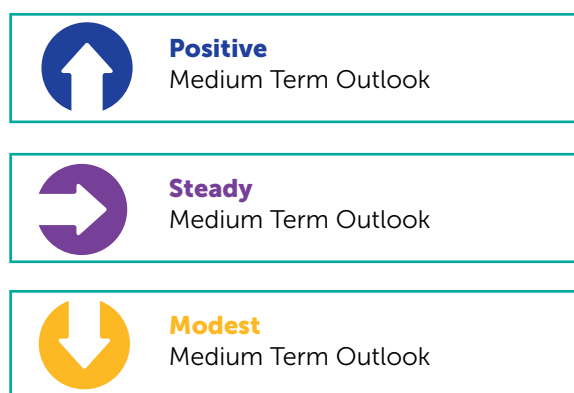
For Upstream-related information, this report covers the activity outlook for Malaysia. This includes activities from PETRONAS Group of Companies and other Petroleum Arrangement Contractors (PACs). Activities governed under the Malaysia-Thailand Joint Development Area (MTJDA) are excluded from this report.

For Downstream and Gas and New Energy-related information, this report covers the activity outlook for PETRONAS Group of Companies in Malaysia only.

Time Horizon

The report provides information on activities within a three-year period, from 2021 to 2023. Information is accounted for when a specific activity begins and not by contract award. Using Offshore Fabrication as an example, we report the date of the first steel-cut instead of the date of Engineering, Procurement, Construction, Installation and Commissioning (EPCIC) contract award. Another example is plant turnaround that begins in December 2021 and ends in January 2022 is only accounted for once, i.e. in 2021.

Directional narratives are provided for the medium-term (i.e. post-2023), to support outlook analysis using the following signposts:



Actual vs Plan 2020

Actual numbers are based on data as at October 2020.

Base and High Case Scenarios for 2021 – 2023

Outlook numbers for most categories are provided via a lower and upper band:

- **Base Case** – Activities with high probability of occurrence; high project maturity and certainty of requirement
- **High Case** – Activities with lower probability of occurrence; lower project maturity and certainty of requirement

Quick Reference for 2021

Subsurface

Drilling Rigs and Hydraulic Workover Units (HWUs)

- 10 JURs
- 4 TADRs
- 3 Semi-Submersibles/Drillship
- 5 HWUs



Equipment and Material

Supply of Linepipes

- 2.3 km Flexible Pipes
- 48 km Carbon Steel
- 7.3 km CRA



Engineering, Construction and Projects

Offshore Fabrications

- 6 WHPs and 1 CPP
- 2 SURFs

Offshore Installations

- 12 lifts for Heavy Lift
- 1 installation for Floatover
- 37 days for Pipeline Installation

Hook-up and Commissioning (HUC)

- 3.5 million man-hours

Decommissioning

- 18 Wells



General Facilities and Maintenance

Maintenance, Construction and Modification (MCM)

- 10.1 million man-hours

Underwater Services

- 490 days for DP2 DSV (ROV and Air Diving System)
- 161 days for DP2 DSV (Built-in Saturation Diving System)
- 69 days for DP2 DSV (ROV Intervention)

Plant Turnaround

- 5 with >350k man-hours
- 5 with <=350k man-hours
- 1 with <=100k man-hours



Logistics and Warehousing

Offshore Marine Vessel

- 101 AHTS
- 55 PSV/SSV
- 32 GPV/SBV
- 19 LCT
- 59 FCB
- 30 Workboat/Work Barge
- 7 UV



Others

Chemical Digital and ICT Indirect



Activity Phase (Upstream, Downstream, Gas and New Energy):

Exploration
 Development/Projects
 Production/Operations
 Abandonment

A Subsurface

Drilling Rigs and Hydraulic Workover Units

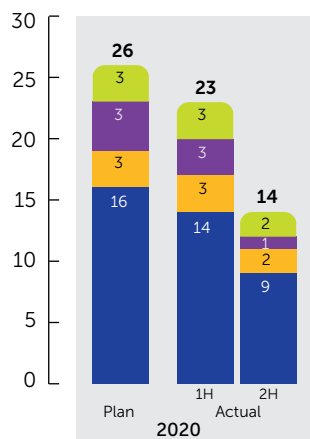
Drilling Rigs are used to drill wellbores. Activity outlook will be provided for all types of rigs operating in Malaysia i.e. Jack-up Rigs (JURs), Tender Assisted Drilling Rigs (TADR), Semi-Submersible Rigs and Drillship.

Workovers refer to any well intervention processes which help to remediate the wells using an invasive technique. The Hydraulic Workover Units (HWUs) are used to perform these operations.

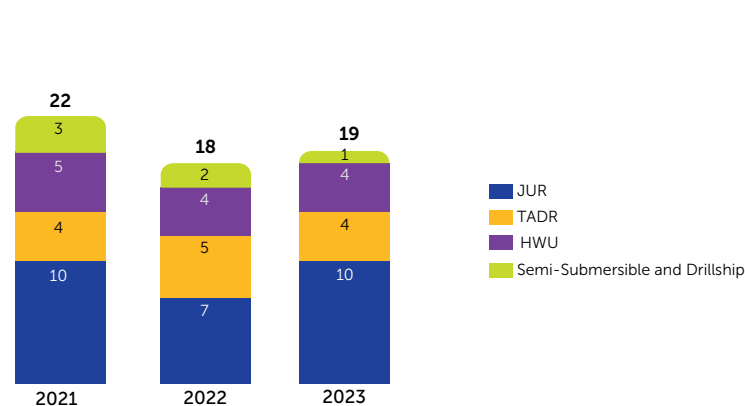
Type of Rigs	Jackup	TADR	Semi-Submersible	Drillship	HWU
Activity Phase	<ul style="list-style-type: none"> • Exploration • Development • Abandonment 	<ul style="list-style-type: none"> • Development 	<ul style="list-style-type: none"> • Exploration 	<ul style="list-style-type: none"> • Exploration 	<ul style="list-style-type: none"> • Production • Abandonment
Application	The most common type of offshore rig due to its flexibility. Typically used for drilling in shallow water.	Typically used in deeper water with space/load/approachability limitations e.g. deepwater spars, tension leg platform (TLP), etc.	The most stable type of rig, typically used for drilling in deepwater and/or harsh environment.	Typically used for drilling in deepwater/ultra deepwater. Can also be used for well maintenance, completion and capping works.	Typically used for workover operations e.g. well casings and casing levels repair, sand cleanout, etc.
Associated Services	Supporting vessels, Oil Country Tubular Goods (OCTG), third party drilling services e.g. drilling fluids, Directional Drilling (DD)/Measurement While Drilling (MWD)/Logging While Drilling (LWD), wellheads, drill bits, cementing, fishing, slickline etc.			OCTG and third party drilling services.	Supporting vessels, slickline, cementing, etc.

Number of Rigs:

2020 Plan vs Actual



Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- In 2020, there were as many as 23 rigs with peak utilisation in March. The rig count started declining from May onwards due to reprioritisation of investments as a result of plummeting global oil price and the COVID-19 pandemic.
- Steady outlook for the next three years is expected for all types of rigs as PETRONAS remains committed to maximise its oil production as a cash generator while producing gas to meet customers' demand, within its allocated capital investment.
- Outlook for 2021 to 2023 is based on full year utilisation. Actual numbers may vary based on campaign duration and/or optimisation, project deferment, cancellation, etc.



Medium Term Outlook – Post 2023

Steady outlook is expected for drilling rigs. PETRONAS is encouraging players to enhance drilling rigs' capability and offerings towards better drilling efficiency, in achieving lower drilling cost per foot while minimising work hazards.

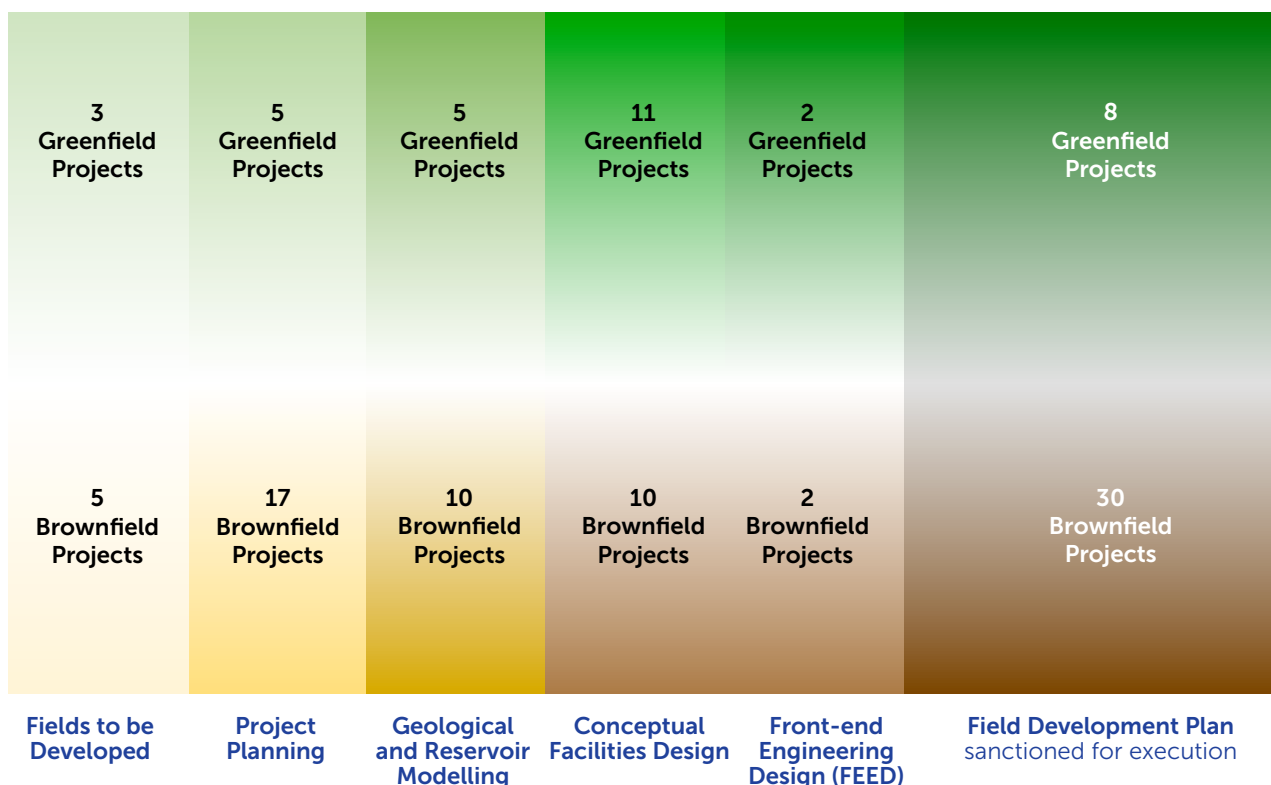
B

Engineering, Construction and Projects

The outlook for Engineering, Construction and Projects is best represented by activities related to development projects, i.e. offshore fabrication, supply of linepipes, offshore installation, hook-up and commissioning as well as decommissioning.

Typical upstream project development comprises Engineering, Procurement, Construction, Installation, Hook-up and Commissioning (EPCIC) stages.

The following portfolio of projects showcases abundant investment opportunities in Malaysian waters over a longer period. Large pool of projects are continuously and rigorously reviewed to materialise a steady pipeline of feasible and economically viable projects for production sustainability.



Number of projects are as at November 2020, and inclusive of infill drilling projects.

The fields to be developed include marginal fields, late life assets, fields with high contaminants, high complexity reservoirs and distant fields that offer opportunities for investors to turn the projects viable through innovative, disruptive and cost-effective solutions. This is a niche play that can create a marketplace for a profitable and sustainable business.

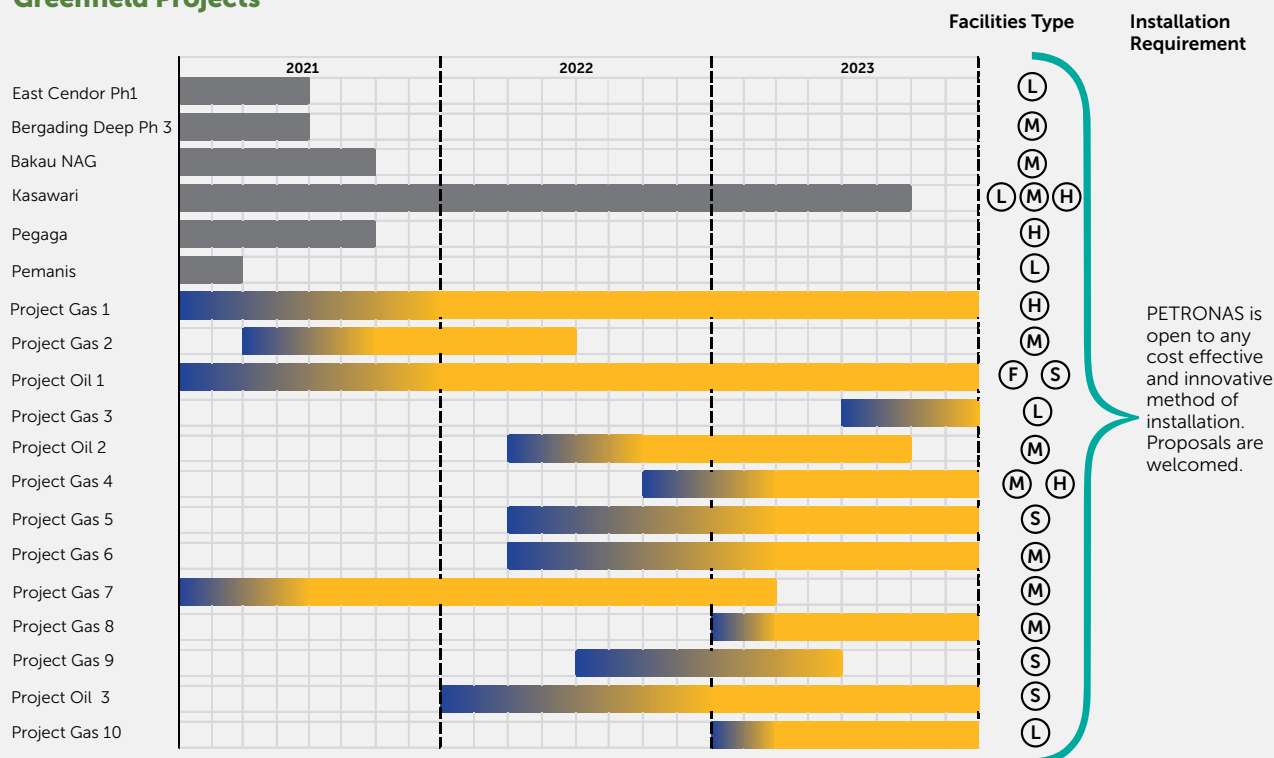
B

Engineering, Construction and Projects

For the purpose of this report, the timeline for each project is segregated into two stages, i.e. (i) Engineering and (ii) Procurement, Construction, Installation, Hook-up and Commissioning. There may be overlap of activities between the two stages, as depicted by the gradient. Also provided are indicators for facility type and installation requirements.

The list below depicts upstream **greenfield development projects**:

Greenfield Projects¹



PETRONAS is open to any cost effective and innovative method of installation. Proposals are welcomed.

¹At the time of reporting, approximately 70 per cent of the projects are still under review

- Engineering
- Fabrication, Installation and Hook-up Commissioning
- In Execution

Legend for Facilities Type:

Fixed structure (L) Lightweight – total tonnage ≤ 1,000 tonnes (H) Heavy Weight – total tonnage > 7,500 tonnes
 (M) Medium Weight – total tonnage ≤ 7,500 tonnes

Floating structure (F) Floaters – Floating Production Storage and Offloading (FPSO)/Floating Storage and Offloading (FSO)/ Mobile Operating Production Unit (MOPU)

Subsea structure (S) Subsea – Subsea Production System and Subsea Umbilical Riser Facilities (SURF)

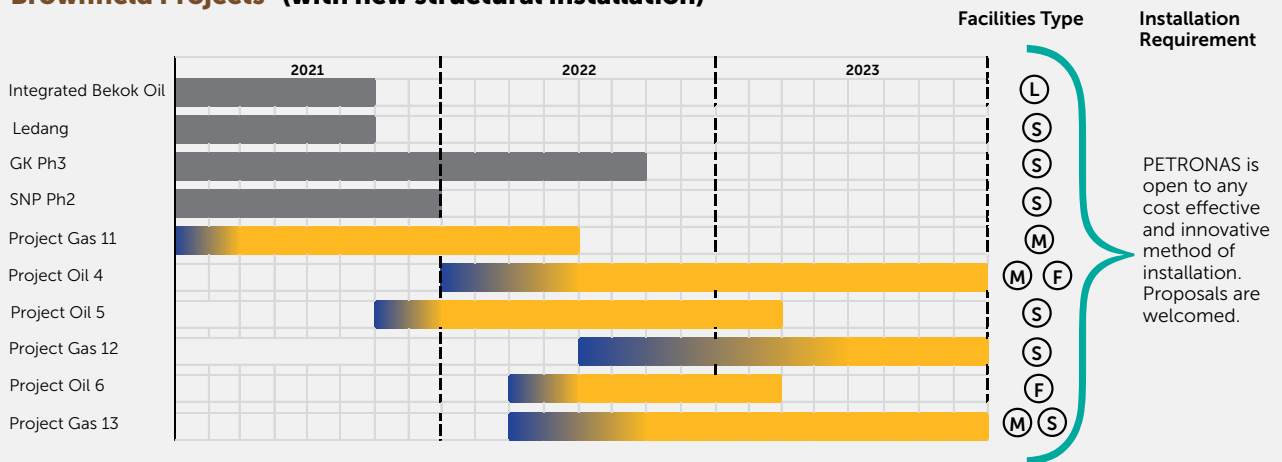
B

Engineering, Construction and Projects

For the purpose of this report, **brownfield projects** are segregated by:

- Brownfield Projects (with new structural installation)**
- Brownfield Projects (without new structural installation)**

Brownfield Projects² (with new structural installation)



²At the time of reporting, approximately 60 per cent of projects are still under review

- Engineering
- Fabrication, Installation and Hook-up Commissioning
- In Execution

Legend for Facilities Type:

Fixed structure (L) Lightweight – total tonnage ≤ 1,000 tonnes (H) Heavy Weight – total tonnage > 7,500 tonnes
(M) Medium Weight – total tonnage ≤ 7,500 tonnes

Floating structure (F) Floaters – Floating Production Storage and Offloading (FPSO)/Floating Storage and Offloading (FSO)/Mobile Operating Production Unit (MOPU)

Subsea structure (S) Subsea – Subsea Production System and Subsea Umbilical Riser Facilities (SURF)

B

Engineering, Construction and Projects

For **brownfield projects (without new structural installation)**, the activity types are indicated as:

- Infill Drilling** → Drilling of new wells in an existing field within the original well patterns to accelerate production.
- Platform Modification** → Modifying existing structures to enable rig move-in (for infill drilling) or to serve new/additional operational objectives. May involve minor fabrication works.
- Host Tie-in** → Connecting two or more structures to complete the chain of production facilities, allowing production to commence.

Brownfield Projects (without new structural installation)

Project	2021			2022			2023			Activity Type		
	ID	HTI	PM	ID	HTI	PM	ID	HTI	PM	ID	HTI	PM
Project Oil 1											*	
Project Oil 2											*	
Project Oil 3											*	
Project Oil 4												*
Project Oil 5												*
Project Oil 6												*
Project Oil 7												*
Project Oil 8												*
Project Oil 9												*
Project Oil 10												*
Project Oil 11												*
Project Oil 12												*
Project Oil 13											*	
Project Oil 14												*
Project Oil 15												*
Project Gas 1											*	
Project Oil 16											*	
Project Oil 17											*	*
Project Oil 18											*	
Project Oil 19											*	
Project Oil 20											*	
Project Oil 21											*	
Project Oil 22											*	*
Project Gas 2												*
Project Gas 3												*
Project Oil 23											*	
Project Oil 24												*
Project Oil 25											*	
Project Oil 26												*
Project Oil 27											*	
Project Oil 28											*	
Project Oil 29											*	

Legend:

- ID** Infill Drilling
- HTI** Host Tie-in
- PM** Platform Modification

B

Engineering, Construction and Projects

Brownfield Projects (without new structural installation)

Project	2021	2022	2023	Activity Type		
				ID	HTI	PM
Project Oil 30				*		
Project Oil 31				*		
Project Gas 4				*		*
Project Gas 5				*		
Project Oil 32						*
Project Oil 33				*		
Project Gas 6						*
Project Oil 34						*
Project Oil 35						*
Project Gas 7				*		
Project Oil 36				*		
Project Oil 37				*		
Project Oil 38				*		
Project Gas 8				*		
Project Oil 39				*		
Project Oil 40				*		
Project Gas 9						*
Project Gas 10						*
Project Gas 11					*	
Project Gas 12					*	
Project Oil 41				*		
Project Oil 42						*
Project Oil 43				*		
Project Oil 44						*
Project Oil 45				*		
Project Gas 13						*
Project Gas 14						*
Project Gas 15						*
Project Gas 16						*
Project Gas 17						*
Project Gas 18						*
Project Gas 19						*
Project Gas 20						*
Project Gas 21						*
Project Gas 22						*
Project Gas 23						*
Project Gas 24						*
Project Gas 25						*

Legend:

ID Infill Drilling

HTI Host Tie-in

PM Platform Modification

B

Engineering, Construction and Projects

Brownfield Projects (without new structural installation)

Project	2021	2022	2023	Activity Type		
				ID	HTI	PM
Project Gas 26	■				★	
Project Gas 27		■			★	
Project Gas 28		■			★	
Project Oil 46	■			★		
Project Oil 47	■	■		★		
Project Oil 48	■					★
Project Oil 49	■	■		★		
Project Oil 50		■				★
Project Oil 51		■				★
Project Oil 52	■	■		★		
Project Oil 53			■			★
Project Oil 54	■					★
Project Oil 55			■	★		
Project Oil 56			■	★		★
Project Oil 57			■	★		★
Project Oil 58			■	★		★
Project Gas 29	■			★		
Project Gas 30	■	■				★
Project Gas 31		■	■	★		
Project Gas 32	■	■				★
Project Gas 33		■	■			★
Project Gas 34		■	■			★
Project Gas 35		■	■			★
Project Gas 36			■			★

Legend:

ID Infill Drilling

HTI Host Tie-in

PM Platform Modification

B Engineering, Construction and Projects

Offshore Fabrication

Offshore fabrication outlook is provided for fixed and floating structures, with first steel-cut as the indicator of commencement of fabrication activity.

Fixed Structures: Wellhead Platform/Central Processing Platform

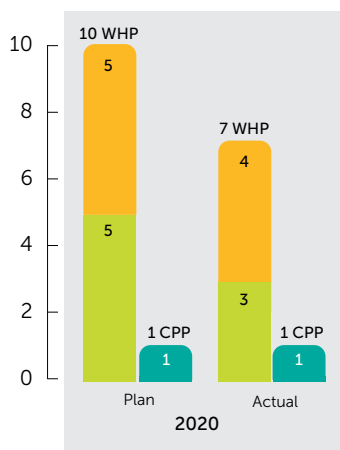
Wellhead Platform (WHP) Application: Used to house wellheads and equipment that extract oil/gas from the seabed and serve as a platform for drilling activities. Typically, it is linked to other fixed or floating structures for oil/gas processing.

Central Processing Platform (CPP) Application: Used to house wellheads and equipment that extract and process oil/gas from WHPs and piped to point of export. CPP typically acts as the central hub for the entire field complex.

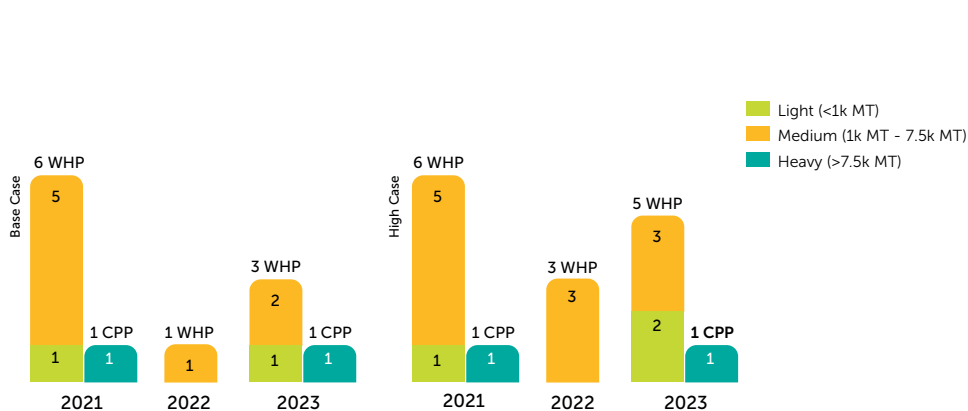
Associated Services: Engineering, structural steel, bulk materials (e.g. piping, cables, etc.), equipment supplies (e.g. mechanical, electrical, instruments, etc.)

Number of Fixed Structures Fabrication:

2020 Plan vs Actual



Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- For 2020, two projects were rephased due to low oil price and low demand, while one project was simplified as infill drilling.

Did you know?

Joint Industry Programme 35 (JIP35) for Offshore Structure Specifications has 12 specifications under its scope of coverage to be adopted for PETRONAS capital projects to achieve industry-level standardisation, driving reduction in upstream project costs through a decrease in variation of requirement between operating companies. Specifications include topside structures, weight management, fixed steel offshore structures and floating structures, among others.

B

Engineering, Construction and Projects

Floating Structures: Floaters

For the purpose of this report, floaters refer to non-fixed structures involved in processing and/or storage of hydrocarbons, i.e. Floating Production Storage and Offloading (FPSO), Floating Storage and Offloading (FSO) and Mobile Offshore Production Units (MOPU).

Application: Used as relocatable production facilities, generally to enable monetisation of marginal or isolated oil and gas fields without existing export facilities (pipeline) in the vicinity.

Associated Services: Engineering, structural steel, equipment supplies (e.g. mechanical, electrical, instruments, etc.), shipyards.



FPSO

Floating Production, Storage and Offloading

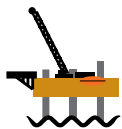
Vessel used for the processing of hydrocarbons, as well as for storage of crude oil before export via tanker lifting.



FSO

Floating Storage and Offloading

A simplified FPSO without the capability for oil or gas processing.

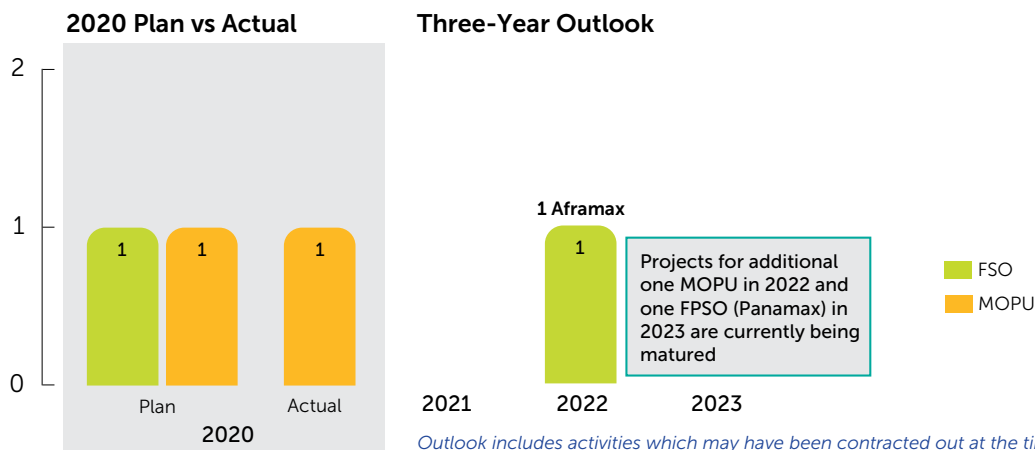


MOPU

Mobile Offshore Production Unit

Portable structure that can be reused in offshore well production. In this report, MOPU refers to the portable wellhead platform.

Number of Floating Structures Fabrication:



- In 2020, the fabrication of FPSO (Aframax) was deferred to 2022 due to low oil price and low demand.

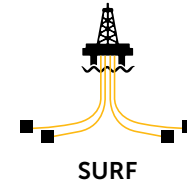
B Engineering, Construction and Projects

Subsea Structures

Subsea structures are facilities located on the sea floor, as opposed to on the surface. Petroleum is extracted on the sea floor, and then "tied-back" to an existing production platform using Subsea Umbilical, Riser and Flowline (SURF) facilities.

Application: Used to provide safe and efficient interconnection from the topside platforms and vessels to the wellheads and pumps on the sea floor, and vice versa for reliable oil and gas extraction from subsea wells.

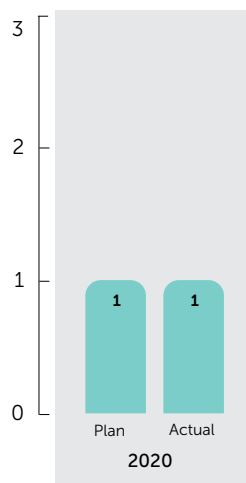
Associated Services: Engineering, equipment supplies (e.g. mechanical, electrical, instruments, etc.), installation.



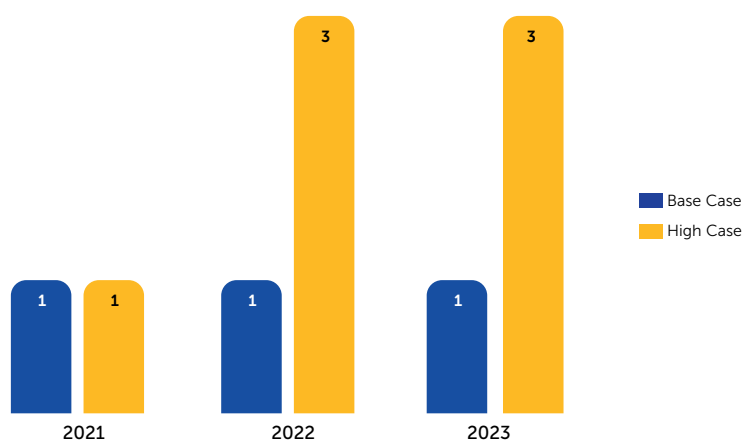
SURF
Subsea Umbilical, Riser and Flowline (SURF) comprises subsea completed wells, subsea Christmas trees and wellhead systems, subsea tie-in to flowline system, jumpers, umbilical and riser system, and subsea equipment to operate the well.

Number of Projects for SURF:

2020 Plan vs Actual



Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- Subsea tie-backs are gaining traction as they present economic viability for monetisation of previously untapped and less economically viable discoveries, i.e. deepwater and marginal fields.
- Demand for SURF in 2023 could be higher as more deepwater projects are being matured.

Medium Term Outlook – Post 2023

Steady outlook is expected for fabrication of fixed structures and subsea facilities as PETRONAS continues monetising its oil and gas resources for cash generation while meeting gas customers' demand.

- Modest outlook is expected for heavier structures as cost competitiveness drives development projects to opt for WHP tie-ins to existing nearby facilities.
- Modest outlook is also expected for floaters, as technology advancements present favourable options for monetisation of remote fields.

B

Engineering, Construction and Projects

Offshore Installation

Offshore installation outlook for each project is provided by the type of installation barge required for facility installation, i.e. heavy lift, floatover or pipelaying barge.

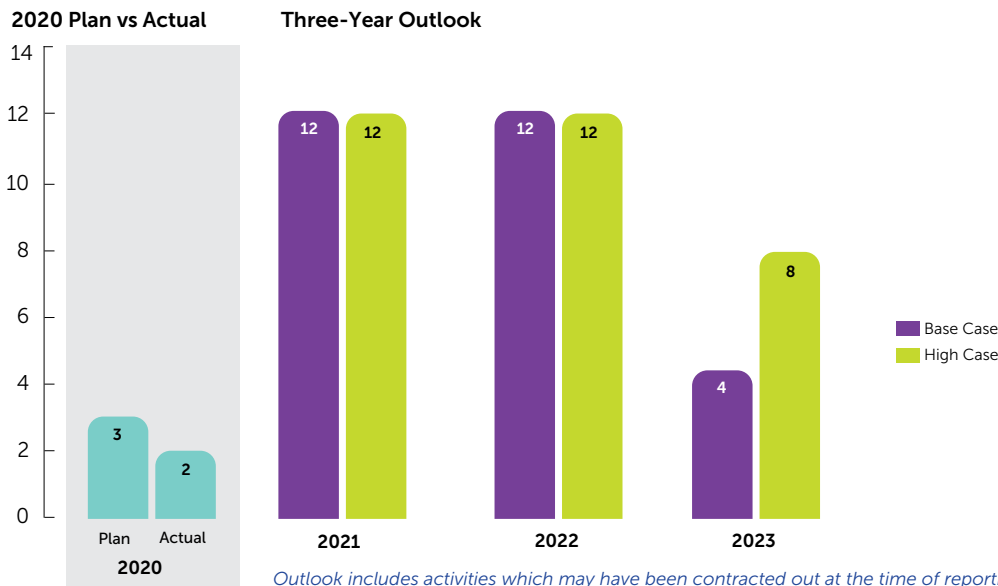
Structural Installation – Heavy Lift

Application: Used for installation of jackets (for WHPs and CPPs) and topsides (for WHPs).

Associated Services: Supporting vessels, diving and remotely operated vehicles (ROVs), welding and non-destructive testing (NDT).



Number of Lifts Using Heavy Lift Barges:



- In 2020, one structure installation was deferred to 2021 as a result of delayed fabrication completion due to Movement Control Order (MCO) restrictions.
- Outlook number is measured in terms of number of lifts, counted separately for each jacket and topside, and excludes heavy lift barges utilisation for facilities decommissioning.
- This outlook may be read together with the outlook for offshore fabrication.

B Engineering, Construction and Projects

Structural Installation – Floatover

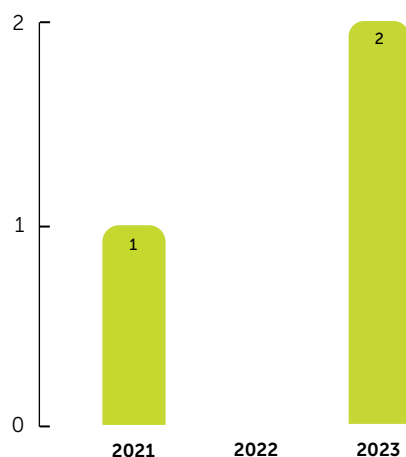
Application: Used for installation of heavier or integrated topsides (for CPPs).

Associated Services: Supporting vessels, diving and ROVs, welding and NDTs.



Number of Structural Installation Using Floatover Barges:

Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- Numbers indicated are base case and are measured in terms of number of projects. Duration may vary.
- This outlook may be read together with the outlook for offshore fabrication.



Medium Term Outlook – Post 2023



- Steady outlook is anticipated for heavy lift barges given the steady amount of projects requiring WHPs.
- Modest outlook is expected for floatover barges with lower number of projects requiring CPPs.

B

Engineering, Construction and Projects

Pipeline Installation – Pipelay

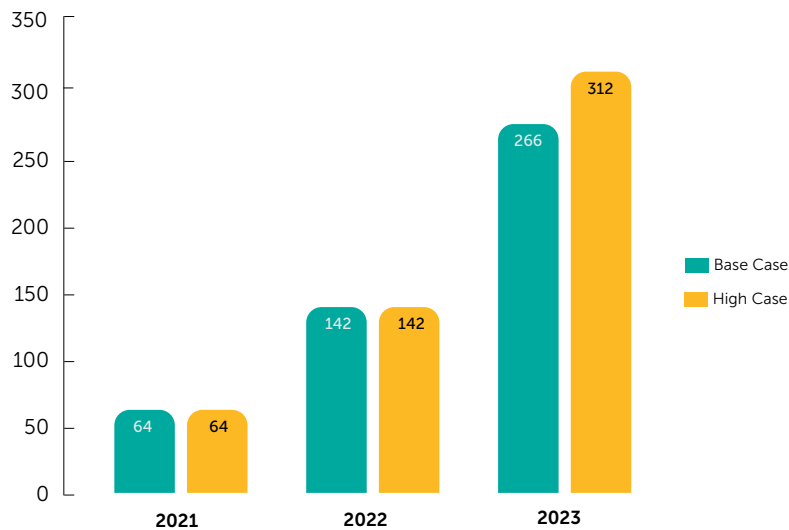
Application: Used to install rigid linepipes (e.g. carbon steel, corrosion resistant alloy (CRA), etc.) for offshore projects.

Associated Services: Supporting vessels, diving and ROVs, fill joint coating services, welding and NDT.



Number of Installation Days:

Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- Outlook number is measured by number of installation days, based on estimated number of pipe joints and length, and covers carbon steel and Corrosion Resistant Alloy (CRA) pipeline only.
- High number of days for 2023 is mainly attributed to pipeline installation for two CPP structures.
- This outlook may be read together with the outlook for supply of linepipes.



Medium Term Outlook – Post 2023

- Steady outlook can be expected for pipelay barges as more development projects opt for tie-ins to existing WHP or processing facilities.

B Engineering, Construction and Projects

Hook-up and Commissioning

Hook-up and Commissioning (HUC) ties in all components of the facilities including all function tests and start-up of facilities.

Outlook is stated in man-hour units as the activities are labour intensive.

Activity Phase: Development and Production

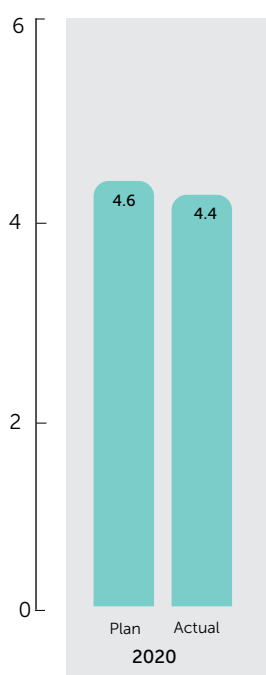
Application: **Greenfield** HUC involves works on newly installed platforms during development stage. Typically bundled as part of EPCC/EPCIC contracts. **Brownfield** HUC involves works on existing offshore facilities and equipment; including rejuvenation/redevelopment, general topside modification, infill drilling activity, etc.

Associated Services: Marine spread (accommodation work barge, workboat, FCB), logistics services, pre-commissioning services, inspection services, etc.

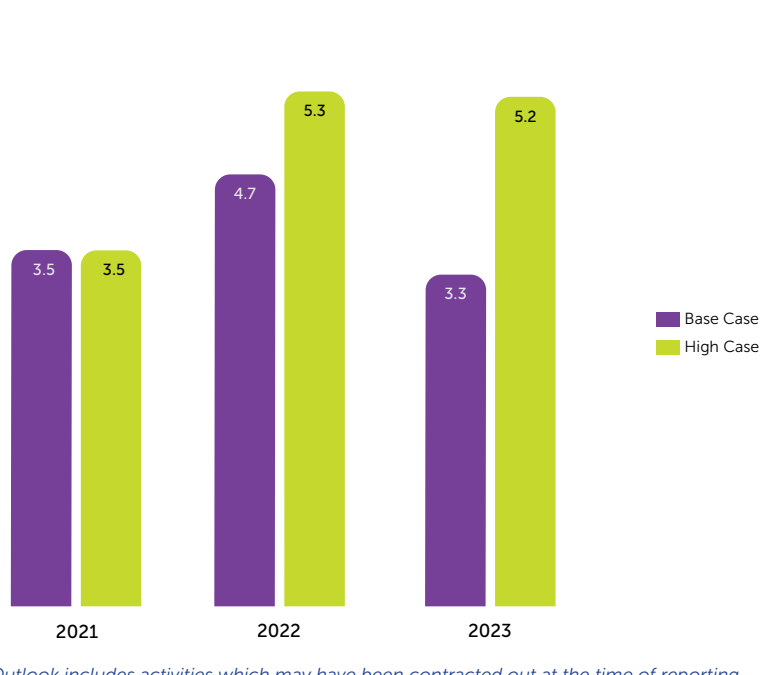


Number of Man-Hours (Millions):

2020 Plan vs Actual



Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- Slightly lower actual man-hours than planned for 2020 due to resource and manpower limitations during MCO, offset by additional activities to leverage the available resources already onboard.
- Steady outlook for the next three years with the consistent number of brownfield projects being planned, which covers mainly infill drilling, host tie-in and platform modification.
- Outlook excludes man-hours from EPCC and/or EPCIC projects.



Medium Term Outlook – Post 2023

- Steady outlook is expected for HUC in line with growing focus on Brownfield projects in effort to maximise hydrocarbon recovery from existing fields as well as optimising ageing facilities.

B Engineering, Construction and Projects

Decommissioning

Decommissioning refers to the act of removing petroleum facilities that are disused or no longer required for petroleum operation and to restore the affected contract area to a safe and environmentally stable condition.

Activity Phase: Abandonment

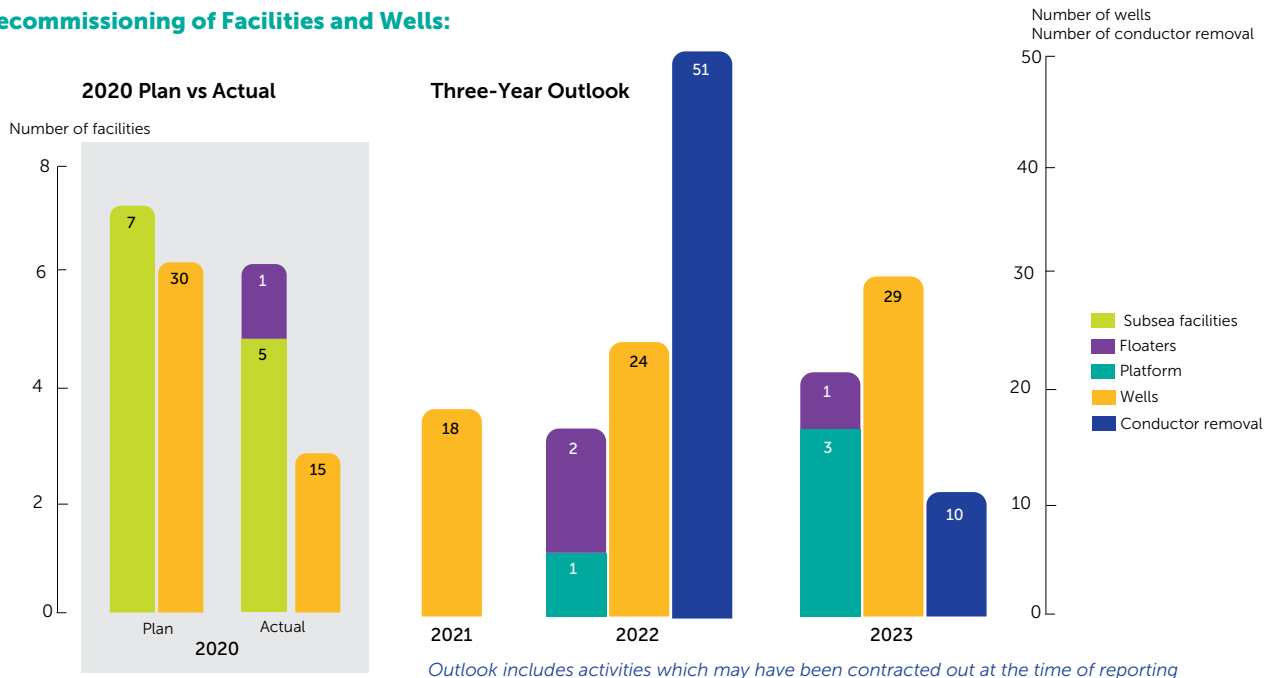
Application: Decommissioning comprises two activities:

- Well Abandonment: prepare wells to be closed permanently.
- Upstream Facilities Decommissioning: permanently make safe the facilities e.g. WHP, CPP, Subsea Tree, etc.



Associated Services: Drilling rigs and HWU, offshore support vessels, lifting and third-party drilling services, engineering services, yard facility, transport, cutting services, conductor removal, pipeline flushing, etc.

Decommissioning of Facilities and Wells:



- Lower number of well abandonment and facility decommissioning for 2020 due to overall activity reprioritisation.
- Conductor removal activity is subject to execution of optimisation strategy to achieve better cost efficiency.
- PETRONAS welcomes fit-for-purpose technologies to support cost competitiveness that brings the best benefit to the environment. The industry is encouraged to foster greater collaboration with all stakeholders to propose innovative decommissioning solutions.

Medium Term Outlook – Post 2023



- Steady outlook is expected for decommissioning activities based on the increasing trend of idle wells and facilities operating beyond design life.

i

Did you know?

Malaysia Oil and Gas Asset Dimension



>350 facilities

>750 pipelines

>3,000 wells



56% are operating beyond design life
18% are operating more than 40 years



38% are operating beyond design life
4% are operating more than 40 years



45% are idle wells
500+ wells are planned to be plugged permanently by 2030

C

Equipment and Materials

Supply of Linepipes

Linepipes and flexible pipes are used to transport oil or gas between two or more facilities. In this report, pipeline requirement is indicated by its type, i.e. rigid linepipe, flexible pipe, or both.

In this report, outlook is provided in relation to upstream development projects requirements, reflecting the year that it is required on site.

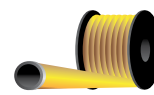
Linepipes Application: Generally used for longer distances, typically for platforms to onshore plants.

Flexible Pipes Application: Generally for shorter distances, typically for floating production systems with high-pressure production risers, export risers, chemical/water/injection lines, and gas lift lines.

Associated Services: Engineering, pre-commissioning services, logistics, coating services (only for linepipes).



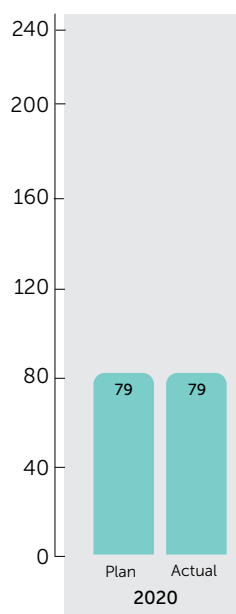
Linepipes
Rigid pipes, generally made of carbon steel material or corrosion-resistant alloy.



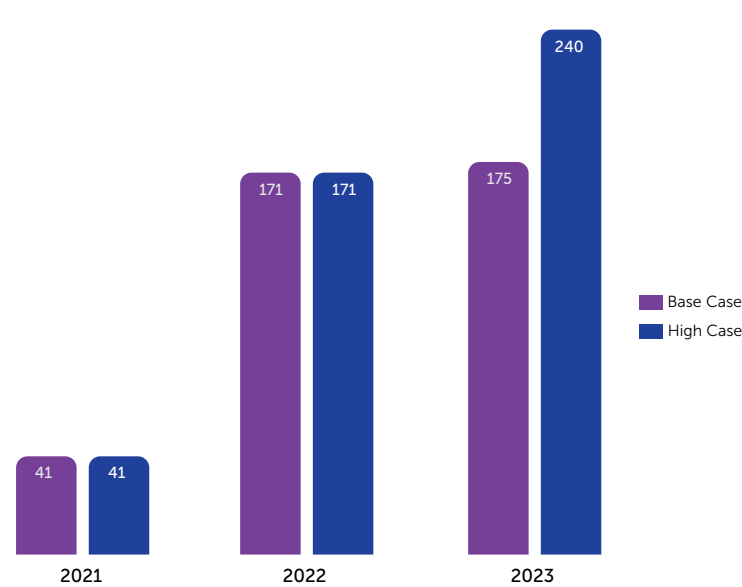
Flexible Pipes
Strong and adaptable pipes that are high-pressure resistant, bendable, adjustable and retrievable.

Number of Linepipes (km):

2020 Plan vs Actual



Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- In 2020, the length of linepipes being procured/fabricated were well within plan.
- The outlook is for carbon steel only, and includes demand for new development projects, excluding pipeline replacement projects, and water and process piping.
- In addition, there is a requirement for:
 - a) 2.3 km flexible pipe and 7.3 km CRA pipeline in 2021
 - b) 10 km of flexible pipe in 2022
- This outlook may be read together with the outlook for installation of linepipes.



Medium Term Outlook – Post 2023

- Steady outlook can be expected for supply of linepipes as more development projects opt for tie-ins to existing WHP or processing facilities.

D

General Facilities and Maintenance

Offshore Maintenance, Construction and Modification

Offshore Maintenance, Construction and Modification (MCM) covers activities related to the repair and maintenance of existing topside facilities.

Outlook is stated in man-hour units as the activities are labour intensive.

Activity Phase: Production

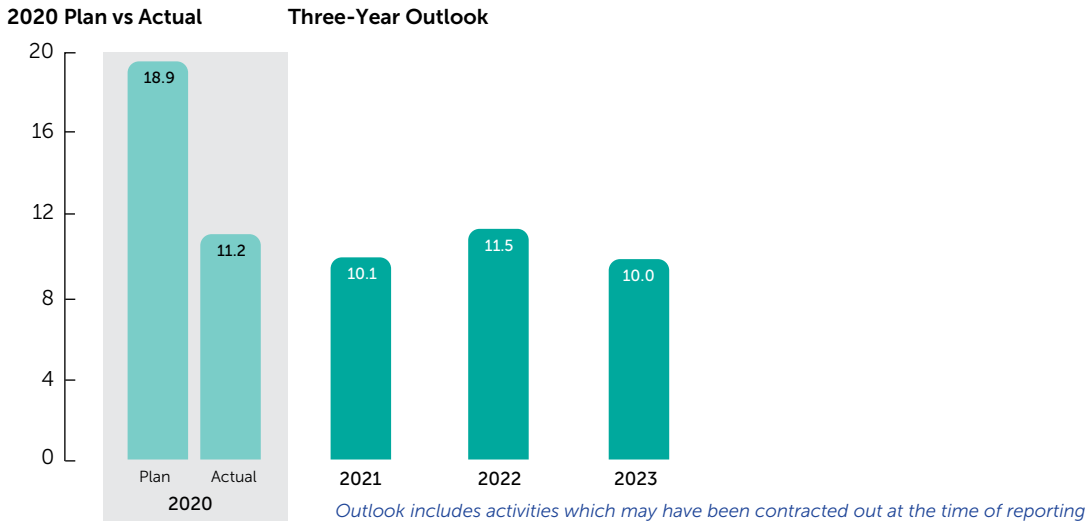
Application: MCM involves two types of activities:

- i. Scheduled Maintenance: Planned activities.
- ii. Corrective Maintenance: Unplanned activities arising from unforeseen circumstances.

Associated Services: Supply vessel, inspection services, blasting, painting services, etc.



Number of Man-Hours (Millions):



- Lower actual man-hours for 2020 is attributed to the low oil price coupled with restrictions during the MCO, resulting in execution of only high priority maintenance (critical and/or related to Health, Safety and Environment (HSE) risk).
- Activity is expected to remain stable over the next three years, driven by the shift from preventive maintenance to predictive and prescriptive maintenance leveraging digital, analytics and automation.



Medium Term Outlook – Post 2023

- Steady outlook can be expected for MCM activities given its cyclical nature, with continuous scope prioritisation, driven by affordability. Efficient cost management will enable more activities to become feasible for execution.

D

General Facilities and Maintenance

Underwater Services

Underwater Services cover inspection, maintenance and repair activities performed for underwater structures such as platform jacket inspection, offshore pipeline inspection, debris survey and removal, etc.

For the purpose of resource planning and optimisation, the outlook is represented by the number of days for activities to be executed.

Activity Phase: Development and Production

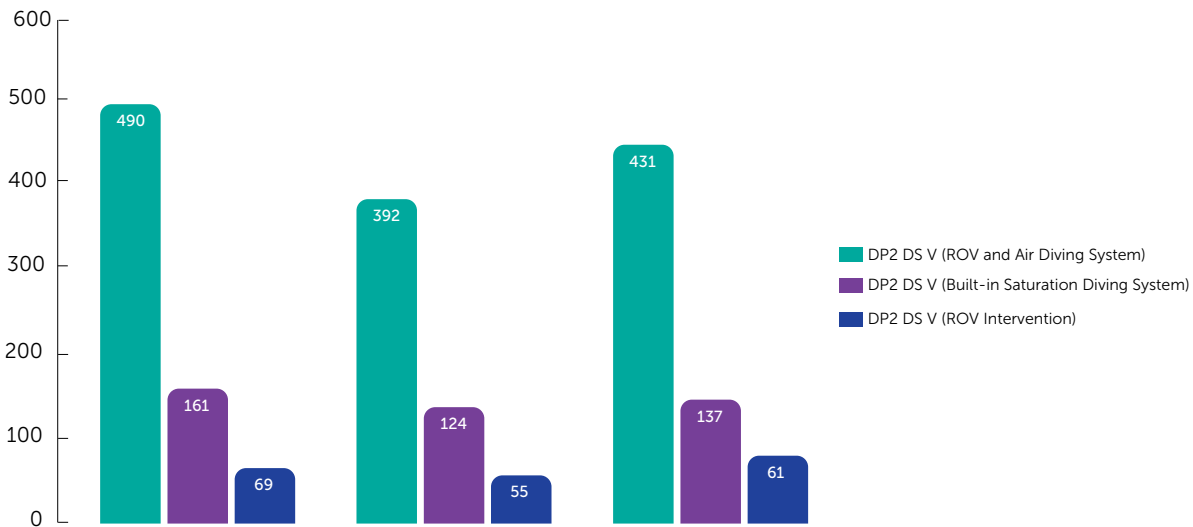
Application: Inspection, maintenance and repair activities for continuity of services, safety and integrity of underwater structures e.g. platform jackets, pipelines, subsea equipment, etc.

Associated Services: Support vessel, ROV, manpower, equipment, etc.



Number of Days:

Three-Year Outlook



Outlook includes activities which may have been contracted out at the time of reporting

- Outlook is based on estimated number of days for execution of underwater activities utilising Diving Support Vessel (DSV). Vessel specifications selection may vary depending on scope requirement.
- While activity prioritisation continues for the next three years, requirement for DSV is consistent. Where possible, optimisation will be exercised through activity consolidation across PACs.
- Prioritisation of local vessels will continue to be exercised.



Medium Term Outlook – Post 2023

- Steady outlook is expected for Underwater Services as activities are periodically scheduled. However, constant cost pressure will continue to drive further scope optimisation/prioritisation.

D

General Facilities and Maintenance

Plant Turnaround

Plant Turnaround is defined as a major engineering event during which an onshore facility is shut down for equipment inspection and overhaul, debottlenecking, revamps and catalyst regeneration projects.

Turnaround comprises main mechanical work, which constitutes the bulk of total activities (~60 per cent). Other activities are discipline-specific; e.g. electrical, instrument, inspection and rotating equipment maintenance. Turnaround is labour intensive, hence activity outlook is stated in man-hour units.

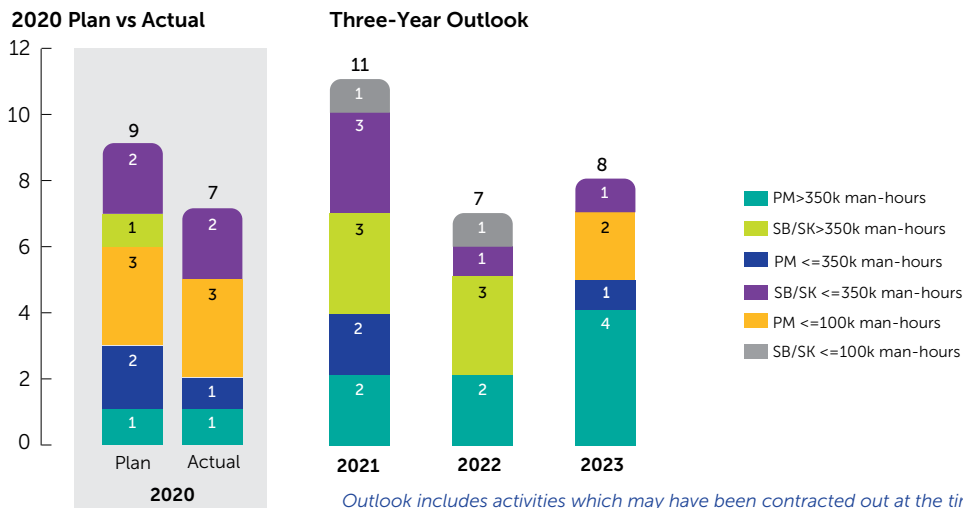
Activity Phase: Operations

Application: Turnarounds are scheduled periodically, important to ensure timely renewal of Certificate of Fitness (CF) by the authorities and maximise plant efficiency and capacity.

Associated Services: Equipment services (e.g. mechanical, electrical, instruments, etc.), inspection services, manpower, etc.



Number of Turnarounds:



- In 2020, two turnarounds were deferred to 2021 due to restrictions imposed (e.g. personnel capacity, mobility, etc.) during the MCO.
- The outlook represents the number of PETRONAS Operating Units (OPUs) to perform turnaround and excludes plants not operated by PETRONAS.



Medium Term Outlook – Post 2023

- Steady outlook is expected given the cyclical requirement of maintenance for downstream plants.

E Logistics

The Logistics category covers transportation, logistics, warehouse, workshop, storage and marine operation services.

Marine Vessels

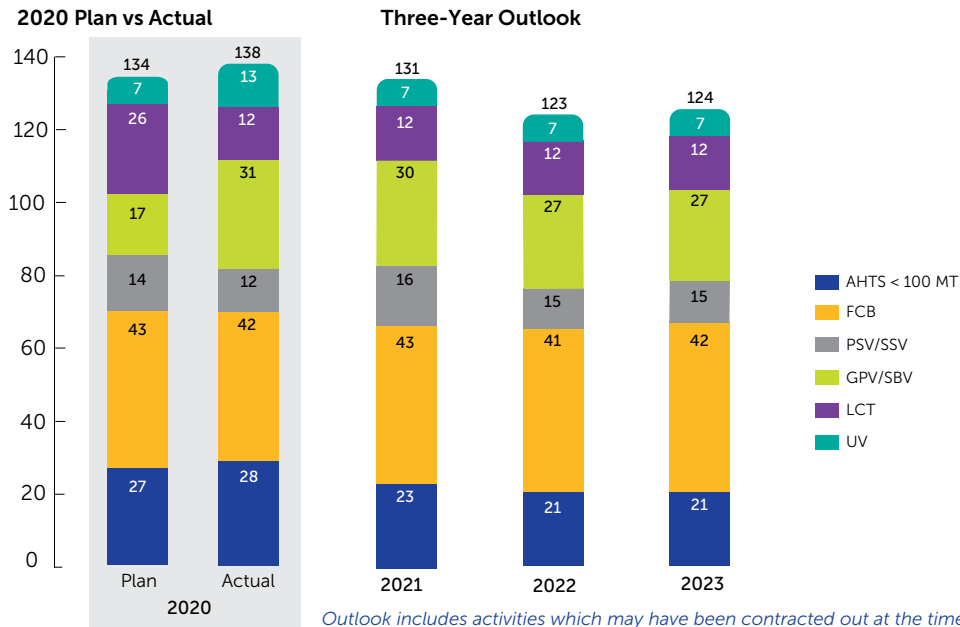
Type of Vessel	Anchor Handling Tug Supply (AHTS)	Platform Supply Vessels (PSVs)/ Straight Supply Vessels (SSVs)	Fast Crew Boat (FCB)
Activity Phase	<ul style="list-style-type: none"> • Exploration • Development 	<ul style="list-style-type: none"> • Production • Abandonment 	<ul style="list-style-type: none"> • Development • Production • Abandonment
Application	Used to assist in anchor handling operation, towing and transport supplies to and from offshore platforms/drilling rigs	Transport equipment and supplies to offshore platforms/drilling rigs	High speed vessel for the transportation of crew to offshore facilities and inter rigs
Associated Services	Vessel inspection services, bunkering services, port services, tank cleaning services		

Type of Vessel	Workboat/ Work Barge	General Purpose Vessel (GPV)/ Standby Vessel (SBV)	Utility Vessel (UV)	Landing Craft Tank (LCT)
Activity Phase	<ul style="list-style-type: none"> • Development • Production • Abandonment 	<ul style="list-style-type: none"> • Development • Production 		<ul style="list-style-type: none"> • Production
Application	Accommodation for personnel	Standby support, rescue and emergency duties		Transport equipment and supplies to offshore platforms/drilling rigs
Associated Services	Vessel inspection services, bunkering services, port services			

E

Logistics

Number of Vessels Supporting Production Operations:



- Outlook depicts consistent demand for vessels supporting production operation from year-to-year.
- This is an opportune time for local players and financiers to re-evaluate opportunities for investment.

i

Did you know?

PETRONAS is committed to ensuring operational safety during offshore transportation. Efforts are underway to replace the aging fleet that is currently serving our operations through collaboration with the marine industry.

In addition, PETRONAS is currently considering options for new vessel technology for our operations that can accommodate 365 days operability per year, able to provide comfort to passengers during voyage, and safe passenger transfer from vessel to platform and vice versa, among others.



Medium Term Outlook – Post 2023

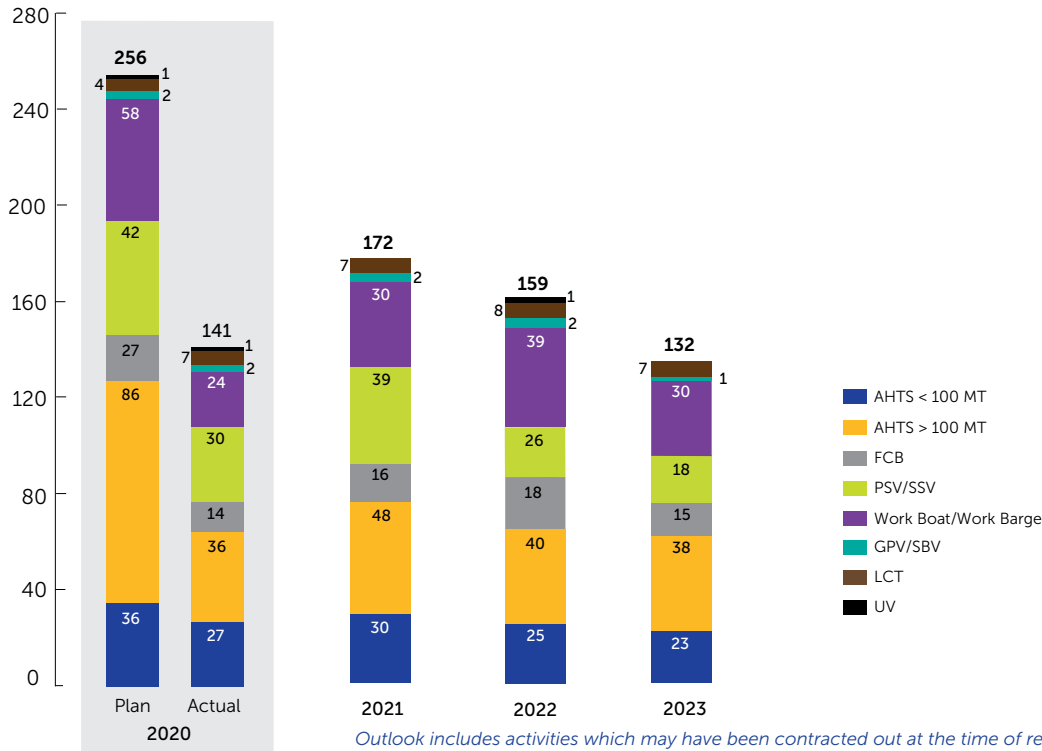
- Steady outlook is expected for marine vessels due to the consistent activity of production operations in Malaysian waters.

E Logistics

Number of Vessels Supporting Drilling and Projects:

2020 Plan vs Actual

Three-Year Outlook



- In 2020, lower number of drilling and project activities resulted in fewer AHTS, FCB and workboat/work barge being called for service.
- This outlook excludes the requirement of vessels for HUC, MCM and Underwater Services activities, which have been sourced separately.
- The outlook correlates to activities described in Subsurface, Engineering, Construction and Projects, and General Facilities Maintenance sections.



Did you know?

“Uberised” Logistics Control Tower (ULCT)

ULCT is an “uberised” logistics concept, a new way of working by pooling marine vessels across all businesses in PETRONAS Carigali Sdn Bhd (PCSB) into a single digital platform. It enables increased visibility on deck space and seats of all vessels, allowing for optimisation in many areas, including vessel idling time, vessel utilisation, fuel consumption, time and cost.

With successful pilots in PM9 and Duyong assets, ULCT will be scaled up to all PCSB assets by end of 2021 and is open for expansion to PACs thereafter.



Medium Term Outlook – Post 2023

- Modest outlook can be expected for marine vessels supporting drilling and projects through PETRONAS’ efforts of optimising its resource requirement.
- Prioritisation of local vessels will continue to be exercised.

F

Chemical

Chemicals are utilised in both Upstream and Downstream businesses, mainly during maintenance and operation activities.

For the purpose of this report, only the primary categories (excluding chemicals used as feedstocks) are highlighted as below:

	Process	Commodity	Chemical Services
Main composition	Catalysts, production chemicals, corrosion inhibitors and biocides, boiler and cooling water chemical, sulfiding agent and additives	Base oil, lubricants, API Class G cement, glycols, amines, resins, chloralkali, solvents	Catalysts and internal media change out
Utilisation	Chemicals that are used to accelerate plant processes, maximise asset reliability and improve productivity	Chemicals that are commonly used in process and operations	Periodical services during unit shutdown or turnaround based on catalysts/internal media life and/or operation requirements
Outlook	<ul style="list-style-type: none"> Catalysts, production chemicals, corrosion inhibitors and biocides, oil and lubricants, glycols and base oil amount to 80 per cent of spending in chemicals Continuous requirement for purchases and services related to catalyst and internal media across PETRONAS OPU's in view of multiple change out or top up requirements for the period 2021 to 2025 		

G

Indirect

The Indirect category covers diverse products and services such as Human Resource Services, Health, Safety, Security and Environment (HSSE), Marketing, Advertising and Public Relations, Office Administration and Professional Services, as well as Corporate Services, which mainly support internal usage to maintain the company's daily operations.

Primary highlights are tabulated below:

	Human Resource Services	HSSE	Marketing, Advertising and Public Relations	Office, Administration and Professional Services
Main composition	<ul style="list-style-type: none"> Manpower supply Capability development 	<ul style="list-style-type: none"> Waste management Medical services and supply Protection equipment HSSE consultancy Safety and firefighting equipment and services 	<ul style="list-style-type: none"> Advertising Market research 	<ul style="list-style-type: none"> Business travel management Onshore and Offshore catering General consultancy services

The key approach for sourcing within the Indirect category will be via:

- Volume consolidation through integrated contracts across corporate and business units.
- Online buying experience through external Business-to-Business (B2B) marketplaces i.e. Lapasar and Dropee, allowing direct purchases from suppliers.
- New ways of working through technology-driven initiatives, for example, seamless end-to-end travel management systems with improved customer experience, Waste-To-Energy (WTE) initiatives in line with PETRONAS' net zero carbon emissions by 2050 aspiration.

H Digital and ICT

Digital and ICT covers all digital and ICT related products and services such as application software, IT consultancy and professional services, as well as telecommunications and network hardware and software. The key approach for sourcing of digital and ICT is through integrated consolidated contracts across PETRONAS' corporate and business units.

PETRONAS is taking a new procurement approach for digital and ICT to adapt and respond to the rapidly changing digital landscape, such as:

- Drive flexible contracting to co-innovate and capture "unknown" future requirements.
- Foster long-term strategic partnership to co-create and incentivise partners to 'scale fast or fail fast' outcomes.
- Allow pace in procurement to match with the shorter innovation cycle.
- Optimise value for PETRONAS through governance based on outcome/value and Total Cost of Ownership (TCO) throughout the lifecycle of the asset.

Primary highlights are tabulated below:

	Archetype 1 Run and Maintain	Archetype 2 Essential Building Block	Archetype 3 Sandbox and Scale
Description	Focuses on everyday digital and ICT operations of the business such as software maintenance and license renewal, application support , etc.	Foundational infrastructure, application and security requirements for enterprise	Explore or experiment and develop "among first of its kind" concepts, use cases or products which need to be proven in PETRONAS context at pace, at scale
Outlook	Positive outlook for digital and ICT services, in line with active digitalisation efforts in PETRONAS		



Contracts Outlook



Contracts Outlook

The outlook comprises the following contracts:

Pan-Malaysia contracts: Joint contracts between Petroleum Arrangement Contractors (PACs) in Malaysia for similar scopes of services and material.

Integrated Downstream contracts: Joint contracts between PETRONAS Downstream Operating Units (OPUs) for similar scopes of services and material.

Integrated Upstream and Downstream contracts: Joint contracts between PETRONAS OPUs for similar scopes of services and material in Upstream and Downstream.

Upstream and Downstream Individual contracts

As many of these contracts are due for re-tendering in the period of 2021-2023, this would be an opportune time for players to strategise on resources, new technology offerings, and strategic partnerships while maintaining the highest degree of efficiency in performing jobs.

A Subsurface

No	Contract	Start	2020	2021	2022	2023	2024	
Pan-Malaysia								
1	Well Testing and Tubing Conveyed Perforations (TCP)	2017						
2	Drill Bits (Rock/PDC) and Hole Enlargement Tools	2017						
3	Mudlogging	2017						
4	Liner Hanger Equipment and Services	2018						
5	Cementing and Downhole Tools	2018						
6	Drilling Fluids	2018						
7	Slickline	2018						
8	Tubular Handling, Conductor Installation and Slot Recovery	2018						
9	Deepwater Subsea Wellhead Equipment, Tools and Services	2019						
10	Directional Drilling (DD)/Measurement While Drilling (MWD)/ Logging While Drilling (LWD)	2020						
11	Fishing Equipment and Services	2020						

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024
Individual - Upstream							
12	Electric Wireline Logging (EWL)	2016					
13	Well Leak Repair	2017					
14	Geological Samples and Laboratory Core Analysis Services	2018					
15	Annulus Wash and Cementing Assurance	2017					
16	Wellhead Maintenance Services	2017					
17	Surface Controlled Subsurface Safety Valve System Installation and Services	2018					
18	Geophysical, Geomatics, HSE and Technical Auditor Consultancy Services	2018					
19	Remotely Operated Vehicle (ROV)	2018					
20	Soil Investigation Services	2019					
21	Surface Wellhead Equipment and Services	2018					
22	Well Downhole Leak Detection Services (Ultrasound)	2018					
23	Sand Control and Stimulation Equipment and Services	2018					
24	Drilling Rig Integrity and Inspection	2018					
25	Wellbore Cleanup Equipment and Services	2018					
26	Drilling Rental Tools for Downhole Pressure Management	2018					
27	Geotechnical Onshore and Offshore Related Services	2019					
28	Real Time Metocean Observation System and Services	2019					
29	Drilling Tools, Well Test Tubular and Accessories Rental	2018					
30	Surface Sand Management	2019					
31	Gas Lift Valves (GLV) and Insert Strings Equipment, Accessories and Services	2019					
32	Marine Site Investigation Survey	2020					
33	Offshore Surveying and Positioning Services	2020					
34	Metal Expandable Packer (MEP) for Annular Barrier Equipment	2019					

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

B Engineering, Construction and Projects

No	Contract	Start	2020	2021	2022	2023	2024
Pan-Malaysia							
1	Transportation and Installation of Offshore Facilities	2016	■				
2	Engineering, Procurement and Construction (EPC) of Fixed Offshore Structure	2018	■	■	■	■	■
Integrated Upstream and Downstream							
3	Engineering Services (Minor)	2018	■	■			
4	Engineering Services (Major)	2019	■	■	■		
Individual - Upstream							
5	Marine Warranty Survey and Technical Services for Offshore Facilities	2020	■	■	■		
6	Integrated Hook-up and Commissioning (HUC)	2020	■	■	■	■	

C Equipment and Materials

No	Contract	Start	2020	2021	2022	2023	2024
Pan-Malaysia							
1	Mechanical Rotating Equipment Services and Parts	2019	■	■	■		
Integrated Upstream and Downstream							
2	Maintenance, Supply and Installation of Batteries	2018	■	■			
3	Maintenance and Services of HV/LV Motor and Alternator	2018	■	■			
4	Instrument Maintenance and Services	2019	■	■	■		
5	Centrifugal and Reciprocating Type Gas Compressors	2019	■	■	■	■	
6	Heat Exchanger, Pressure Vessel and Utility Tank Maintenance	2019	■	■	■		
7	General Electrical Equipment Services	2020	■	■	■	■	
Integrated - Downstream							
8	Supply and Installation of Composite Overwrap Repair System	2018	■				
9	Repair and Refurbishment of Mechanical Seal	2020	■	■	■		
10	Critical Flange Management Services	2019	■	■	■	■	
11	Supply of Gaskets	2019	■	■	■	■	
12	Water Treatment Solution Programme for Boiler and Cooling Water System	2017	■	■	■		

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024
Individual - Upstream							
13	Supply and Delivery of Oil Country Tubular Goods (OCTG)	2019	■				
14	Machining Services for Oil Country Tubular Goods (OCTG)	2019	■				
15	Supply, Service and Maintenance of Heater Bundle and Control Panel	2018	■				
16	Operational Pigging Services	2018	■				
17	Pressure Relief Device Maintenance Services	2019	■				
18	Valve Maintenance Services	2020	■				
19	Reciprocating Engine and Compressor Maintenance	2019	■				
20	Material Disposal Services	2019	■				

D General Facilities and Maintenance

No	Contract	Start	2020	2021	2022	2023	2024
Pan-Malaysia							
1	Inspection and Corrosion Monitoring Services (ICMS)	2018	■				
2	Underwater Services	2018	■				
3	Maintenance, Construction and Modification (MCM) - Offshore and Onshore	2018	■				
Integrated Upstream and Downstream							
4	Intelligent Pigging for In-Line Inspection	2018	■				
5	Atmospheric Storage Tank Cleaning and Maintenance Services	2016	■				
6	Pump Maintenance Services (Region 1)	2020	■				
7	Online Leak Sealing Services	2018	■				
8	Pump Maintenance Services (Region 2)	2020	■				
9	Water Treatment Solution Programme	2017	■				
10	Maintenance for Single Point Mooring and Supply of Marine Hoses	2020	■				
Integrated - Downstream							
11	Fire and Gas Maintenance Services	2020	■				
12	Integrated Turnaround Main Mechanical and Maintenance Mechanical Static	2019	■				
13	Mechanical Pipelines Maintenance	2019	■				

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024
Individual - Upstream							
14	Pressurised Welding Habitat	2018					
15	Integrated Operation (IO) System Implementation and Services	2019					
16	Overall Pipeline Commissioning and Services	2018					
17	Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) Monitoring and Contaminated Material Cleaning	2018					
18	Production Optimisation with CO ₂ Tracer Pumping Services	2018					
19	Splash Zone Structural Repair and Maintenance	2019					
20	Blasting and Painting Services	2018					
21	Riser Corrosion Prevention System and Maintenance	2018					
22	Overall Pig Trap System Commissioning and Services	2018					
23	Integrity and Fitness for Service (FFS) Assessment of Pipelines	2019					
24	Pipeline Isolation Services	2019					
25	Maintenance, Construction and Modification (MCM) - Offshore	2017					
26	Maintenance, Construction and Modification (MCM) - Onshore	2018					
27	Marine Operations and Maintenance for Floating LNG	2019					
Individual - Downstream							
28	Overall Commissioning and Maintenance of Underground Storage Tank and Monitoring Test Well for PETRONAS Stations	2018					
29	Maintenance Services of Aviation Vehicles at Aviation Fuel Terminals	2016					
30	Repainting of LPG Cylinders	2018					
31	Terminal Operations and Maintenance Services	2018					
32	Overall Commissioning and Maintenance for Chillers and Freezers	2019					
33	Tubular Inspection Services for Heat Exchangers	2018					
34	Inspection and Servicing Electrical Works at PETRONAS Stations	2020					
35	Facilities Maintenance, Associated Works and Bush Control	2020					
36	Maintenance of Fuel Dispenser, Accessories and Equipment for PETRONAS Stations	2020					
37	Fabrication and Reconditioning of LPG Cylinder and Supply of LPG Compact Valves	2019					

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024
Individual - Downstream							
38	Requalification and Shot-Blast Repainting of LPG Cylinder	2019	■	■	■		
39	Supply and Maintenance of Underground Flexible Piping Sytem for PETRONAS Stations	2019	■	■			
40	Refractory Inspection and Repair	2019	■	■	■		
41	Supply and Maintenance of LPG Cylinder Steel Pallets	2019	■	■	■		
42	Supply and Maintenance of Automatic Tank Gauging for PETRONAS Stations	2019	■	■	■		
43	General Maintenance Work at PETRONAS Stations	2019	■	■	■		
44	Main Cryogenic Heat Exchanger (MCHE) Repair	2019	■	■	■		
45	Overall Upgrading, Renovation and Decommissioning of PETRONAS Stations	2020	■	■	■	■	

E Chemicals

No	Contract	Start	2020	2021	2022	2023	2024
Pan-Malaysia							
1	Chloroalkali Chemicals	2018	■	■	■		
2	Sulphuric Acid Chemicals	2018	■	■	■		
3	Base Oil	2018	■	■	■		
Integrated - Downstream							
4	Supply of Caustic Soda	2019	■	■	■		
5	Supply of Specialty Chemicals: Dimetylhl Disulfide (DMDS) and Ethyl Mercaptan (EM)	2019	■	■			
6	Integrated Flushing and Passivation Services for Boiler Feedwater and Cooling Water Systems	2018	■	■	■		
7	Supply of Water Treatment Chemicals	2018	■	■			
8	Sample Management Programme	2019	■	■	■		
Individual - Upstream							
9	Laboratory Services and Personnel	2017	■	■			
10	Chemical Treatment and Chemical Cleaning Services	2019	■	■			
11	Supply of Production Chemicals	2017	■	■	■		
12	Supply of Integrity Chemical	2016	■	■			
13	Process Chemical Treatment Programme	2018	■	■			
14	Supply of Chemical Additives	2018	■	■			
15	Supply of Nitrogen	2017	■	■	■		

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024	
Individual - Upstream								
16	Precious Metal Silver Leasing for Ethylene Oxide Catalyst Production	2017						
17	Supply of Di-Iso Propanol Amine (DIPA) and Sulfolane	2020						
18	Supply of New Empty High Density Polyethylene (HDPE) Drums	2019						
19	Laboratory Analysis for Petroleum Products	2020						

F Indirect

No	Contract	Start	2020	2021	2022	2023	2024	
Pan-Malaysia								
1	Comprehensive Integrated Medical Services	2020						
Integrated Upstream and Downstream								
2	Flame Resistant Coverall and Headscarf	2019						
3	Supply and Delivery of Safety Footwear	2020						
4	Manpower Supply Services	2019						
5	Travel Management Company	2018						
6	Global Mobility Services	2018						
Integrated - Downstream								
7	Pest Control Management	2020						
Individual - Upstream								
8	Offshore Catering - Region 1	2018						
9	Offshore Catering - Region 2	2018						
10	Offshore Catering - Region 3	2019						
11	H ₂ S Safety Equipment and Services	2019						
Individual - Downstream								
12	Above-the-Line (ATL) Creative Advertising Services	2018						
13	Sludge Collection, Transport, Treatment and Disposal	2019						
14	Out-of-Home (OOH) Advertising Services	2018						
15	Below-the-Line (BTL) Creative Advertising Services	2019						
16	Printing and Delivery of Promotional Materials	2020						
17	Principal Submitting Person for Land Acquisition and Development	2019						
18	PETRONAS Merchandise Vendor	2018						

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

No	Contract	Start	2020	2021	2022	2023	2024	
Individual - Downstream								
19	Supply of New Empty Steel Drum	2019						
20	Geohazard Assessment for Onshore Gas Pipeline	2019						
21	Vehicle Leasing for Onshore Plants	2020						

G Logistics

No	Contract	Start	2020	2021	2022	2023	2024	
Pan-Malaysia								
1	Offshore Support Vessels for PACs' Production Operations	2018						
2	Offshore Support Vessel (OSV) Services for PETRONAS PACs' Drilling Project Activities	2019						
Integrated Downstream Contract								
3	Intra-Plant Transportation and Related Services	2017						
Individual - Upstream								
4	Vessel Tracking System (VTS)	2019						
5	Offshore Marine Vessel and Rig Tank Cleaning	2018						
Individual - Downstream								
6	Transportation Services for Bulk Petroleum Products	2019						

H Digital and ICT

No	Contract	Start	2020	2021	2022	2023	2024	
Individual - Upstream								
1	Data Store Operational Services	2018						
2	Wells Real Time Center Services	2019						
Individual - Downstream								
3	Supply of Apple Devices for Cloud-based Point-of-Sale (POS) for PETRONAS Stations	2020						
4	Supply and Maintenance of Payment Terminal and Other Peripherals for PETRONAS Stations	2019						
5	Software Support and Maintenance Services of Cloud-based Point-of-Sale (POS) for PETRONAS Stations	2019						
6	Supply of Hardware for Cloud-based Point-of-Sale (POS) for PETRONAS Stations	2020						
7	Supply and Maintenance of Visual Element for PETRONAS Stations	2020						

Notes:

- In contract
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas and New Energy.
- The list excludes original equipment manufacturer (OEM)-supplied item contracts.

List of Abbreviations

Abbreviations used in the report

UNIT	DEFINITION	USED FOR
A	AHTS	Anchor Handling Tug Supply
	AI	Artificial Intelligence
C	CCUS	Carbon Capture, Utilisation and Sequestration
	CO₂	Carbon Dioxide
	CPP	Central Processing Platform
	CRA	Corrosion Resistant Alloy
D	DP	Dynamic Positioning
E	EPCC	Engineering, Procurement, Construction and Commissioning
	EPCIC	Engineering, Procurement, Construction, Installation and Commissioning
F	FCB	Fast Crew Boat
	FPSO	Floating Production Storage and Offloading
	FSO	Floating Storage and Offloading
G	GPV	General Purpose Vessel
H	HR	Human Resource
	HSSE	Health, Safety, Security and Environment
	HTI	Host Tie-in
	HUC	Hook-up and Commissioning
	HWU	Hydraulic Workover Unit
I	ICT	Information and Communications Technology
	ID	Infill Drilling
J	JUR	Jack-up Rig
L	LCT	Landing Craft Tank
M	MCM	Maintenance, Construction and Modification
	MCO	Movement Control Order
	MOPU	Mobile Offshore Production Unit

List of Abbreviations

Abbreviations used in the report (continued)

UNIT	DEFINITION	USED FOR
N	NDT	Non-Destructive Testing
O	OCTG	Oil Country Tubular Goods
	OEM	Original Equipment Manufacturer
	OGSE	Oil and Gas Services and Equipment
	OPEC	Organization of the Petroleum Exporting Countries
P	PAC	Petroleum Arrangement Contractors
	PIC	Pengerang Integrated Complex
	PM	Peninsular Malaysia
	PSV	Platform Supply Vessel
R	ROV	Remotely Operated Vehicle
S	SB	Sabah
	SBV	Standby Vessel
	SDG	Sustainability Development Goals
	SK	Sarawak
	SSV	Straight Supply Vessel
	SURF	Subsea Umbilical, Riser and Flowline
T	TADR	Tender Assisted Drilling Rigs
U	USD	United States Dollar
	UV	Utility Vessel
W	WHP	Wellhead Platform
	WTI	West Texas Intermediate

Glossary

Industry terms used in the report

UNIT	DEFINITION	USED FOR
A	Aframax	Mid-sized tanker with a dead weight tonnage (DWT) between 80,000-120,000MT and oil storage capacity of approximately 600–750kbbbls.
B	Barrel	A standard unit of measurement for oil production. One barrel contains 159 litres of oil.
	Barrels of Oil Equivalent (boe)	A unit of measurement to quantify amount of crude oil, condensates and natural gas. Natural gas volumes are converted to barrels on the basis of energy content.
	Brent Price	The benchmark crude oil price in Europe, as traded on International Petroleum Exchange in London. Brent crude refers to a particular grade of crude oil, which is slightly heavier than WTI crude. See WTI price.
	Brownfield	Field that has been previously developed and has reached its peak oil/ gas production level.
	Brownfield Development Project	Projects to improve oil and/or gas recovery from an existing producing field, inclusive of infill drilling, Improved Oil Recovery (IOR) and Enhanced Oil Recovery (EOR) projects.
C	Carbon Capture, Utilisation and Sequestration	Technology involving the capture of carbon dioxide (CO ₂) from fuel combustion or industrial processes, the transport of this CO ₂ via ship or pipeline, and the use of CO ₂ as a resource to create valuable products or services, or its permanent storage deep underground in geological formations.
	COVID-19	The name of the disease caused by the novel coronavirus, SARS-CoV-2, and is short for "Coronavirus Disease 2019."
D	Deepwater	Projects in water depths exceeding 450ft. Unique methods are required to produce the oil and gas from ocean bed at such depths. See Floating Production Unit.
	Development	Activities following discovery that are necessary to begin production and transportation of crude oil and natural gas.
	Downstream	All segments of a value chain that add value to the crude oil and natural gas produced, for example, oil refining, gas processing, gas liquefaction, petrochemical manufacturing, marketing of petroleum and petrochemical products, storage and transportation.
E	Enhanced Oil Recovery (EOR)	Any method(s) applied to productive reservoirs in order to increase production rates and to improve the overall recovery factor.
	Exploration	The search for crude oil and/or natural gas by geological and topographical studies, geophysical and seismic surveys, and drilling of wells.
F	Field	A geographical area overlying a hydrocarbon reservoir.
G	Greenfield	Field that has proven oil/gas reserves but has never been developed.
	Greenfield Development Project	Projects to start the production of oil and/or gas from new, undeveloped reserves.

Glossary

Industry terms used in the report (continued)

UNIT	DEFINITION	USED FOR
L	Liquefied Natural Gas (LNG)	Natural gas that is liquefied under extremely cold temperatures of about 260 degrees Fahrenheit to facilitate storage or transportation in specially designed vessels.
N	Net Zero Carbon Emissions	Achieved by balancing carbon dioxide (CO ₂) emissions with removal (for example, through carbon capture and sequestration) or simply eliminating CO ₂ emissions altogether (for example, decarbonisation of energy systems through solar and wind energy)
P	Petrochemicals	Organic and inorganic compounds and mixtures derived from petroleum, used principally to manufacture chemicals, plastics and resins, synthetic fibres, detergents, adhesives and synthetic motor oils.
	Pan-Malaysia Contract	A contract that combined the requirement for more than one PACs to get Economies of Scale (EOS).
	Panamax	Smaller-sized tanker with a dead weight tonnage (DWT) between 65,000-80,000MT and oil storage capacity of approximately 350 kbbls.
R	Refining	A purification process for natural resources which includes hydrocarbons, using distillation, cooling and/or compression.
	Regasification	Process of converting LNG temperature back to natural gas at atmospheric temperature.
	Resources	The total estimated quantities of petroleum at a specific date to be contained in, or that have been produced from known accumulations of hydrocarbon.
S	Sustainable Development Goals	17 interlinked goals adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Also known as the Global Goals.
U	Upstream	The segment of value chain pertaining to finding, developing and producing crude oil and natural gas. These include oil and gas exploration, development and production operations; also known as Exploration and Production (E&P).
W	WTI Price	Stands for West Texas Intermediate (WTI), which refers to a type of high quality crude oil, as the benchmark crude oil price in the US, measured in USD per barrel.
	Wellheads	Component at the surface of an oil or gas well that provides the structural and pressure-containing interface for the drilling and production equipment.

Glossary

Units used in the report

UNIT	DEFINITION	USED FOR
GW	Gigawatt	Power
kbd	Kilobarrels per day	Production Rate
km	Kilometre	Distance
MMscfd	Million metric standard cubic feet per day	Production Rate
MMstb	Million stock tank barrels	Volume
mtpa	Million tonnes per annum	Capacity
MMBtu	Million British thermal unit	Heating Value
MT	Metric tonne	Weight
MWp	Megawatt peak	Power
km²	Square kilometres	Area

Frequently Asked Questions (FAQs)

1

How does this report benefit the local Oil and Gas Services and Equipment (OGSE) sector?

This report will improve visibility on PETRONAS' domestic activities, enabling better planning of resources and investments by vendors.

2

What is the accuracy and reliability of the outlook data? Would this be in line with what has been previously disclosed to the public?

This data is based on the projection of activities with high/base scenarios indicating the project milestones, at the time of release. Changes are to be expected in response to market dynamics and operational requirements.

3

How will the OGSE sector be affected if oil price recovers?

If oil price recovers for a sustainable period, we expect a higher number of greenfield and brownfield projects to become commercially viable; provided that we keep the cost at a competitive level. Thus, activities for the OGSE sector may increase accordingly.

4

Is this outlook referring to tenders to be issued or contracts to be awarded?

The outlook provided is based on activities per year, not by tender issuance nor contract award. Therefore, it includes activities which may have been contracted at the time of reporting. An overview of contracts with its current duration is provided in this document. Companies may use them as an indicator for opportunities that may arise in the future.

5

Should I make my investment decisions/business planning based on this report?

The intent of this report is to provide a general direction for the industry and be sufficient for players to make their high-level planning. PETRONAS makes no representation on the accuracy or completeness of any information provided in this report and expressly disclaims any liability whatsoever arising from, or in reliance upon, the whole or any part of its contents. We recommend players to also make references to other sources of data and information to complement their decision-making.

6

Wellhead Platform (WHP), Central Processing Platform (CPP) and rigs information are primarily for larger players. How will smaller players benefit from the information?

The outlook in this report prioritises leading indicators for a broad spectrum of activities in the oil and gas industry, as indicated in the list of associated services, which may benefit smaller players.

7

Given that this is a three-year outlook, will the effort to provide transparency of activities continue in the near term?

This is the fifth edition of the report since 2017 and is part of PETRONAS' effort to increase engagement with the OGSE sector. We endeavour to publish this report on an annual basis.

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