



PETRONAS

# PETRONAS

## Activity Outlook

### 2023-2025







## Cover Rationale

The global economy is experiencing a broad-based and sharper than expected slowdown as well as the lingering effects of the COVID-19 pandemic, bringing with it labour shortages, record-high commodity prices and global supply chain disruptions, which will all weigh heavily on the outlook.

These challenges, combined with the complexity of the energy transition, have necessitated industry players to be agile in responding to the changing energy landscape and embrace innovation as well as new solutions to face the new normal towards a lower-carbon 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.

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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 issued.

Images are for illustrative purposes only.

Released in December 2022.



# Table of Contents

<b>05</b>	<b>Greater Collaboration Towards Energy Transition</b> Foreword by Vice President, Group Procurement, PETRONAS
<b>07</b>	<b>Industry Overview</b>
<b>11</b>	<b>In the Spotlight</b> <ul style="list-style-type: none"><li>• Collaborating for a Smooth Energy Transition</li><li>• Seizing Opportunities from Activities Recovery</li><li>• Building Pace in the Energy Transition with Cleaner Solutions</li></ul>
<b>27</b>	<b>Business Overview</b> <ul style="list-style-type: none"><li>• Upstream Business</li><li>• Gas Business</li><li>• Downstream Business</li></ul>

<b>35</b>	<b>Activity Outlook</b> <ul style="list-style-type: none"><li>• Methodology</li><li>• Quick Reference for 2023</li><li>• Subsurface<ul style="list-style-type: none"><li>- Drilling Rigs and Hydraulic Workover Units</li></ul></li><li>• Engineering, Construction and Projects<ul style="list-style-type: none"><li>- Offshore Fabrication</li><li>- Offshore Installation</li><li>- Hook-up and Commissioning</li><li>- Decommissioning</li></ul></li><li>• Equipment and Material<ul style="list-style-type: none"><li>- Supply of Linepipes</li></ul></li><li>• General Facilities Maintenance<ul style="list-style-type: none"><li>- Offshore Maintenance, Construction and Modification</li><li>- Underwater Services</li><li>- Plant Turnaround</li></ul></li><li>• Logistics<ul style="list-style-type: none"><li>- Offshore Support Vessel</li></ul></li><li>• Chemicals</li><li>• Indirect Category</li><li>• Digital and ICT</li></ul>
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<b>71</b>	<b>Contracts Outlook</b>
<b>83</b>	<b>List of Abbreviations</b>
<b>86</b>	<b>Glossary</b>
<b>89</b>	<b>Frequently Asked Questions (FAQs)</b>
<b>91</b>	<b>Partner Us</b>
<b>92</b>	<b>Find Out More</b>





# Greater Collaboration Towards Energy Transition

Foreword by Vice President  
Group Procurement, PETRONAS



## Dear Esteemed Partners,

It gives me pleasure to introduce the 2023 - 2025 edition of the PETRONAS Activity Outlook.

The global economic activity is experiencing a broad-based and sharper-than-expected slowdown as well as the lingering effects of the COVID-19 pandemic.

The resultant labour shortages, record-high commodity prices and global supply chain disruptions will all weigh heavily on the outlook. Cost-of-living crisis caused by persistent inflationary pressures and tightening financial conditions can already be seen globally.

As we face the ongoing market uncertainties combined with the complexity of the energy transition, industries today are compelled to depart from business-as-usual. We need to actively shape the direction of the industry, anticipate market requirements and find solutions to meet these demands. Responding with agile strategies and willingness to embrace innovation as well as new solutions to face the new normal, is important in facing the rapid changes.

The new energy transition and landscape calls for greater collaborations not only among industry players but also among other industries towards creating efficient solutions for better cost management, heightened customer centricity, value-creation and innovative solutions. We must tap the full potential of technologies at our disposal and develop innovative technologies to offer the solutions needed to meet the world's growing demand for energy. This mindset is crucial as the industry is faced with greater demands for sustainable environmental products.

The industry players must push on with innovation while remaining cost competitive at par with global players in the course of doing business to ensure projects and production remain feasible despite the cyclical swings in oil price. PETRONAS is committed to working together with our partners as the industry accelerates its efforts to decarbonise operations as part of a wider energy transition.

The transition into clean energy needs to happen now, to meet the changing energy landscape projected by 2050. This is crucial to avoid missing the window of opportunity to navigate the energy transition successfully.

As we continue to build our strength and resilience through the current challenges and beyond, we must now navigate the immediate future with explicit understanding that **sustainability is our new license to operate**. Therefore, in our duty as stakeholders of the energy ecosystem, it is imperative that we navigate these challenges with a deep-rooted purpose.

The responsibility to shift towards a lower-carbon future shall not fall on the shoulders of one party but must be carried through by the whole ecosystem. What we are setting out to achieve, can be achieved if we work together.

We must collaborate as an effective engine that provides energy that is clean, reliable and affordable as well as co-create an ecosystem that is resilient to enable a just transition.

PETRONAS remains committed to creating value that supports Malaysia's economic growth. This includes ensuring the robustness and resilience of the local OGSE ecosystem and cultivating collaboration towards sustaining a conducive environment in which businesses can strive and thrive.

## Freida Amat

Vice President Group Procurement



# Industry Overview





## Changes in Energy Landscape

Two years have passed since the World Health Organization declared COVID-19 a global pandemic, the resultant impact of which suppressed oil and gas demand across the world. Even as recovery began to set in at the start of 2022, the world faced an energy crisis that was amplified by the geopolitical turmoil in Europe as supply failed to catch up to the energy demand rebound due to prolonged supply chain disruptions.

Despite the challenges and upheaval, the fight against climate change has become more urgent with more countries, organisations and environmentalists stepping up the call to action. The United Nations Climate Change Conference COP27 in Egypt ended with an agreement for the creation of a loss-and-damage fund for countries hit hard by climate disasters. This illustrates the growing scrutiny on industry players' moves in delivering their respective commitments to limit emissions and increase in global temperature.

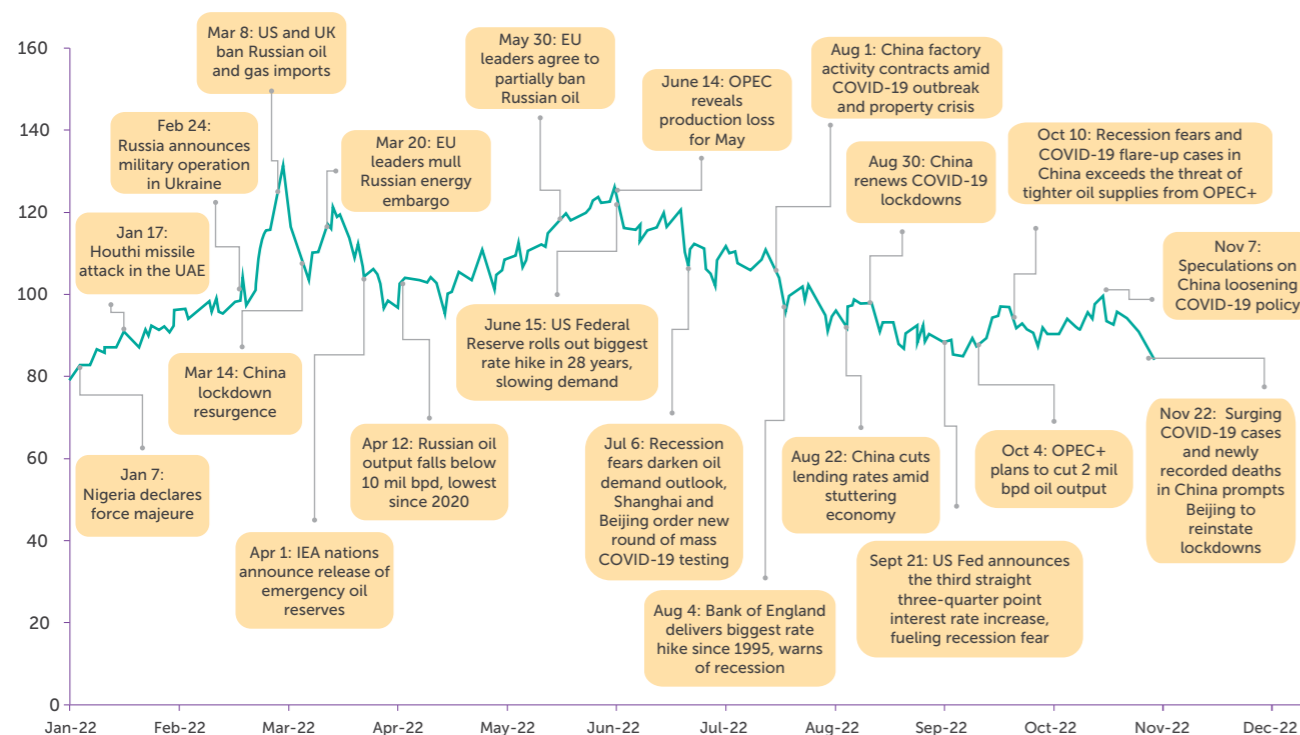
This comes at a time when costs are rising as commodity prices escalate. The combination of broadening inflationary pressures, labour shortages and supply chain disruptions in addition to the newfound challenges such as climate change, is set to reshape the energy landscape.

In the near term, these challenges might pose a growing risk of global recession, threatening to derail a recovery in oil and gas demand. Geopolitical upheavals add to the challenges of ensuring uninterrupted flows in energy and other commodities.

The uncertainties have yet to recede and recovery remains uneven across the world. The current elevated oil and gas prices are not an assurance of high prices in the future. The industry remains cautious over rising costs, which erode margins for players. Yet, the sector has to build its resilience today by deploying the latest technology and utilising resources in an optimal manner to weather prevailing uncertainties and rising volatility in the market.

**Daily Dated Brent Prices**  
Unit: USD/bbl

**YTD 2022:**  
USD104/bbl



Source: Argus, PETRONAS internal analysis

## Renewable Energy (RE) as a Long-term Solution for Energy Diversification



Energy diversification is essential in achieving energy security in which everyone has access to clean, reliable and affordable energy. RE is a key to achieving a more sustainable long-term energy security while reducing countries' exposure to and dependence on volatile fossil fuel prices. As such, policies developed to promote sustainable energy must incorporate the different renewable sources of energy that meet the needs of the nation.

Consequently, Malaysia through its Economic Planning Unit (EPU) issued the National Energy Policy, 2022 – 2040 (DTN) on 19 September 2022.

*"In alignment with (the) energy transition, the DTN will enhance the environmental sustainability by reducing the overall energy intensity, while improving the intensity of the primary energy mix through increased penetration of clean and renewable sources of energy and decreased penetration of coal and petroleum products in the primary energy mix." (DTN, p. 29)*

In achieving the DTN vision of 'Energy Sustainability Towards Achieving Shared Prosperity', one of the strategies being employed to spur greater RE penetration include optimising power generation mix factoring in rapid technology progress, implementing physical and regulatory enablers to accommodate power system advancement as well as enhancing regional and international grid system interconnectivity.

To enhance energy sector contribution towards environmental sustainability, focus is being given to high greenhouse gas (GHG) emission areas, reduction and reporting of carbon footprint and platforms for businesses to access RE.

For more details, on the National Energy Policy, please scan the QR code.



## Shaping the Industry Through the National OGSE Industry Blueprint 2021-2030



As part of its continuous effort to help shape the Oil & Gas Services and Equipment (OGSE) industry and adapt to the rapidly revolving global needs of the global market, Malaysia Petroleum Resources Corporation (MPRC) will coordinate the roll-out of five new industry initiatives from the National OGSE Industry Blueprint 2021-2030 (OGSE Blueprint), in 2023.

This is in tandem with the 26 operationalised initiatives as outlined in the OGSE Blueprint. The industry is urged to capitalise on the myriad of initiatives available, which is intended to assist the OGSE players grow stronger amidst the volatility of uncertain business climate to further expand their capabilities in other adjacent areas.

For more details on the National OGSE Industry Blueprint, please scan the QR code.





# In The Spotlight





# Collaborating for a Smooth Energy Transition



The push for a transition of global energy systems towards a lower-carbon future is largely driven by mounting concerns about the effects of climate change, policies, and advancement of technologies such as digitalisation, energy efficiencies and alternative lower-carbon solutions. The growing body of science-based evidence on climate change delivered by the Intergovernmental Panel on Climate Change (IPCC) states that to avert a climate disaster, immediate GHG emissions reduction is required. The IPCC Sixth Assessment Report mentions that the world must reduce 43 per cent of its total emissions by 2030 to mitigate the impacts of climate change, with consideration for the climate goals of the Paris Agreement. Achieving this near-term target requires global energy systems to reduce emissions drastically and for every country to play its part. This context presents a challenge but also an opportunity for the energy industry.

In responding to the global climate crisis, governments are transitioning towards a lower-carbon future where approximately 140 countries had announced or are considering net zero targets. Malaysia too, has pledged to become a net zero GHG emissions nation at the earliest, by 2050. As part of the journey towards net zero, the Malaysian Government aims to reduce carbon intensity by 45 per cent by 2030, against Gross Domestic Product (GDP), from 2005 levels. Progressively, Malaysia has also successfully launched the National Energy Policy 2022 – 2040 (DTN 2040) on 19 September 2022. DTN 2040 highlights the commitment of the Malaysian Government in catalysing development of low carbon technologies in preparing the nation towards a low carbon economy. DTN 2040 is intended to prepare the nation towards a cleaner energy mix in achieving the net zero aspiration by 2050.

PETRONAS recognises the opportunities in the energy transition and aims to play its role in catalysing the acceleration towards net zero in the region, drawing on its experience and reach as a global energy company. PETRONAS became Southeast Asia's first oil and gas company to declare its aspiration of achieving net zero carbon emissions by 2050 in October 2020 and has subsequently published PETRONAS' Pathway to Net Zero Carbon Emissions 2050 in November 2022 to demonstrate tangible actions PETRONAS will be taking to reduce its operational GHG emissions and expand business growth opportunities in the low carbon economy. This will contribute to Malaysia's net zero GHG emissions by 2050 aspiration.

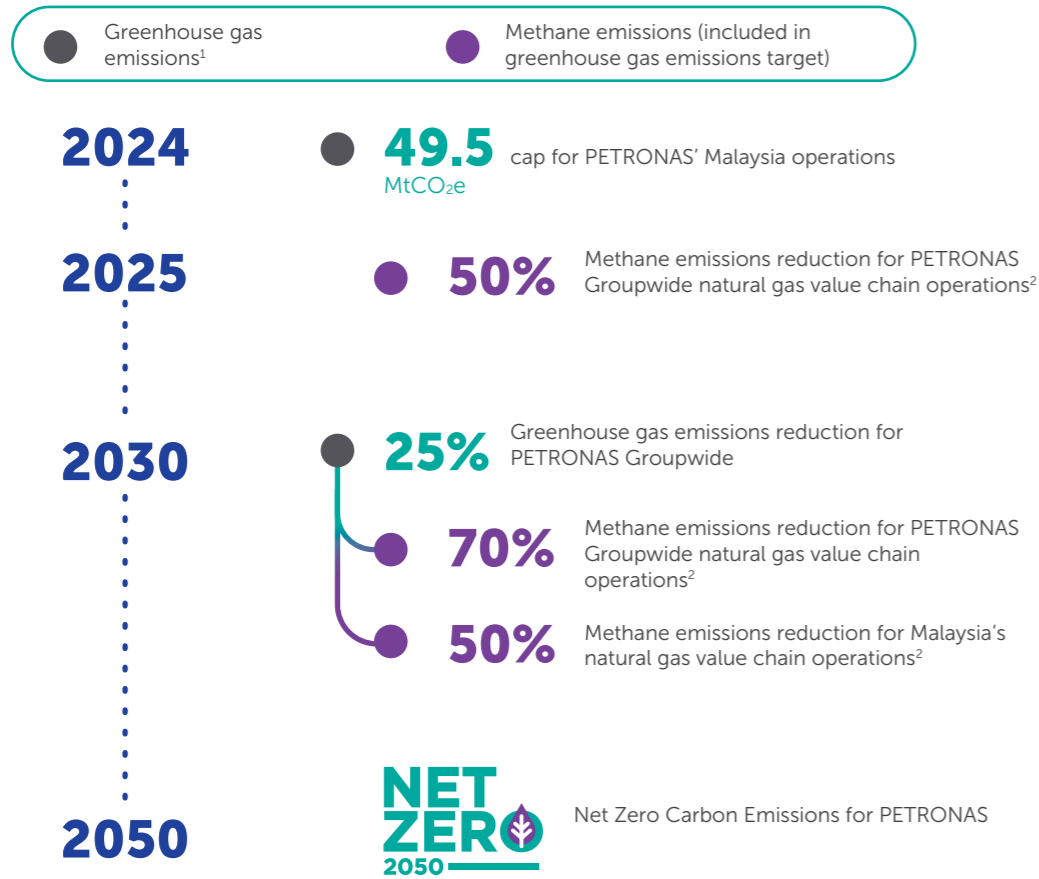
PETRONAS' pathway to net zero carbon emissions by 2050 includes PETRONAS' GHG emissions reduction targets and growth targets for its cleaner energy solutions. PETRONAS has set a near-term target to cap operational GHG emissions to 49.5 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) for Scope 1 and Scope 2 emissions for its Malaysia operations by 2024 and achieve a 50 per cent reduction in methane emissions from its Groupwide natural gas value chain operations by 2025.

PETRONAS defined its mid-term target, which is to achieve GHG emissions reduction of 25 per cent from 2019 levels by 2030 for Groupwide operations. A specific methane emissions reduction target of 70 per cent was outlined for Groupwide assets where PETRONAS has operational control. PETRONAS is also playing an active role as a regulator to target a 50 per cent methane emissions reduction for Malaysia's natural gas value chain, contributing to Malaysia's Global Methane Pledge. Besides GHG emissions reduction targets, ambitions have been set for renewables and clean energy, such as increasing renewable energy capacity to 30 – 40 Gigawatt, supplying up to 1.2 million tonnes per annum of clean hydrogen and becoming the preferred green mobility partner by capturing 10 per cent of market share (circa 25,000 charging points) across key markets in Asia Pacific, all to be achieved by 2030.



PETRONAS will pursue the net zero carbon emissions by 2050 aspiration by leveraging on technologies and innovations: and offsetting our remaining hard-to-abate emissions with nature-based climate solutions.

### PETRONAS' Net Zero Carbon Emissions 2050 Short-, Mid- and Long-term Targets



Note: From 2019 levels.

<sup>1</sup> Greenhouse gas emissions inclusive of Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) measured in CO<sub>2</sub>e.

<sup>2</sup> Natural gas value chain definition is aligned with the Oil and Gas Climate Initiative's (OGCI) reporting parameters which includes production processing and storage, transportation, distribution and end-use of natural gas.

In ensuring a sustainable energy transition that creates social value and drives progress for society, oil and gas industry players need to collaborate to collectively accelerate their efforts to reduce GHG emissions and identify growth opportunities both in decarbonising existing production and in developing new clean energy solutions. The transition must be executed responsibly and sustainably, where deployment of lower-carbon technologies is done strategically and systematically.

PETRONAS will continue to nurture a robust Malaysian OGSE ecosystem and endeavours to work together with its partners in this energy transition journey. PETRONAS welcomes greater collaboration and cooperation from OGSE players to deliver a sustainable future together.



For more information on PETRONAS' Net Zero Carbon Emissions 2050 Pathway, please scan the QR code



# Seizing Opportunities from Business Activities Recovery



The year 2022 saw the oil and gas industry rebounding strongly as oil prices reached its highest level against crude oil benchmark prices after experiencing an unprecedented blow from the global economic contraction due to the COVID-19 pandemic and the continuing energy market imbalances. The race by governments around the world to reopen their economies as well as removing travel restrictions have contributed to a surge in demand despite the challenging economic landscape.

Amidst these challenges, PETRONAS continues to invest in business activities and growth projects. However, the lingering effects brought about by the pandemic such as prolonged movement restriction order, supply chain disruptions and players' ability to recover have affected many project executions.

Recognising the large role it plays in achieving its net NZCE 2050 aspiration and at the same time balancing the obligation to deliver energy security, PETRONAS is progressively driving operational excellence across its integrated businesses, as well as collaborating with government agencies and energy-related stakeholders towards lowering its carbon footprint to deliver clean and lower-carbon energy to our customers through key projects that deliver high value.

## Assets Reliability

Assets are now being sought after as demand continue to increase across the regions. Heightened competition amongst contractors calls for the owners to ensure their assets are readily available to be deployed and in operable condition. With the global energy market transitioning towards cleaner and sustainable solutions, vendors need to look into improving their strategies and planning for the resources to meet future demand.

## Resources Availability

The demand for skilled workers has far exceeded the available supply for qualified talents. Previous migration to the gig economy and the decision to stay or even venture out into another form of employment, further drained the existing pool. Moreover, tight regulations on entry for workers in some jurisdictions, together with the highly competitive global talent market, proved challenging for businesses to play catch up on their activities.

As the demand gap for skilled workers continue to widen together with the evolving work landscape, businesses need to prepare to grow alongside the change. In order to adapt within the uncertain economic climate, it is vital for companies to retain and retrain while strategising to attract new talents that come from various backgrounds and capabilities by exploring and leveraging on existing government incentives/programmes that readily provide an additional talent pool.

## Quality and Competitiveness

To remain competitive in meeting evolving market demand, it is vital for PETRONAS to ensure that all assets are readily operable, well-maintained, reliable and efficient to deliver operational excellence to the customers. As the market transitions towards a cleaner and sustainable way of operating businesses, the call to increase the capabilities and expand the capacity to meet complex market demand and expectations are the top focus, at the same time improving efficiency through cost optimisation to cushion the impact of future escalation of costs.

There is a need to intensify adoption and capitalisation of digital transformation and technology advancement to optimise costs.



## PETRONAS Remains Committed to Support and Contribute Towards the Robustness and Resiliency of the OGSE Industry

PETRONAS continues to invest and attract investment to opportunities in the OGSE industry. Some of the initiatives have been undertaken in providing assistance to OGSE players.

### Sustaining Malaysia OGSE

#### Access to Financing

PETRONAS has developed an innovative partnership with Malaysian financial institutions to facilitate Access to Financing (A2F) to its vendors via OGSE Vendor Financing Programme (VFP). PETRONAS facilitates the programme by providing verification platform on contracts awarded and performance of contractors.

### Towards Corporate Governance Standards

#### Road to Bursa

Road to Bursa (R2B) programme is established to support and facilitate local vendors to adopt corporate governance standards that qualify for Bursa listing.

The programme aims to encourage vendors to strengthen their capabilities based on listing criteria.

### Continuously Nurture OGSE Vendors

#### Vendor Development Programme (VDP)

PETRONAS VDP focuses on nurturing Bumiputera vendors for Product Manufacturing and/or Services for Oil and Gas industry.

### Standardised Technical Specification to Align with Industry

#### Industry Standard

Lead industry transformation towards adopting global industry best practices enabling digital and analytics.

**1**  
Innovation and Technology Think Tank

**2**  
Project Management of the Future (PMoF)

**3**  
Joint Industry Programme 33 (JIP33)

## At PETRONAS, we continuously provide guidance and assistance in strengthening OGSE Vendors' capabilities and competencies

**Sustaining Malaysian OGSE Industry**

**Vendor Financing Programme (VFP)**

Bridging vendors with nine financial institutions in Malaysia for financing needs.



**Shifting Towards A Better Tomorrow**

**Sustainability Awareness Webinars**

Encouraging OGSE vendors to future-proof businesses by diversifying towards sustainable energy.



**Market Information Flow**

**PETRONAS Activity Outlook 2023 - 2025**

**Stay updated!**  
Get more insights on industry trends, demand outlook and PETRONAS' upcoming activities.




Reducing methane emissions from Samarang Platform



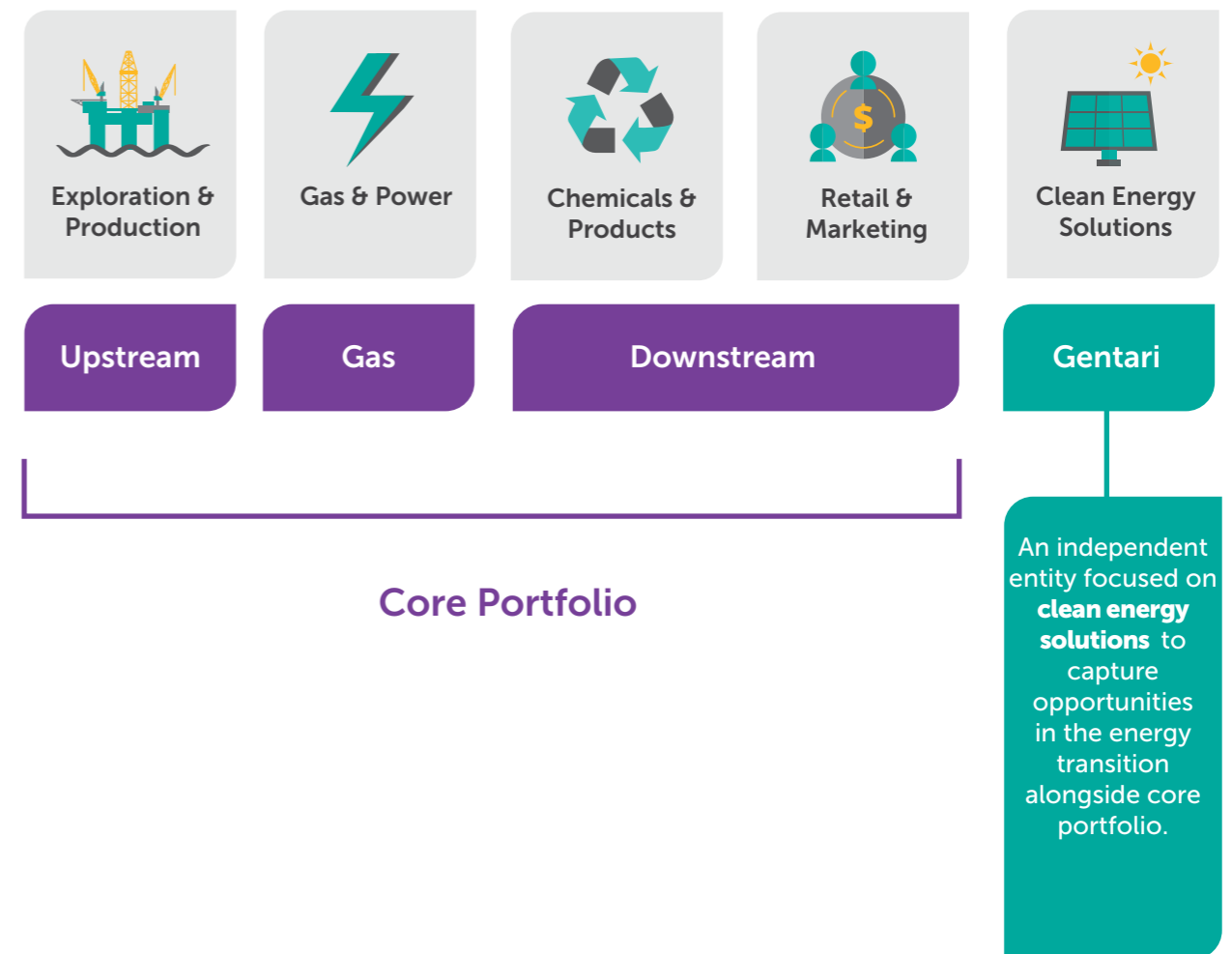
# Building Pace in the Energy Transition with Cleaner Solutions



The energy transition is gaining momentum as the world moves towards sustainability and cleaner energy. Countries are seeking ways to meet their development needs, but with the increasing threat of climate change, concrete efforts must be made to ensure ongoing developments will not negatively affect the future.

As a dynamic global player in the energy industry, PETRONAS is progressively stepping out and aspires to achieve net zero carbon emissions by 2050 (NZCE 2050) via delivering integrated cleaner energy and lower-carbon solutions globally, in line with our Statement of Purpose.

Apart from decarbonising its current core portfolio, PETRONAS is also intensifying its efforts to offer clean energy solutions via the establishment of Gentari Sdn Bhd (Gentari), an independent entity focused on providing clean energy solutions.





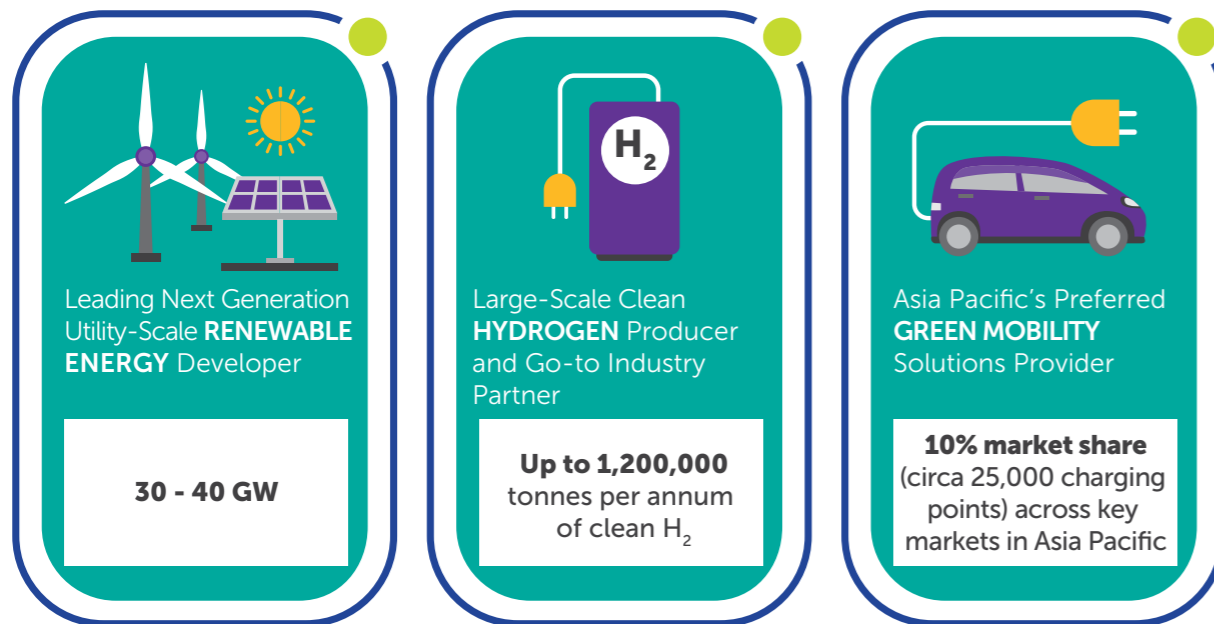
## Gentari - Putting Clean Energy Into Action

PETRONAS is committed to playing a leadership role in the energy transition and decarbonisation, simultaneously investing in reducing emissions from its own operations and growing clean energy solutions for its customers, responsibly and sustainably.

Following this, PETRONAS launched Gentari in September 2022, a clean energy solutions entity to independently pursue and deliver integrated sustainable energy solutions, and to capture opportunities in the energy transition.

Gentari offers lower-carbon solutions through three initial core pillars – Renewable Energy, Hydrogen and Green Mobility, forming a portfolio of solutions cutting across the electron value chain to help customers achieve net zero emissions.

### Gentari's 2030 Goals



In the long term, Gentari aims to be an integrated net zero solutions provider, creating greater value, connecting businesses, and making the journey to net zero simpler.

Gentari acknowledges that collaboration among various parties, from industry players and policymakers to its valued customers and partners, are essential in order to push forward a just and pragmatic energy transition in an impactful way and bring us closer to a low carbon future.

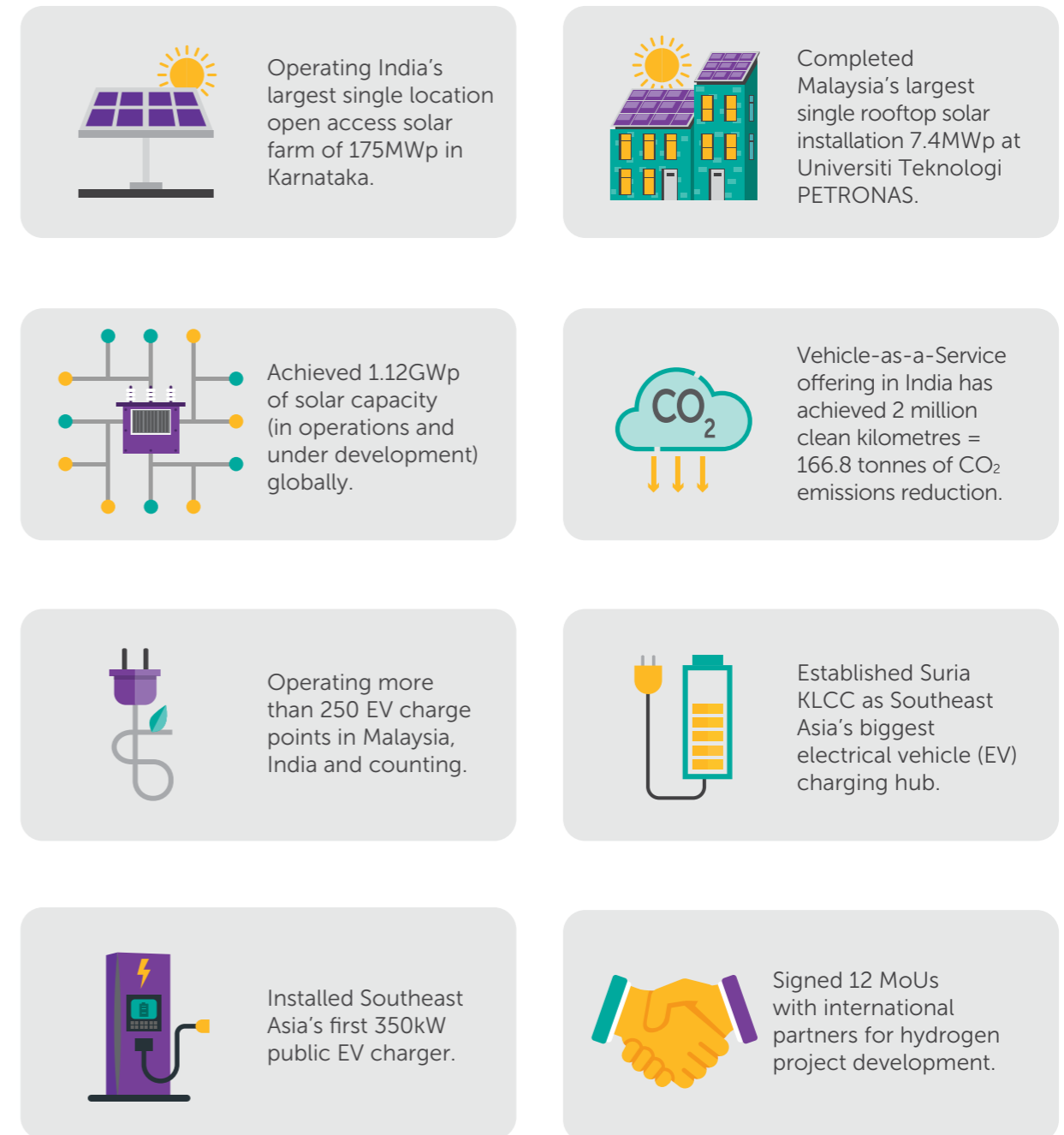
PETRONAS encourages the OGSE fraternity to capture the emerging opportunities in the clean energy space. It is imperative for industry players to adapt, step up and step out in order to remain competitive and resilient in the years to come.

To find out more, reach out to Gentari at [enquiries@gentari.com](mailto:enquiries@gentari.com)

## Gentari Highlights

Gentari takes its name from the shortened combination of the English word "generation" or "to generate" and the Bahasa Melayu word "lestari", which means "sustainable".

Together, these words capture the essence of Gentari's purpose to "solve the world's most pressing sustainable energy needs, to change how we live today and help to secure our future" and its commitment to putting clean energy into action.





Gentari is a **clean energy company** focused on delivering the **integrated net zero solutions** required to put cleaner energy into action today, to transform how we live tomorrow.



Renewables



Hydrogen



Green Mobility

[www.gentari.com](http://www.gentari.com)

[enquiries@gentari.com](mailto:enquiries@gentari.com)

Follow us on



Putting Clean Energy Into Action

## Green Mobility



Asia Pacific's Preferred **GREEN MOBILITY** Solutions Provider

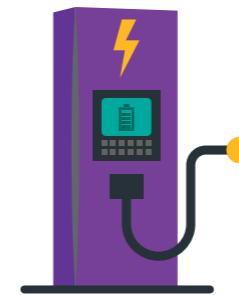
**10% market share** (circa 25,000 charging points) across key markets in Asia Pacific

**Charging infrastructure across Asia Pacific**

**Vehicle-as-a-Service**

**Value-added Services**

### Charging Infrastructure



**Destination**

(e.g. shopping malls, parking lots)

**On-the-go**

(e.g. PETRONAS stations, R&R stops along highways)

### Vehicle-as-a-Service



Gentari's Vehicle-as-a-Service (VaaS) model helps fleet owners and operators to adopt EV at scale and decarbonise their operations, via an affordable VaaS subscription model that also includes charging fees and maintenance costs.

**Low CAPEX**

No big down payment, single subscription fee, immediate conversion, option for future ownership.

**Hassle Free**

One-stop-centre to cater for your fleet needs, with a flexible subscription plan that gives you control.

**Worry Free**

Reliability and maintainability, with access to a vast charging network offered by Gentari and its partners.

### Value-added Services

Digital platform offering on-the-go convenience for our customers by connecting EV drivers to our vast network of solutions. Gentari will also provide other value-added offerings in line with customer requirements.



# Business Overview

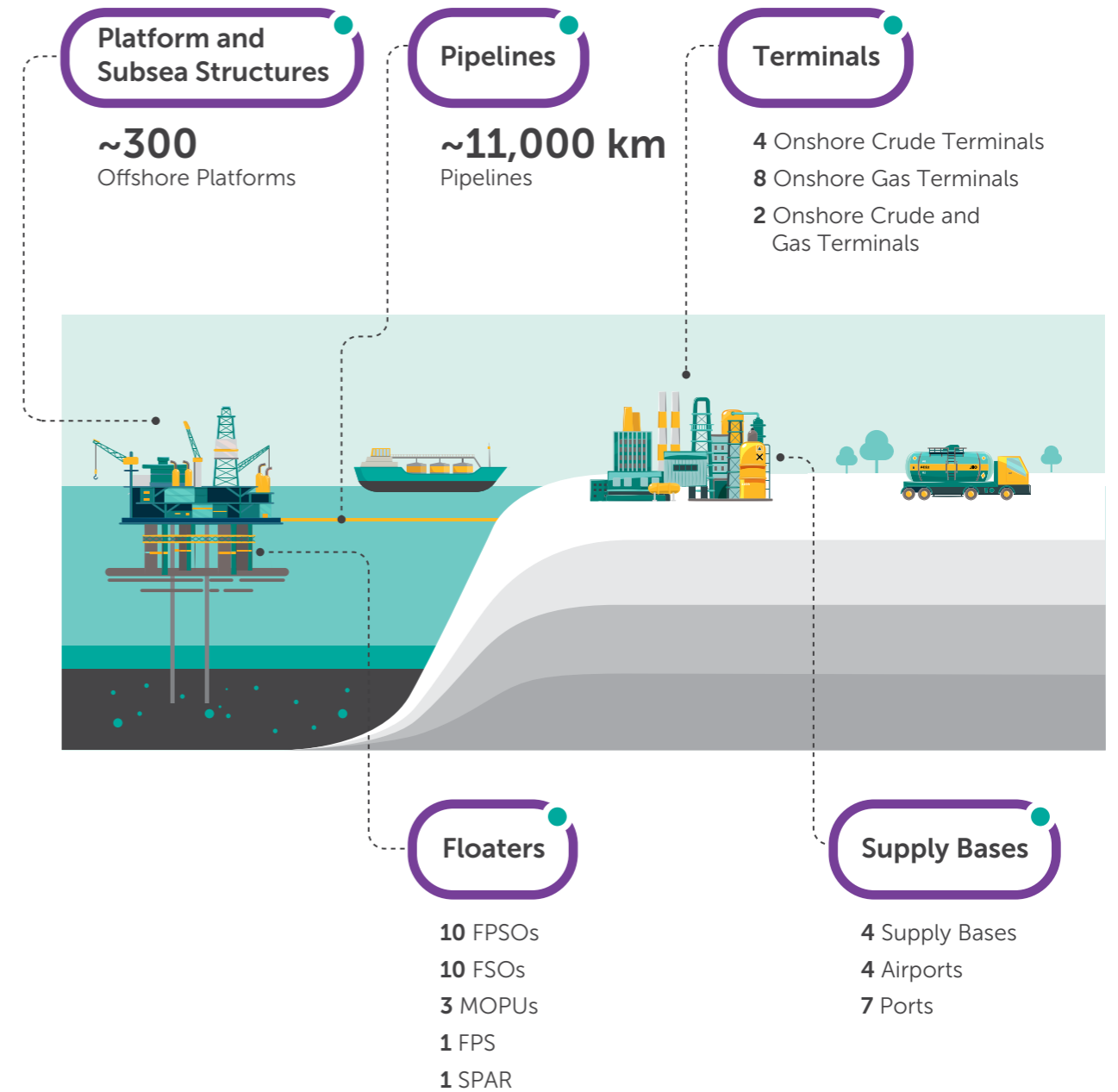




# Upstream Business

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.

The illustration below shall provide a general overview of Upstream Malaysia's facilities dimension, operated by ~30 Petroleum Arrangement Contractors (PACs) as at November 2022.





# Gas Business

The Gas Business portfolio reflects our position as a one-stop-centre for lower-carbon energy solutions with end-to-end value chain capabilities to deliver a reliable supply of natural gas and liquefied natural gas (LNG).

The illustration below depicts the domestic value chain for Gas Business:



PETRONAS Floating LNG SATU





# Downstream Business

PETRONAS' Downstream business plays a strategic role in enhancing the value of petroleum resources through its multiple integrated operations, transforming it into high-quality and value-added products. The diverse activities include the refining, marketing of crude oil and petroleum products, the manufacturing and marketing of specialty chemicals and derivatives, as well as the supply of lower-carbon and sustainable solutions.

## 1 Refining

Three refineries in Malaysia with a total refining capacity of more than 700 kbpd.

1. **Malaysian Refining Company**  
(Sungai Udang, Melaka)
2. **PETRONAS Penapisan Terengganu**  
(Kertih, Terengganu)
3. **Pengerang Integrated Complex**  
(Pengerang, Johor)

## 3 Marketing & Trading

### Marketing

Largest retail network in Malaysia with more than 1,000 PETRONAS stations and 800 Kedai Mesra as well as more than 1,200 Engen stations in South Africa and Sub-Saharan Africa.

Deliver high-quality solutions to customers including automotive, marine and aviation fuel, gas for cooking, heating and electrical power, as well as cleaner energy solutions such as sustainable aviation fuel (SAF) and EV charging infrastructure.

### Trading

Three trading offices located in Dubai, Kuala Lumpur and London.

Marketing, sourcing and trading crude oil and petroleum products for PETRONAS and its subsidiaries.

## 2 Chemicals

22 production plants with 12.8 mtpa production capacity at 11 manufacturing sites in Canada, Germany, Malaysia and Singapore.

Four research and development laboratories sites in Malaysia and Netherlands.

Subsidiaries and representative offices in 17 countries.

## 4 Lubricants

Offer a wide range of lubricants and fluids for automotive and industrial applications.

Headquartered in Kuala Lumpur with over 30 marketing offices in 28 countries, managed through regional offices in Beijing, Belo Horizonte, Chicago, Durban, Kuala Lumpur and Turin.

Top 10 global lubricants player with product availability in 90 countries.





# Activity Outlook





# 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 PACs. Activities governed under the Malaysia-Thailand Joint Development Area (MTJDA) are excluded from this report.

For Downstream and Gas 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 2023 to 2025. 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 2023 and ends in January 2024 is only accounted for once, i.e. in 2023.

**Directional narratives** are provided for the medium-term (i.e. post-2025), to support outlook analysis using the following signposts:



## Actual vs Plan for 2022

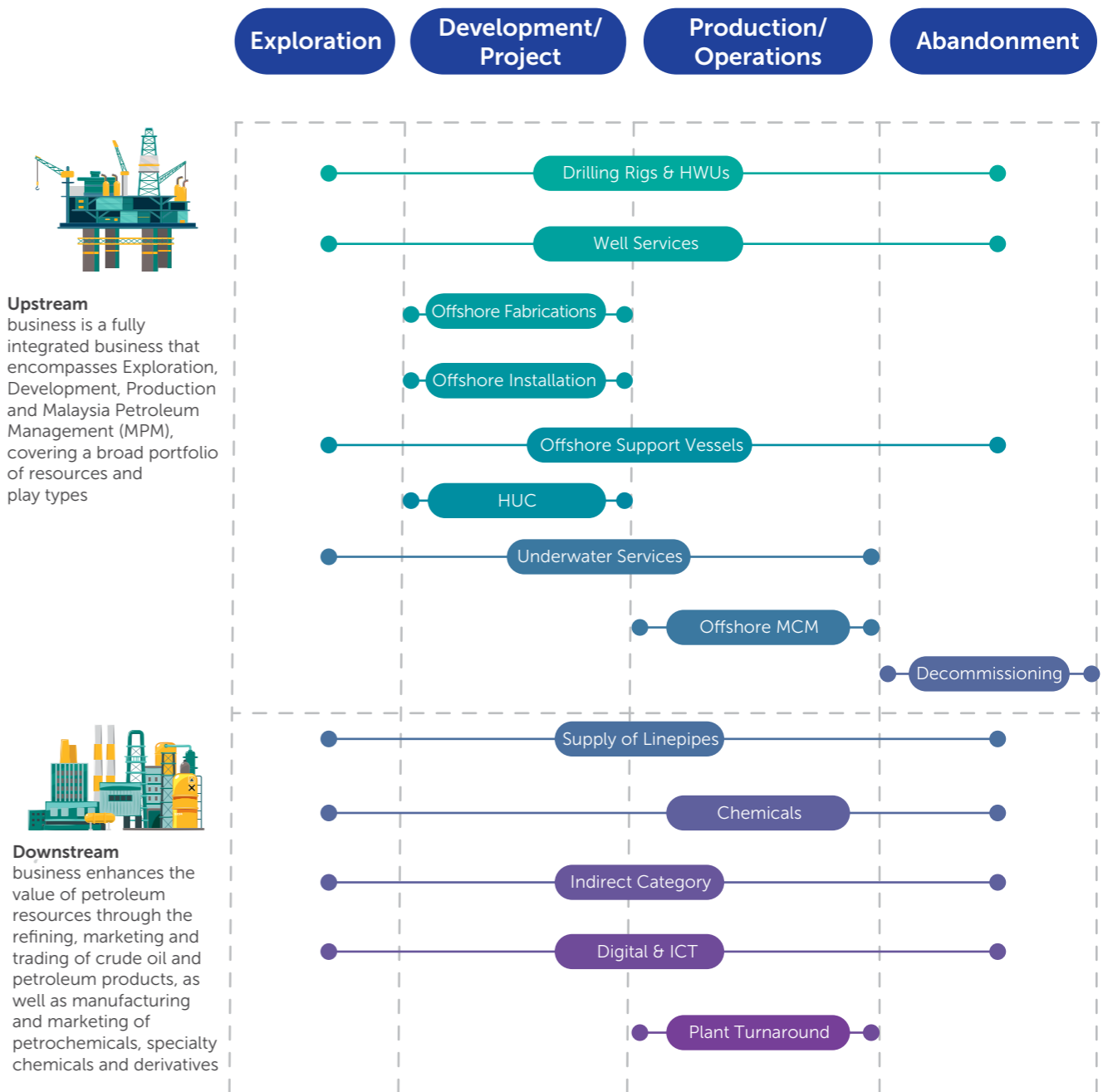
Actual numbers are based on data as at November 2022.

## Base and High Case Scenarios for 2023 – 2025

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 2023



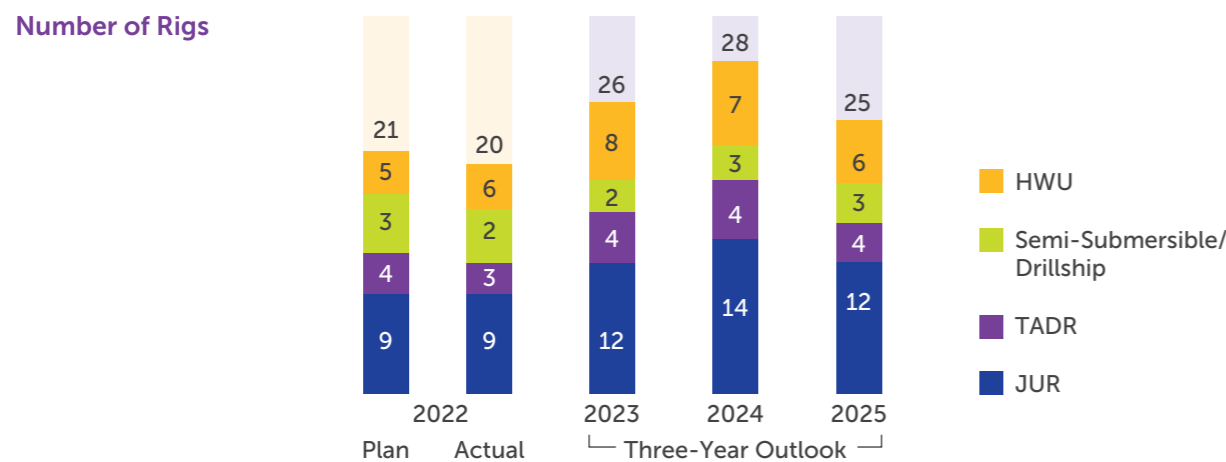


## Drilling Rigs and Hydraulic Workover Units

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 (TADRs), Semi-Submersible Rigs and Drillship.

The Hydraulic Workover Units (HWUs) are utilised to perform workover for recompletion and plugged abandonment work and could function as an alternative to the rigs mentioned above.

	JUR	TADR	Semi-submersible	Drillship	HWU
<b>Activity Phase</b>	<ul style="list-style-type: none"> <li>Exploration</li> <li>Development</li> <li>Abandonment</li> </ul>	<ul style="list-style-type: none"> <li>Development</li> <li>Abandonment</li> </ul>	<ul style="list-style-type: none"> <li>Exploration</li> <li>Development</li> <li>Abandonment</li> </ul>	<ul style="list-style-type: none"> <li>Exploration</li> <li>Development</li> </ul>	<ul style="list-style-type: none"> <li>Production</li> <li>Abandonment</li> </ul>
<b>Application</b>	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. recompletion, well repair and well Plug & Abandonment (P&A).
<b>Associated Services</b>	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.				Supporting vessels, production logging, slickline, wellhead, fishing cementing, etc.



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

- In 2022, the rig count increased compared to 16 rigs in 2021, due to the recovery in oil price and the relaxation of COVID-19 SOPs/directives.
- Positive outlook is expected for the next three years given the increase in workover re-completion to reactivate idle wells and well P&A.
- Outlook for 2023 to 2025 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 2025

Positive outlook is expected for total rigs activities while continue focusing on enhancing and upgrading rig capability to deliver operational excellence and cost effective solutions.

## Well Services

Different services are required for different drilling activities, as tabulated below:

Well Services	Exploration Drilling	Development Drilling	Appraisal	Workover/ Intervention
Cementing	✓	✓	✓	○
Completion	○	✓	○	✓
DD/MWD/LWD	✓	✓	✓	✗
Drilling Bits	✓	✓	✓	○
Drilling Fluids	✓	✓	✓	○
E-Line	✓	✓	✓	✗
Fishing	✓	✓	✓	✓
Mudlogging	✓	✓	✓	✗
Slickline	✗	✓	✓	✓
Tubular Handling	✓	✓	✓	✗
Well Testing	✓	○	✓	✗
Wellhead & Xmas Tree	✓	✓	✓	○

✓ = Yes / Required   ✗ = Not Required   ○ = Optional

## Number of Wells in 2023



Note: Information above is provided with tolerance of +/-10% accuracy

- In 2023, 96 wells are planned to be drilled under Development, Appraisal and Exploration drilling programme. A suitable type of drilling rigs (e.g., Semi-Submersible/Drillship, TADR and Jack-Up) will be selected for the drilling activity based on the type of well.
- 21 producing wells are planned for workover activities where one or more variety of remedial operations will be carried out to increase production.
- For planned Plug and Abandon (P&A) activity, 28 wells have been identified for abandonment where typically producing wells have reached their end of productive life.



### Medium Term Outlook - Post 2025

Positive outlook is expected for third party drilling services focusing on operational excellence and cost effective solutions.

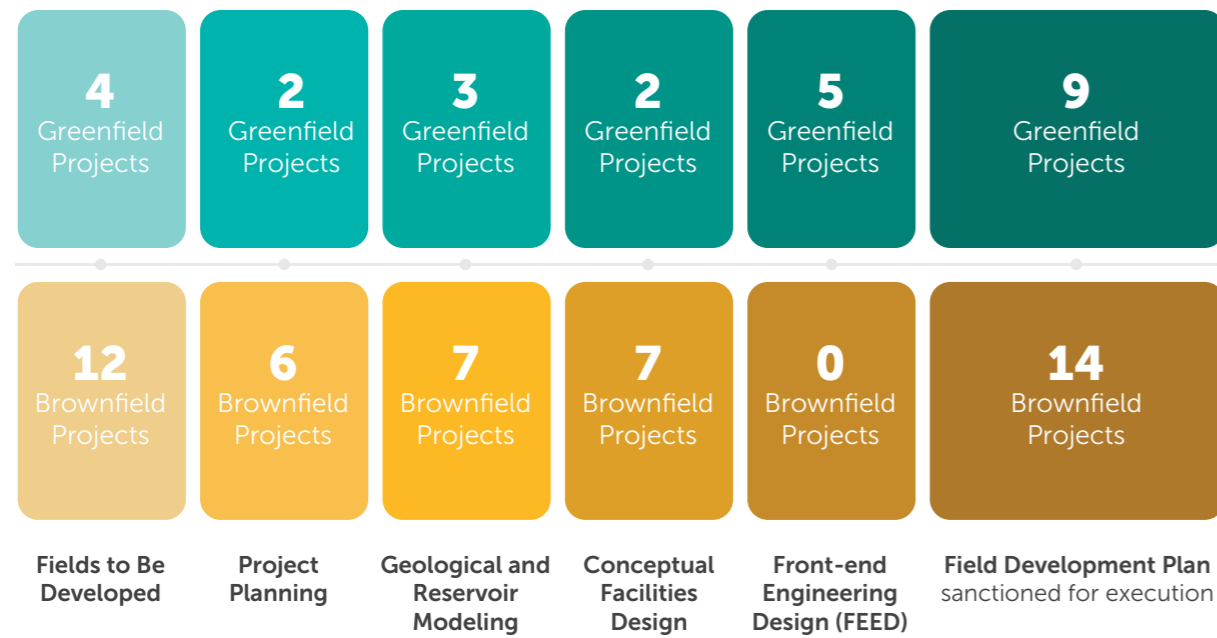


# B - Engineering, Construction and Projects

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 EPCIC stages.

The following portfolio of project 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 2022, 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 stranded 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 profitable and sustainable business.

For the purpose of this report, the timeline for each project is segregated into three stages, i.e. (i) Engineering (ii) Fabrication (iii) Installation, Hook-up and Commissioning. There may be overlap of activities between the three 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 Projects<sup>1</sup>

Project	2023	2024	2025	Facilities Type	Installation Requirement
Jerun	Engineering			C	PETRONAS is open to any cost effective and innovative method of installation.
NMB Phase 4A	Engineering			M	
Marjoram	Engineering	Fabrication	Installation, Hook-up and Commissioning	S	
Rosmari	Engineering	Fabrication	Installation, Hook-up and Commissioning	C, M	
Timi	Engineering			M	
Pegaga MRU	Engineering			M	
Kasawari (E11R-AA)	Engineering			L	
Project 8	Engineering	Fabrication	Installation, Hook-up and Commissioning	M	
Project 9	Engineering	Fabrication	Installation, Hook-up and Commissioning	L	
Project 10	Engineering	Fabrication	Installation, Hook-up and Commissioning	L	
Project 11	Engineering	Fabrication	Installation, Hook-up and Commissioning	L	
Project 12	Engineering	Fabrication	Installation, Hook-up and Commissioning	L	
Project 13	Engineering	Fabrication	Installation, Hook-up and Commissioning	M	
Project 14	Engineering	Fabrication	Installation, Hook-up and Commissioning	M	
Project 15		Fabrication	Installation, Hook-up and Commissioning	L	
Project 16		Fabrication	Installation, Hook-up and Commissioning	M	

<sup>1</sup>At the time of reporting, high number of projects are still under review



### Legend for Facility Type:

- Fixed structure
  - L WHP Lightweight – total tonnage ≤ 1,000 tonnes
  - M WHP Medium Weight – total tonnage ≤ 7,500 tonnes
  - H WHP Heavy Weight – total tonnage > 7,500 tonnes
  - C CPP Heavy 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 Flowline (SURF)



**B - Engineering, Construction and Projects**

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

- i. **Brownfield Projects** (with new structural installation)
- ii. **Brownfield Projects** (without new structural installation)

**Brownfield Projects<sup>2</sup>** (with new structural installation)

Project	2023	2024	2025	Facilities Type	Installation Requirement
Gumusut Kakap Phase 4	[Bar]	[Bar]		S	PETRONAS is open to any cost effective and innovative method of installation.
Kikeh Phase 3A	[Bar]			S	
IBO Module 9	[Bar]			M	
Project 4		[Bar]	[Bar]	M	
Project 5	[Bar]	[Bar]	[Bar]	M	

<sup>1</sup>At the time of reporting, high number of projects are still under review



**Legend for Facility Type:**

- Fixed structure
  - L WHP Lightweight – total tonnage ≤ 1,000 tonnes
  - M WHP Medium Weight – total tonnage ≤ 7,500 tonnes
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  - C CPP Heavy 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 Flowline (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)

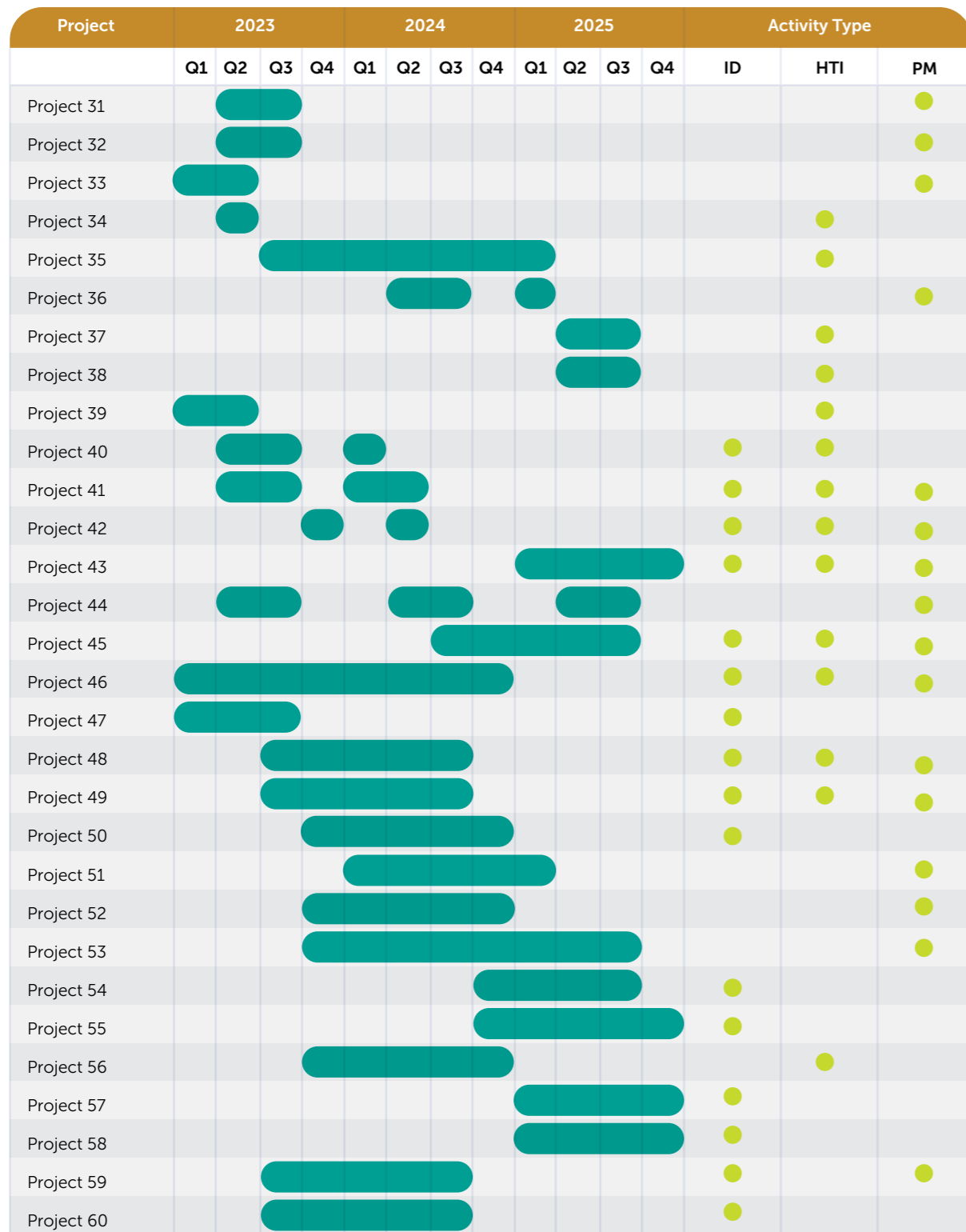
Project	2023				2024				2025				Activity Type		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	ID	HTI	PM
Project 1	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]									[Dot]
Project 2	[Bar]														[Dot]
Project 3					[Bar]										[Dot]
Project 4										[Bar]					[Dot]
Project 5										[Bar]					[Dot]
Project 6	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]			[Dot]
Project 7		[Bar]	[Bar]	[Bar]	[Bar]	[Bar]		[Bar]	[Bar]	[Bar]	[Bar]				[Dot]
Project 8		[Bar]	[Bar]												[Dot]
Project 9						[Bar]									[Dot]
Project 10										[Bar]	[Bar]	[Bar]			[Dot]
Project 11											[Bar]	[Bar]			[Dot]
Project 12				[Bar]			[Bar]				[Bar]	[Bar]	[Dot]		[Dot]
Project 13	[Bar]			[Bar]	[Bar]			[Bar]	[Bar]	[Bar]	[Bar]	[Bar]			[Dot]
Project 14		[Bar]								[Bar]	[Bar]				[Dot]
Project 15	[Bar]	[Bar]				[Bar]				[Bar]	[Bar]				[Dot]
Project 16			[Bar]	[Bar]	[Bar]										[Dot]
Project 17			[Bar]	[Bar]	[Bar]										[Dot]
Project 18			[Bar]	[Bar]	[Bar]										[Dot]
Project 19			[Bar]	[Bar]	[Bar]										[Dot]
Project 20			[Bar]	[Bar]	[Bar]										[Dot]
Project 21			[Bar]	[Bar]	[Bar]										[Dot]
Project 22			[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]			[Dot]
Project 23	[Bar]	[Bar]	[Bar]		[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]			[Dot]
Project 24	[Bar]	[Bar]													[Dot]
Project 25		[Bar]	[Bar]	[Bar]											[Dot]
Project 26		[Bar]	[Bar]	[Bar]											[Dot]
Project 27		[Bar]	[Bar]	[Bar]											[Dot]
Project 28		[Bar]	[Bar]	[Bar]											[Dot]
Project 29		[Bar]	[Bar]	[Bar]											[Dot]
Project 30		[Bar]	[Bar]	[Bar]											[Dot]

**Legend:**

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



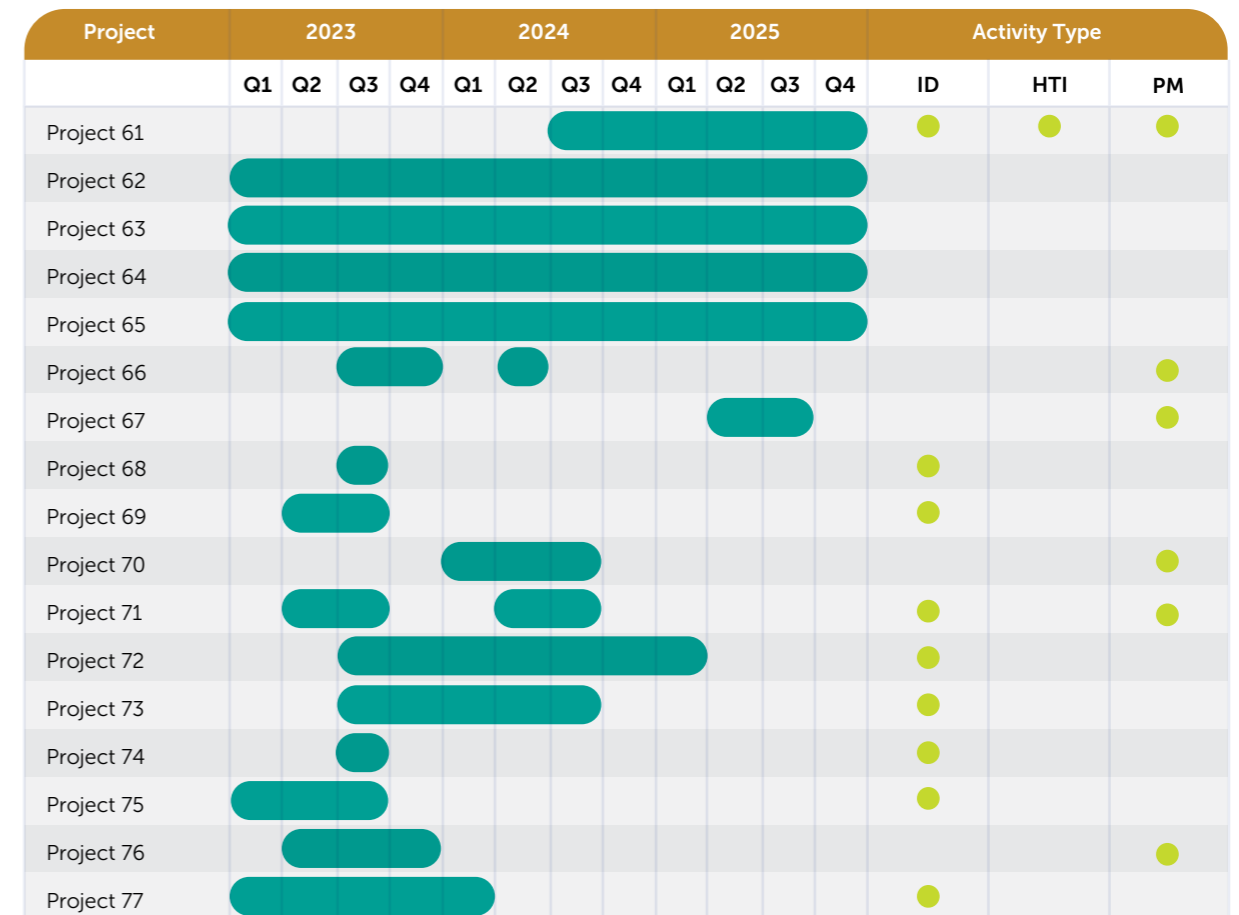
B - Engineering, Construction and Projects



Legend:

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

B - Engineering, Construction and Projects



Legend:

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



## Offshore Fabrication

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

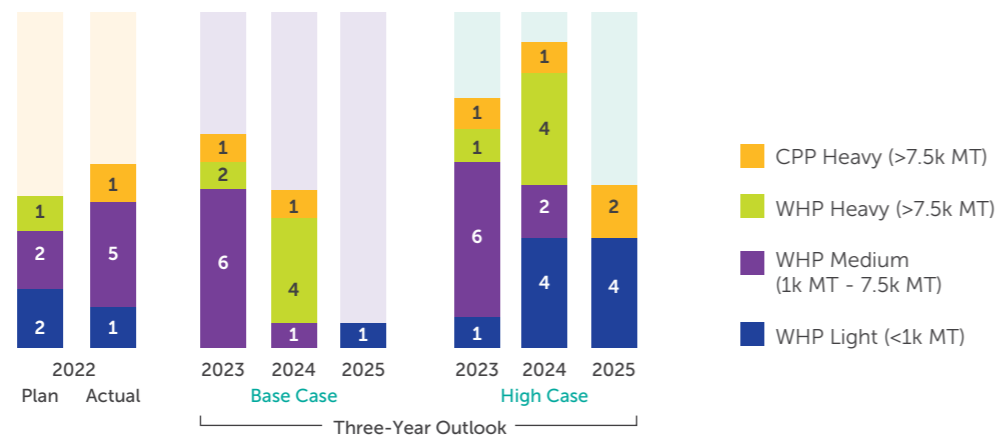
### Fixed Structures: Wellhead Platform/Central Processing Platform

**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 extracts 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.)

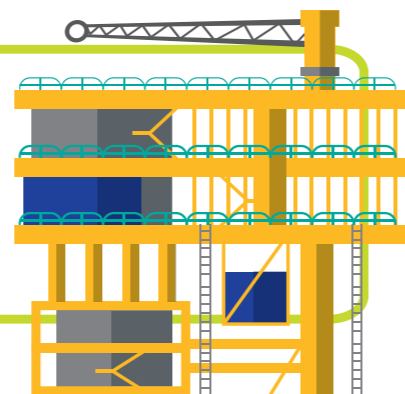
#### Number of Fixed Structures Fabrication



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

### Did You Know?

PETRONAS' Kasawari CCS project is expected to reduce carbon dioxide volumes emitted via flaring by 3.3 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) per annum, making it one of the largest CCS projects in the world.



## 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 facility, 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.), fabrication yards, shipyards, transportation and installation, hook-up and commissioning and Marine Warranty Surveyor.



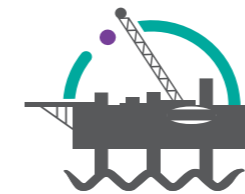
### FPSO Floating Production, Storage and Offloading

Vessel used for the processing of hydrocarbons and oil storage facility before being offloaded onto a tanker for transportation to shore.



### FSO Floating Storage and Offloading

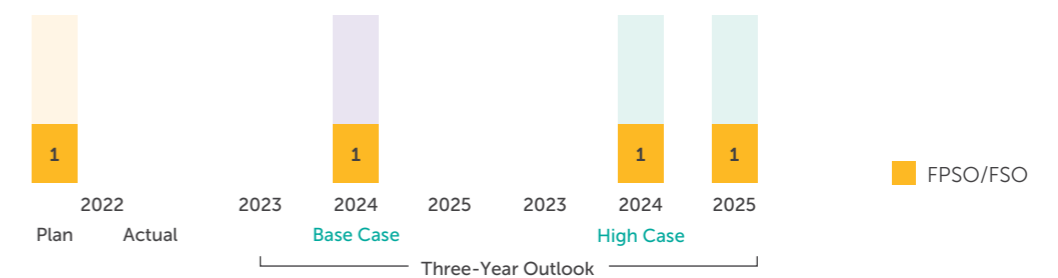
A simplified FPSO without the processing capability for oil and/or gas.



### MOPU Mobile Offshore Production Unit

Portable structure in offshore well production, referring to portable wellhead platform, self-elevating production (including water injection) facilities.

#### Number of Floating Structures Fabrication



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

- Despite the energy transition outlook, the floaters particularly FPSO market remains much in demand to continue unlocking hydrocarbon resources in marginal or isolated fields to meet the energy demands.
- Suppliers also need to be competitive in building green and sustainable FPSO projects to meet the ESG requirements from various stakeholders, including from operators and financiers.

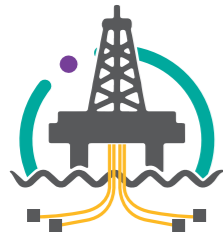


## Subsea Structures

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.

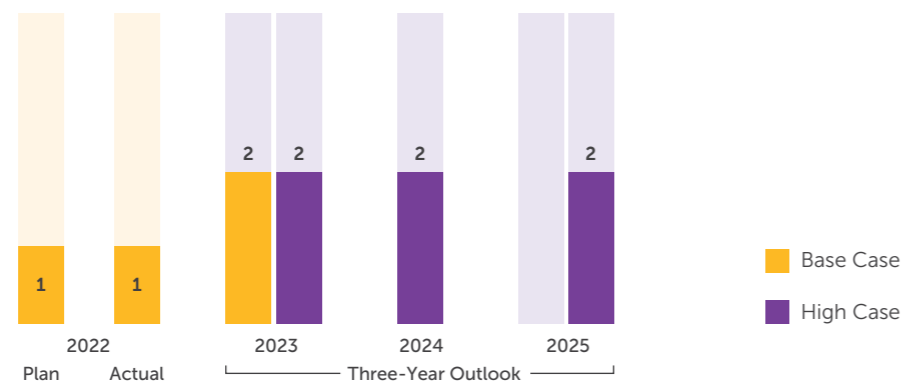


### SURF

#### Subsea Umbilical, Riser and Flowline (SURF)

Comprises subsea completed wells, subsea Christmas trees and wellhead systems, subsea tie-in to flow line system, jumpers, umbilical and riser system, and subsea equipment to operate the well.

#### Number of Projects for SURF



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.
- Expected SURF cost to increase due to constrained supply market.

#### Medium Term Outlook - Post 2025

- Steady outlook is expected for fabrication of fixed structures (especially Lightweight) 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 advancement of technologies present favourable options for monetisation of remote fields.

## Offshore Installation

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

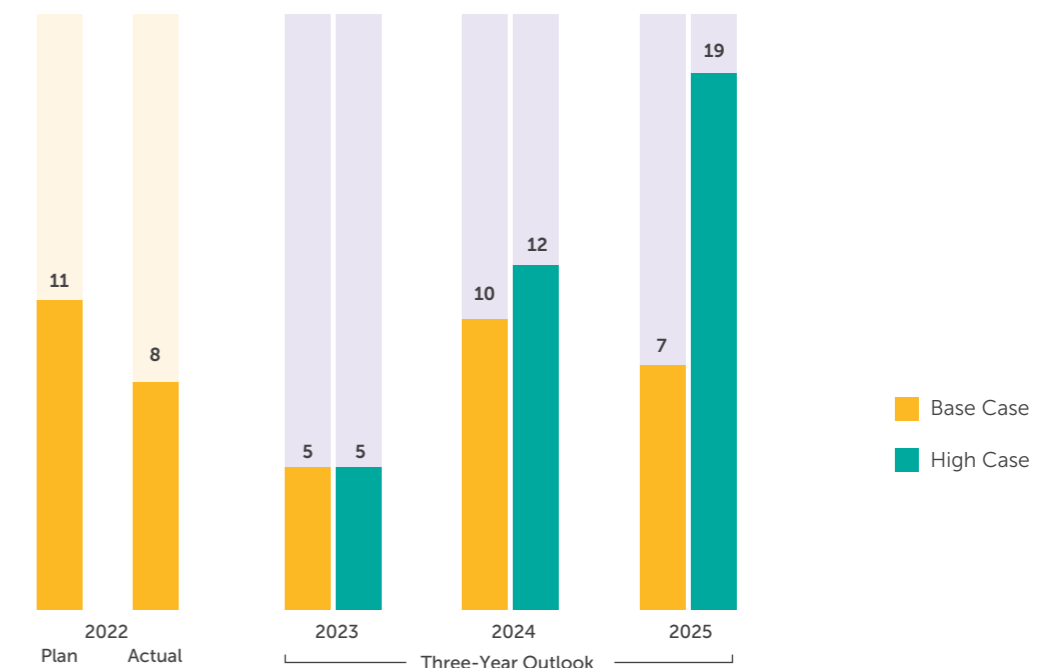


### Structural Installation – Heavy Lift

**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).

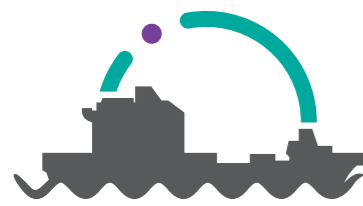
#### Number of Lifts Using Heavy Lifts Barges



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

- 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 based on respective project phases.
- The increase of activities for 2024-2025 may pose challenges in the existing tight supply market.



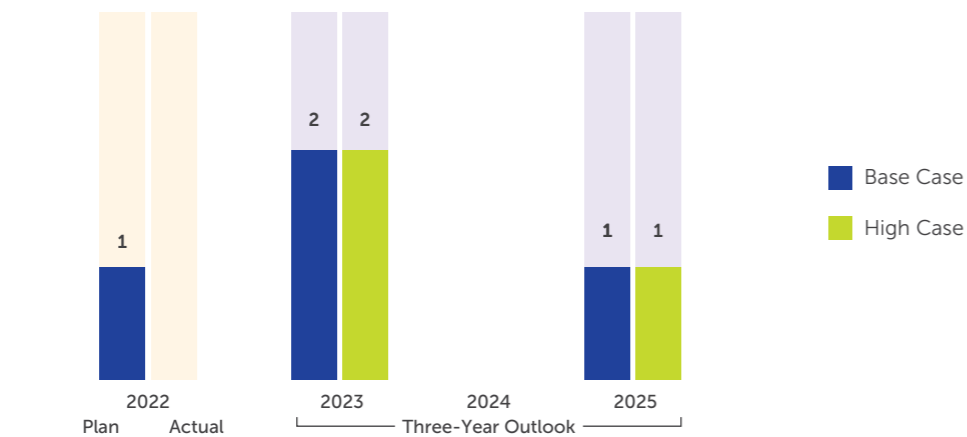


**Structural Installation – Floatover**

**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**



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

- For 2022, 1 CPP was deferred to 2023 due to alignment of strategy.
- Numbers indicated are on base case and measured in terms of number of activities. Duration may vary.
- Modest outlook is expected for floatover barges with lower number of projects requiring CPPs.



**Medium Term Outlook - Post 2025**

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.

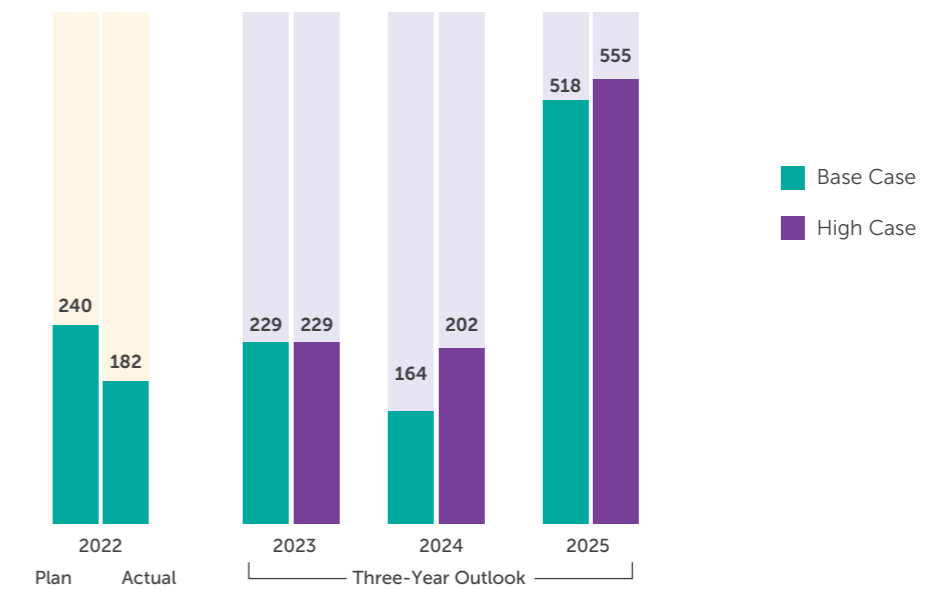


**Pipeline Installation – Pipelay**

**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**



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 (CS) and Corrosion Resistant Alloy (CRA) pipeline only.
- This outlook excludes requirement for pipeline replacement.
- In addition, there are potential installation requirement for flexible pipes as follows:
  - a) 7 km in 2023
  - b) 21 km in 2025
- This outlook may be read together with the outlook for supply of linepipes.



**Medium Term Outlook - Post 2025**

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



## 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.

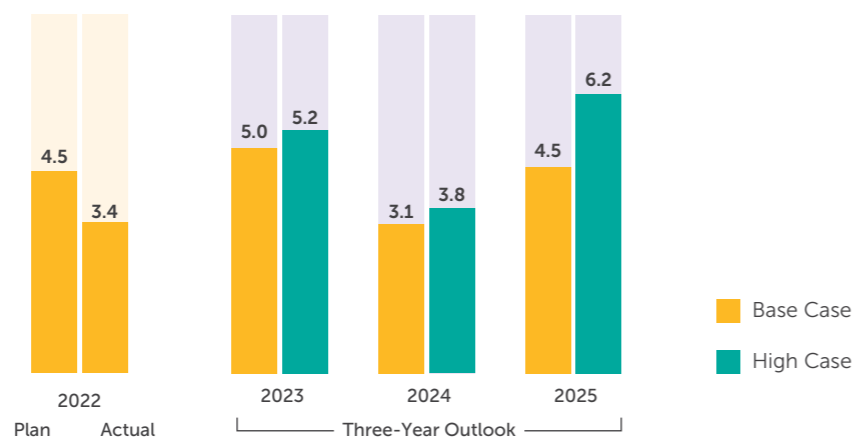


**Activity Phase:** Development and Production

**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, Fast Crew Boat), logistics services, pre-commissioning services, inspection services etc.

### Number of Man-Hours (Millions)



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

- In 2022, a number of the planned projects had to be deferred and rationalised due to COVID-19 pandemic, which is expected to resume and spillover to FY2023 before reaching its peak in FY2025.
- Outlook excludes manhours from EPCC and/or EPCIC projects.



#### Medium Term Outlook - Post 2025

Steady outlook for Brownfield HUC to maximise hydrocarbon recovery from existing fields.

## Decommissioning

Decommissioning refers to activities to restore previously producing sites to safe and environmentally stable conditions.



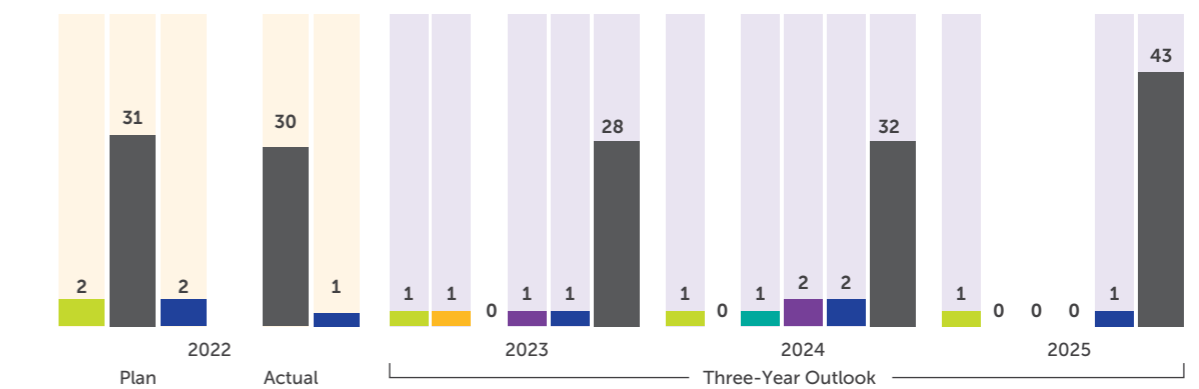
**Activity Phase:** Abandonment

**Application:** Decommissioning comprises two activities:

- Well Plug and Abandonment: Permanently isolate the wellbore from surface/seabed and removal of associated completion/accessories.
- Upstream Facilities Decommissioning: Removal, abandonment, salvage, proper disposal and site remediation of the disused facilities.

**Associated Services:** Drilling rigs and HWUs, offshore support vessels, lifting vessels, engineering services, yard facility, transport, cutting services, conductor removal, pipeline flushing, etc.

### Decommissioning of Facilities and Wells



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

WHP CPP Subsea FPSO/FSO/MOPU Pipeline Wells

- PETRONAS is currently focusing on Wells P&A for the next three years as preparation for future facilities removal campaign.
- PETRONAS is currently exploring innovative decommissioning solutions focusing on technologies, re-use/purpose options, integrated approach as well as identifying potential alternatives that can introduce cost compression. Thus, participation and collaboration are encouraged from all parties.



#### Medium Term Outlook - Post 2025

Steady outlook is expected for decommissioning activities as more fields have come to the end of life and PETRONAS will ensure all the abandonment obligations will be executed accordingly.



## C - Equipment and Materials

### Supply of Linepipes

Linepipes and flexible pipes are used to transport oil or gas between two or more facilities to cater for both upstream and downstream requirement. 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 development projects' requirement and pipeline replacement projects, reflecting the year activities started to meet the required-on-site date.

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

**Application (Flexible Pipes):** 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).

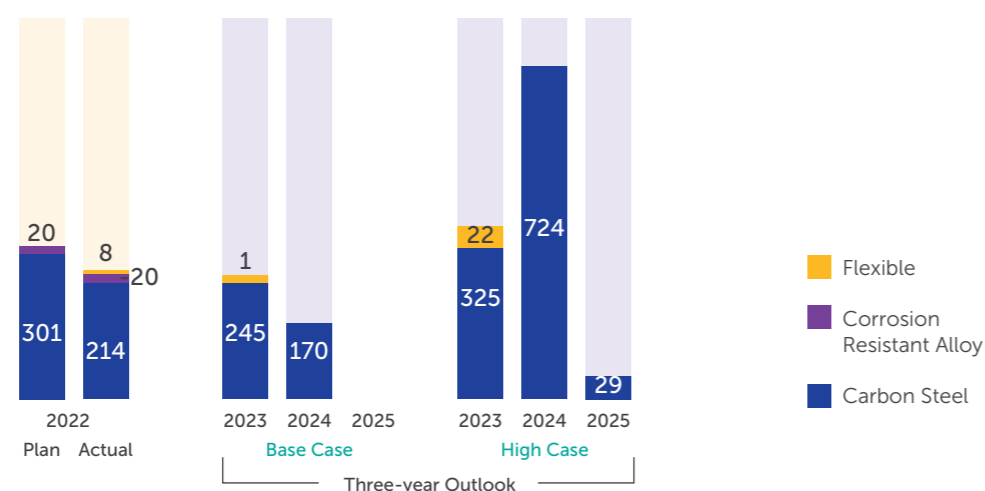


**Linepipes**  
Rigid linepipes, generally made of carbon steel material or corrosion-resistant alloy (CRA).



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

### Length of Linepipes (km)



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

- The outlook are for carbon steel, CRA and flexible pipes only.
- This outlook may be read together with the outlook for installation of linepipes.



#### Medium Term Outlook – Post 2025

Steady outlook is expected for supply of linepipes as steel price will stabilise starting Q4 2022 onwards.

## 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

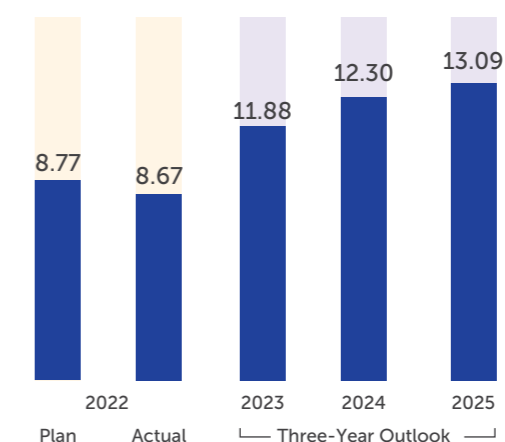
**Application:** MCM involves two types of activities:

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

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



### Number of Man-hours (Millions)



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

- Actual numbers of manhours in 2022 are slightly lower than plan due to COVID-19 restrictions. Contractors faced issues in terms of manpower planning. Some of the planned works were deferred.
- Activity is expected to remain stable over the next three years, given the oil price recovery with relaxation of COVID-19 SOPs and contractors fully adapting to the new norm and improve their overall manpower planning.



#### Medium Term Outlook – Post 2025

Steady outlook can be expected for MCM activities for the next three years due to its cyclical nature. Potential growth due to activities for newly producing PACs.

#### Did You Know?

- Pipeline Maintenance is a strategically managed category which enables high integrity and reliability of approximately 15,000 km pipelines within PETRONAS' business operation in Malaysia to transport oil, gas and petrochemicals around Malaysia.
- 8% of these pipelines have been in operation for more than 40 years and require critical maintenance plan.
- There are close to 400 operating pipelines with total length combined of approximately 5,800 km within offshore Malaysia.

## Underwater Services

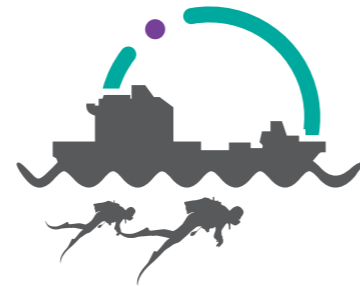
Underwater Services covers inspection, maintenance and repair activities performed for underwater structures such as platform jacket inspection, offshore pipeline inspection, debris survey and removal, etc.

For the purpose of resources planning and optimisation, the outlook is represented by number of days for activities execution.

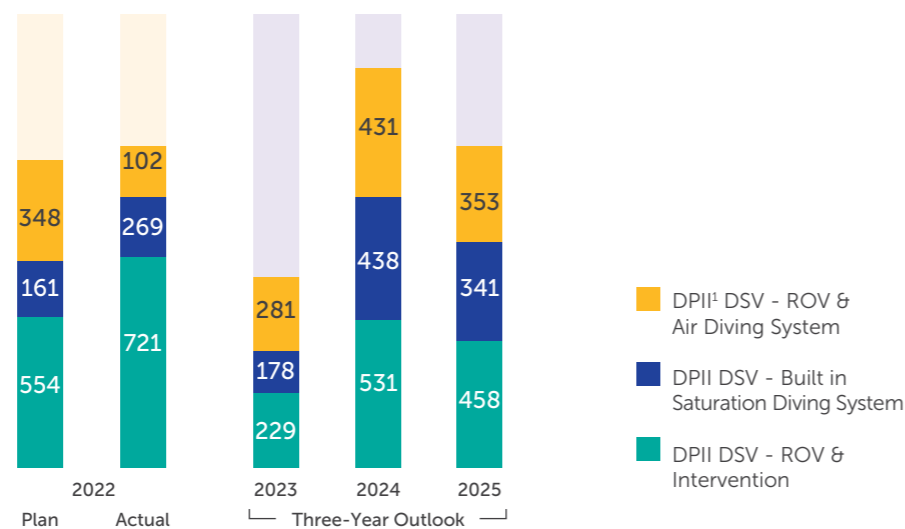
**Activity Phase:** Development and Production

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

**Associated Services:** Diving and support vessel, air and saturation diving system, Remotely Operated Vehicles (ROV) and Project Management Team (PMT), etc.



### Number of Days



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

1 Dynamic Positioning II Diving Support Vessel

- Outlook is based on forecasted number of days for execution of underwater activities utilising Diving Support Vessel (DSV) where the estimated volume for each vessel specification may vary depending on specific scope requirement by PACs.
- The utilisation of DSV in 2023 remains stable and anticipated to increase gradually in 2024 - 2025 due to high market demand and where possible, further resources optimisation will be implemented through activity consolidation across PACs.



### Medium Term Outlook - Post 2025

Positive outlook is expected for Underwater Services due to scheduled Inspection, Repair and Maintenance activities required to maintain the integrity of offshore facilities. Nonetheless, continuous cost pressure will continue to drive further scope optimisation/prioritisation amongst PACs.

## Plant Turnaround

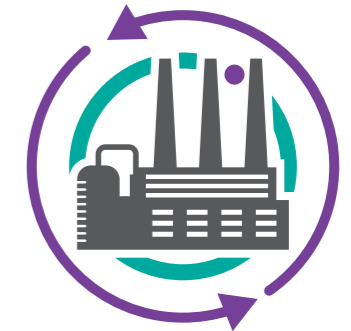
**Plant Turnaround** is defined as a major engineering event during which an onshore facility is shut down for equipment inspection and overhaul, debottlenecking, revamps and catalyst regeneration projects.

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.

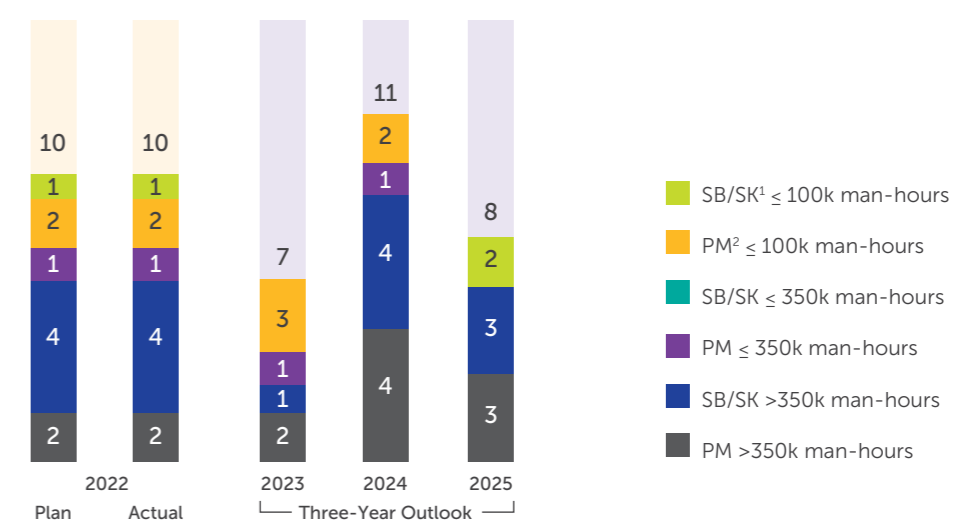
**Activity Phase:** Operations

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

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



### Number of Turnarounds



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

1 Sabah/Sarawak  
2 Peninsular Malaysia

- Plant Turnaround activities for next 2023 - 2025 years outlook remain steady and shall provide slightly higher demand in year 2024. The increase of Plant Turnaround activities in 2024 covering requirement in Pengerang Region.
- The outlook represents the number of PETRONAS' Operating Units (OPUs) to perform turnaround excluding the PETRONAS upstream onshore facilities.










### Medium Term Outlook - Post 2025

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



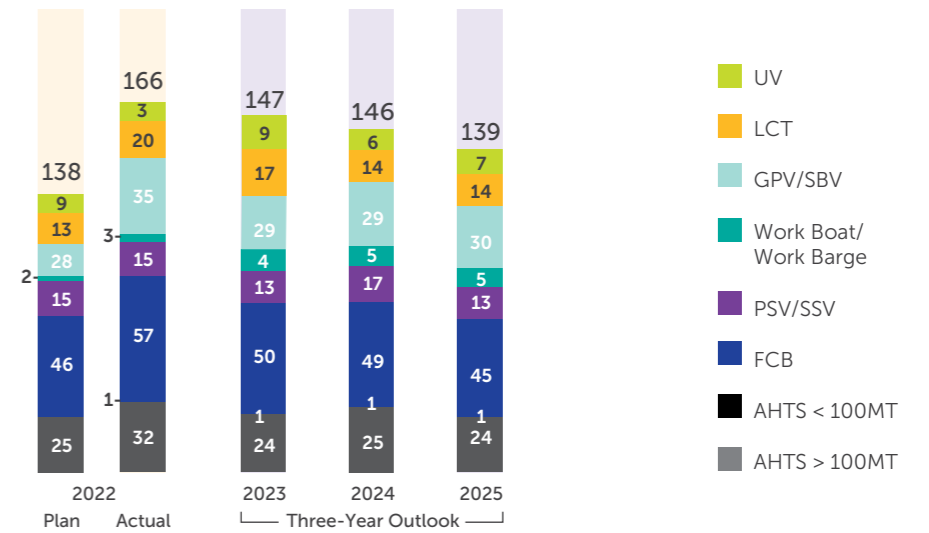
The Logistics category covers land transportation, supply base, warehouse, aviation and Offshore Support Vessel (OSV).

## Offshore Support Vessel (OSV)

Type of Vessel	Activity Phase	Application	Associated Services
 <b>Anchor Handling Tug Supply (AHTS)</b>	<ul style="list-style-type: none"> <li>Exploration</li> <li>Development</li> <li>Production</li> <li>Abandonment</li> </ul>	Used to assist in anchor handling operation, towing and transport supplies to and from offshore platforms/drilling rigs.	Vessel inspection services, bunkering services, port services and tank cleaning services.
 <b>Platform Supply Vessel (PSV)/ Straight Supply Vessel (SSV)</b>	<ul style="list-style-type: none"> <li>Production</li> <li>Abandonment</li> </ul>	Transport equipment and supplies to offshore platforms/drilling rigs.	
 <b>Fast Crew Boat (FCB)</b>	<ul style="list-style-type: none"> <li>Development</li> <li>Production</li> <li>Abandonment</li> </ul>	High speed vessel for the transportation of crew to offshore facilities and inter rigs.	
 <b>Workboat/ Work Barge</b>	<ul style="list-style-type: none"> <li>Development</li> <li>Production</li> <li>Abandonment</li> </ul>	Accommodation for personnel.	
 <b>General Purpose Vessel (GPV)/ Standby Vessel (SBV)</b>	<ul style="list-style-type: none"> <li>Development</li> </ul>	Standby, support, rescue and emergency duties.	
 <b>Utility Vessel (UV)</b>	<ul style="list-style-type: none"> <li>Production</li> </ul>	Transport equipment and supplies to offshore platforms/drilling rigs.	
 <b>Landing Craft Tank (LCT)</b>	<ul style="list-style-type: none"> <li>Production</li> </ul>		
<b>Associated Services</b> Vessel inspection services, bunkering services, port services and tank cleaning services.			

For the purpose of activity outlook, the number represent OSVs requirements for Production Operations, Drilling and Projects (Wells).

## Number of Vessels supporting Production Operations



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

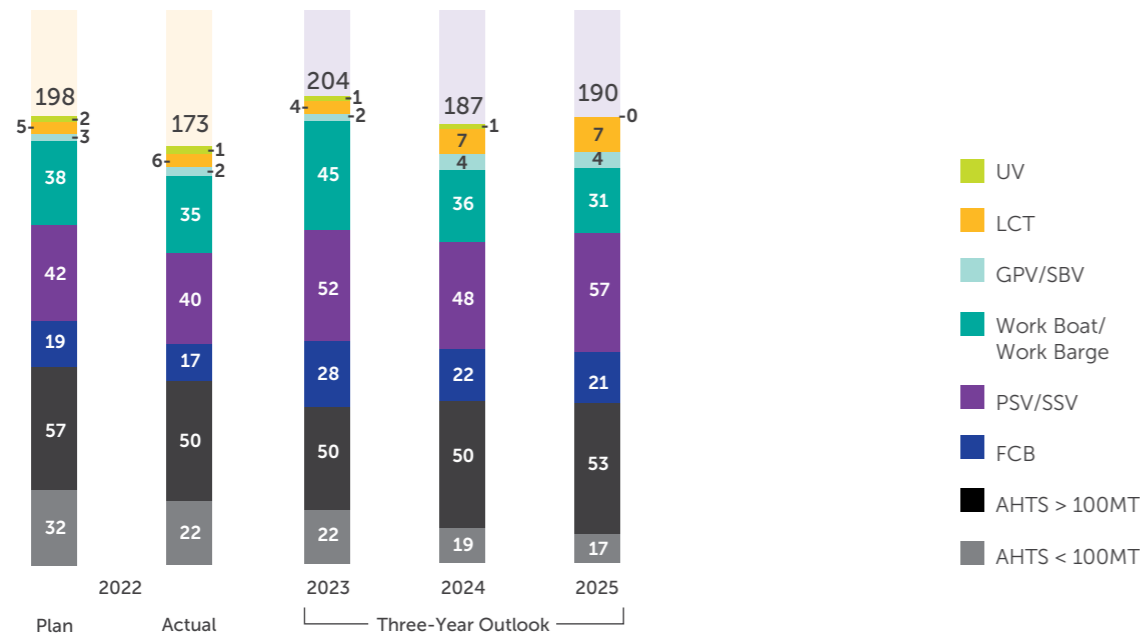
- In 2022, the actual numbers were higher due to additional vessels required to support production operations and security surveillance purposes. Higher demand of production vessels has resulted in a positive impact to the OSV industry.
- Outlook 2023 – 2025 depicts slightly decreasing demand for vessels supporting production operations from year-to-year due to revision in production operations philosophy i.e. unmanned platform.
- OSV owners embarking on fleet renewal should consider fuel efficient technologies including diesel electric vessels to reduce total operational cost for charterers.



### Medium Term Outlook – Post 2025

Steady outlook is expected for OSV due to the consistent activity of production operations throughout Malaysian waters.

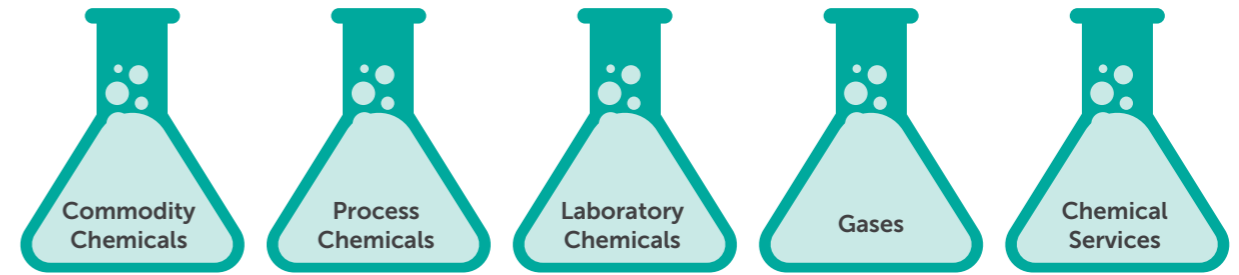
Number of Vessels supporting Drilling and Projects (Wells)



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

- In 2022, lower actual number of vessels was due to deferment of drilling campaign to the following year.
- Outlook 2023-2025 depicts stable year-to-year demand for vessels supporting project/drilling activities.
- This outlook excludes the requirements of vessels for HUC, MCM and Underwater Services activities, EPCC and EPCIC which will be sourced separately.

**Medium Term Outlook – Post 2025**  
Modest outlook can be expected for OSV supporting drilling and projects (Wells) through PETRONAS' effort of optimising its resource requirement.



For the purpose of this report, only the **primary categories** are highlighted below :

	Commodity Chemicals	Process Chemicals	Chemical Services
Description	Chemicals that are commonly used in process and operations.	Chemicals that are specialised and used to accelerate plant processes, maximise asset reliability and/or improve productivity.	Provision of manpower, materials, consumables, equipment and facilities necessary for providing chemical services.
Examples	<ul style="list-style-type: none"> <li>• Amines</li> <li>• Base oil</li> <li>• Chloralkali</li> <li>• Glycols</li> <li>• Lubricants</li> <li>• Resins</li> <li>• Solvents</li> </ul>	<ul style="list-style-type: none"> <li>• Additives</li> <li>• Boiler &amp; Cooling Water System Chemicals</li> <li>• Catalyst</li> <li>• Corrosion Inhibitors and Biocides</li> <li>• Sulfiding Agent</li> <li>• Production Chemicals</li> </ul>	<ul style="list-style-type: none"> <li>• Catalyst and internal media change-out</li> <li>• Other chemical services</li> </ul>
Outlook	<ul style="list-style-type: none"> <li>• Key elements for chemicals prices are raw materials and logistics costs.</li> <li>• PETRONAS chemicals demands are dependent on among others ageing assets, turnaround and shutdown (TASD), new projects, new plants onstream, endurance and lifespan of the chemicals, etc.</li> <li>• Base oil, catalyst, corrosion inhibitors and biocides, glycols, oils and lubricants and production chemicals are the major contributors of chemicals spend.</li> <li>• Explore opportunities for collaboration in applying Advanced Chemical Technology not only in product delivery but also in product management and sustainability.</li> <li>• More companies are managing sustainability to improve processes, pursue growth and add value instead of focusing on reputation only. As research shows that companies that align with sustainability have a higher valuation, a holistic approach to ESG is required.</li> </ul>		



The outlook for selected major categories of Process Chemicals is highlighted in this report for reference i.e. Boilers and Cooling Water System Chemicals, Catalyst, Integrity Chemicals (Corrosion Inhibitors & Biocide) and Production Chemicals.

### Boilers and Cooling Water System Chemicals



To ensure the system in the programme is protected against corrosion, scaling, deposition, microbiological growth and process-related problems and able to perform as intended.

**Application:** Boilers (Downstream) and Cooling Water (Upstream and Downstream).

**Associated Services:** Supply of chemicals and technical services.

### Catalyst



Catalyst is a substance that increases the rate of a reaction without being consumed in the reaction.

**Application:** Petroleum refining, chemical synthesis, petrochemical production, polymer processing, environment protection reactions.

**Associated Services:** Supply of catalyst, supply of internal media, logistics services, catalyst change-out services.

### Integrity Chemical (Corrosion Inhibitors and Biocide)



Corrosion Inhibitors are chemicals used to protect the pipeline, equipment and piping from internal corrosion threat at recommended concentration and dosage.

Biocides are chemicals used to protect the pipeline, equipment and piping from Microbial Influenced Corrosion (MIC) by controlling and reducing microbial growth.

**Application:** Cooling water system, boiler and heat exchanger (Downstream) and crude pipeline, wet gas pipeline and dehydrated gas pipeline (Upstream).

**Associated Services:** Formulation, supply and injection of integrity chemicals.

### Production Chemicals

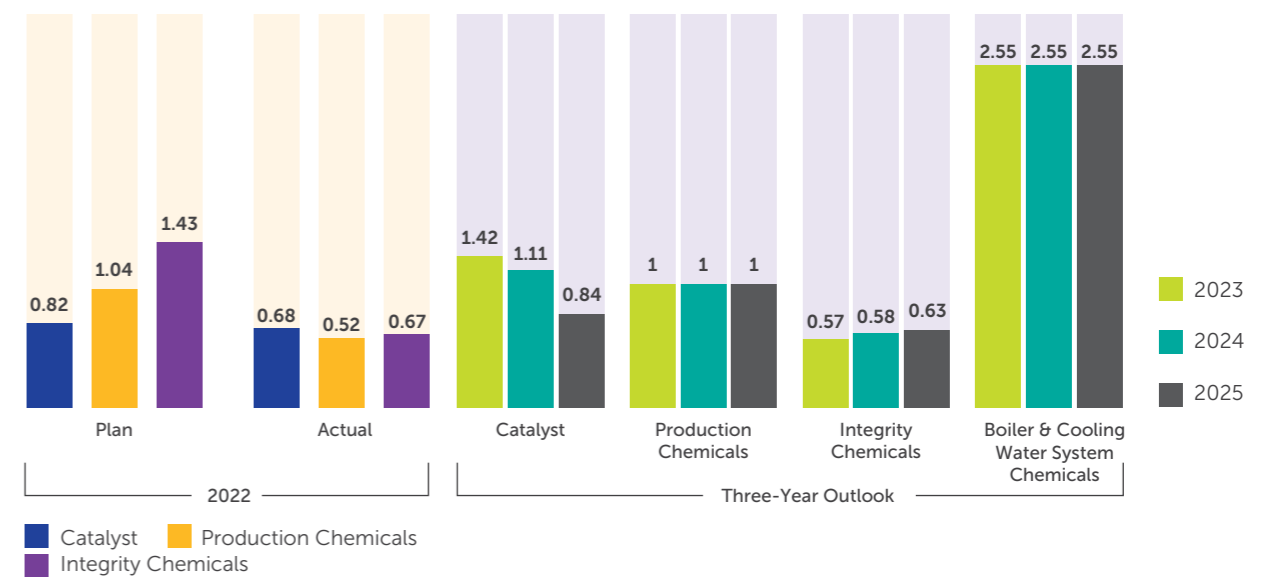


Production Chemicals is crucial to prevent flow assurance and process integrity threat in the production system. It is essential to ensure optimum and uninterrupted flow for higher productivity. Examples of these chemicals are Demulsifier and Pour Point Depressant.

**Application:** Reservoir, wellhead, surface facilities, crude pipeline up to terminal (Upstream) and Downstream.

**Associated Services:** Formulation, supply and injection of production chemicals.

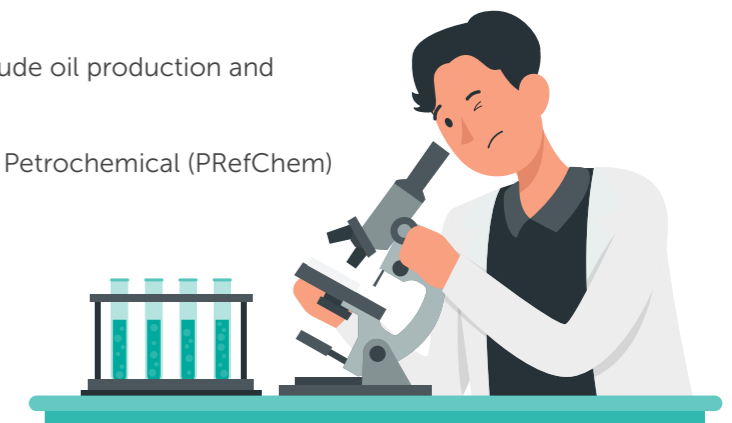
### Number of Chemicals' Purchase Ratio



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

Note: For FY2023 to 2025, Chemicals' Purchase Ratio is based on the forecasted purchase in comparison to actual purchased in base year 2021.

- In 2022, the chemicals procured differed from initial plan due to realignment of strategy.
- **Boilers and Cooling Water System:** Continuous requirement for purchases and services related to boiling and cooling water system across PETRONAS OPU's in ensuring asset integrity/reliability.
- **Catalyst:** 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 2023 onwards.
- **Integrity Chemicals (Corrosion inhibitors and Biocide):** Continuous requirement in ensuring the asset integrity/reliability especially of the pipeline, equipment and piping from corrosion/leak also additional demand for Cooling Water System to remove heat from process or equipment.
- **Production Chemicals:** Outlook will depend on projection of crude oil production and alignment with low-carbon world.
- Activities under Pengerang Refining and Petrochemical (PRefChem) are also excluded from this outlook.



### Medium Term Outlook – Post 2025

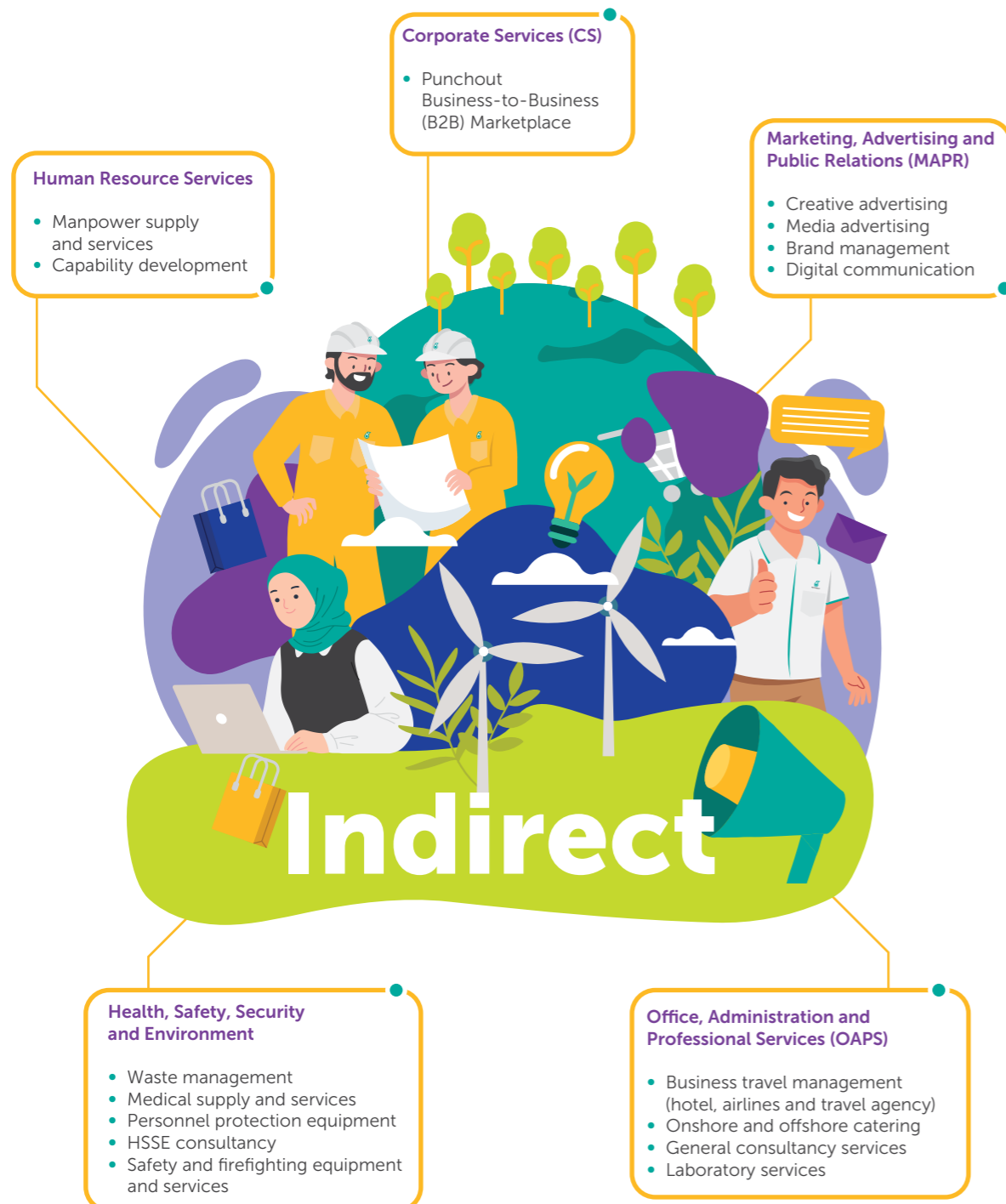
Steady outlook is expected given the continuous requirement for Upstream and Downstream (for maintenance and operation activities).

## G - Indirect Category

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

**Vision:** To create a delightful customer experience in achieving a sustainable future via innovative and digitally driven procurement solutions.

Primary highlights are as follows:



## G - Indirect Category



### Integrated Contracts

Integrated contracts across corporate and business units through volume consolidation to achieve Economies of Scale (EoS).

### New Ways of Working -Technology

New ways of working through technology driven initiatives i.e., cashless hotel payment by the Company instead of by personnel, transition from Scheduled Waste (SW) disposal to 3R (Reduce, Reuse and Recycle) in line with PETRONAS' Net Zero Carbon Emissions by 2050 aspiration.



### Reimagined Advertising

Reimagined Advertising in meeting Business and Stakeholders' requirements by integrating communication strategy, tactical plans, creative and production for campaigns and decoupling of production for small production works i.e. video and animation production in enriching local industry participation.

### Online Marketplace

Established efficient and cost-effective procurement method by providing online buying experience for low value and high transactional volume through external B2B marketplaces i.e. Lapasar and Dropee, expanding opportunity for suppliers to access wider clientele not limited to oil and gas industry.





# H - Digital and ICT

Digitalisation plays a crucial role in navigating market uncertainties and diversification of energy plays in the future. Today, more than ever before, we feel the urgency of having safe, reliable and emissions-abated sources of energy. Through the years, we have benefited significantly from our portfolio of digital solutions across our integrated value chain.

In PETRONAS, Digital and ICT covers all digital and ICT-related products and services. This includes application software, Information Technology (IT) consultancy services and telecommunications and network hardware and software.

The approach for sourcing of digital and ICT is through integrated consolidated contracts across PETRONAS' corporate and business units.

PETRONAS takes a fit-for-purpose procurement approach for Digital and ICT to adapt and respond to the rapidly changing digital landscape:

- 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.
- Have flexibility in procurement to keep up the shorter innovation cycle.
- Optimise value through governance based on outcome/value and Total Cost of Ownership (TCO) over lifecycle of the assets.

## Digital and ICT Archetypes in PETRONAS

Archetype	Run and Maintain	Essential Building Block	Sandbox and Scale
Description	Focuses on everyday digital and ICT operations of the business such as <b>software maintenance and license renewal, application support</b> , etc	Foundational <b>infrastructure, application and security</b> requirements for PETRONAS Groupwide.	Explore or experiment and <b>develop</b> amongst first of its kind <b>concepts, use cases or products</b> 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.		

## Digital as an Accelerator

**Cyber Security**  
Cyber secure and cyber resilient operating environment across the Group, through the formation and execution of a holistic cyber security strategy.

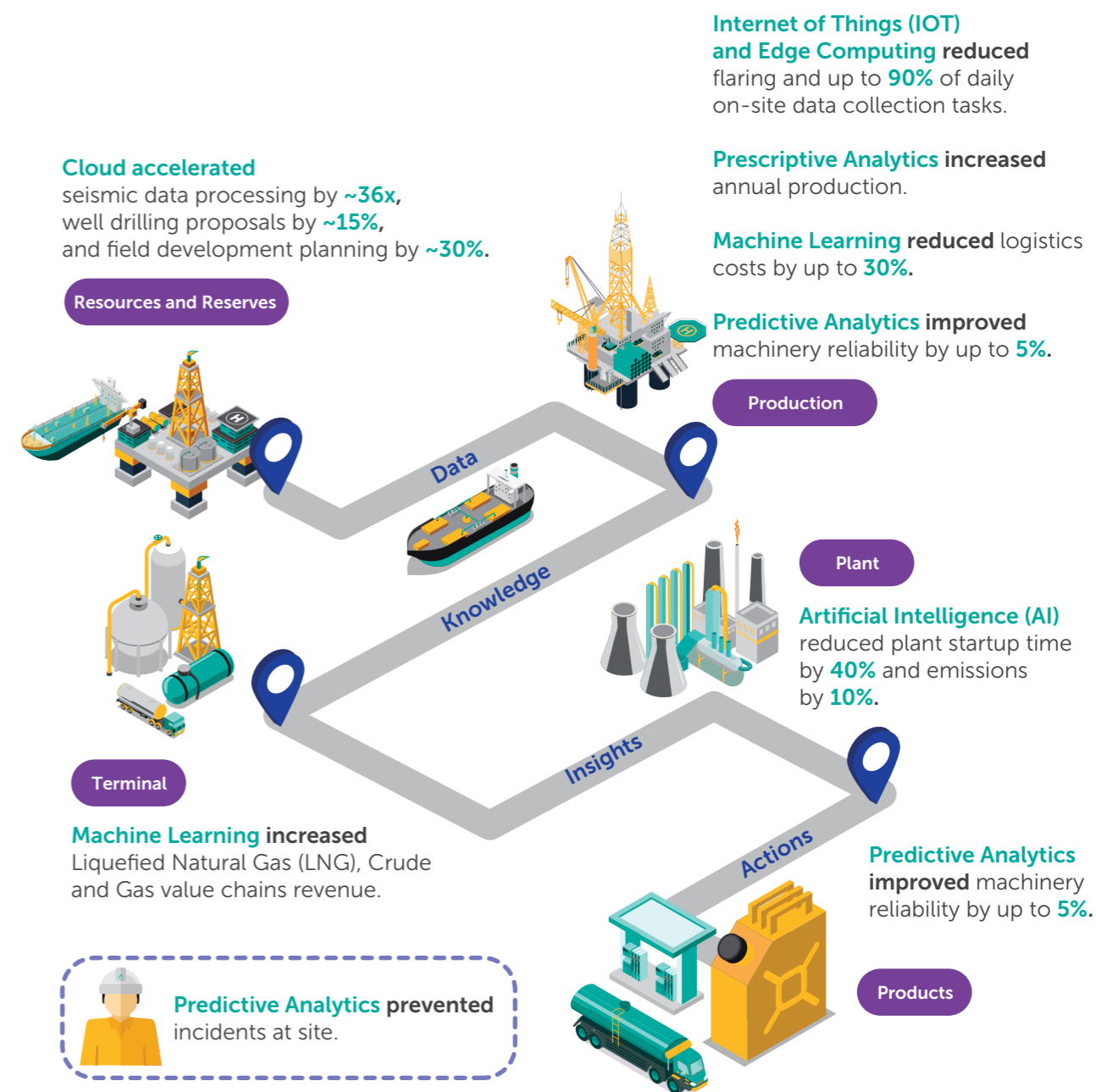
**Data and Knowledge**  
Right strategies, governance and architecture frameworks, standards, processes as well as programmes to enable PETRONAS towards a Data Driven Organisation.

**Enterprise Collaboration**  
Streamlined business processes and practices across the Group that brings considerable value to the business via collaboration platforms such as M365 and ERP.

**Network and Connectivity**  
Connected digital and IT assets in a secure and high available manner, leveraging on our domestic and global network infrastructure.

**Cloud**  
Access advanced technologies, near limitless scalability, improved cyber security posture and user experience through the journey to cloud.

## PETRONAS as a Digitally-Enabled Organisation



**Setel**

Digital Experience Platforms deliver frictionless customer experience.

Customers

**PETRONAS myPR data**

Cloud liberated **~1Pb** of Malaysia E&P data for Malaysia Bid Round (MBR).

Cyber Security      Cloud      Applications and Network reliability



## Staying Ahead with Digital and ICT

STEAR is a full suite logistics solutions platform that leverages on 21st century technology to design and optimise the logistics operations and costs of offshore vessels. It will play a key role in supporting offshore exploration, production and development, while helping to decarbonise logistics operations.

STEAR is an innovative solution provider that addresses logistics business needs across the value chain.

Its goal is to optimise logistics spend, reduce carbon footprint and enhance operations efficiency.



Past results include the following:

Lower fuel consumption

Lower cargo transfer time

Improved mooring buoy utilisation



## Transforming the logistics industry experience to be **Leaner, Cleaner and Better**



Aggregation of demand across users enabled by early reservation incentives and transparency of 30-day horizon.



Routing and scheduling including optimisation recommendations on fleet size, routes and schedules whilst adapting to dynamic changes and business needs.



Voyage monitoring with predictive alerts on vessel deviation with tactical intervention to query and record causes of deviation and vessel activity.



Identifying improvement opportunities across logistics partners based on performance, KPIs and vessel analytics.



# Contracts Outlook





# Contracts Outlook

The outlook comprises the following contracts:

**Pan-Malaysia contracts**  
Joint contracts among PACs in Malaysia for similar scopes of services and material.

**Integrated Downstream contracts**  
Joint contracts among PETRONAS' Downstream OPU for similar scopes of services and material.

**Integrated Upstream and Downstream contracts**  
Joint contracts among PETRONAS' OPU 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 2022-2024, this will 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. With that, industry players will have sufficient time to offer proposals to PETRONAS.

Details of the contracts are based on data as at November 2022.



## A - Subsurface

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b>						
Slickline	2022	[Bar chart showing duration from 2022 to mid-2023]				
Tubular Handling, Conductor Installation and Slot Recovery	2022	[Bar chart showing duration from 2022 to early 2024]				
Well Testing and Tubing Conveyed Perforations (TCP)	2022	[Bar chart showing duration from 2022 to early 2024]				
Drill Bits (Rock/PDC) and Hole Enlargement Tools	2022	[Bar chart showing duration from 2022 to mid-2023]				
Mudlogging	2017	[Bar chart showing duration from 2017 to early 2023]				
Cementing and Downhole Tools	2018	[Bar chart showing duration from 2018 to early 2023]				
Drilling Fluids	2018	[Bar chart showing duration from 2018 to early 2023]				
Deepwater Subsea Wellhead Equipment, Tools and Services	2019	[Bar chart showing duration from 2019 to early 2024]				
Directional Drilling (DD)/Measurement While Drilling (MWD)/Logging While Drilling (LWD)	2020	[Bar chart showing duration from 2020 to early 2024]				
Fishing Equipment and Services	2020	[Bar chart showing duration from 2020 to early 2025]				
Liner Hanger	2022	[Bar chart showing duration from 2022 to mid-2023]				
Well Completion Pan Malaysia	2022	[Bar chart showing duration from 2022 to early 2026]				
Integrated Well Services (IWS)	2020	[Bar chart showing duration from 2020 to early 2024]				
<b>Individual - Upstream</b>						
Wellhead Maintenance Services	2021	[Bar chart showing duration from 2021 to early 2024]				
Surface Controlled Subsurface Safety Valve System Rectification, Maintenance and Services	2022	[Bar chart showing duration from 2022 to early 2025]				
Geophysical, Geomatics, HSE and Technical Auditor Consultancy Services	2021	[Bar chart showing duration from 2021 to early 2024]				
Drilling Tools, Well Test Tubular and Accessories Rental	2022	[Bar chart showing duration from 2022 to mid-2023]				
Surface Sand Management	2019	[Bar chart showing duration from 2019 to early 2023]				
Gas Lift Valves (GLV) and Insert Strings Equipment, Accessories and Services	2019	[Bar chart showing duration from 2019 to early 2023]				
Sand Control	2022	[Bar chart showing duration from 2022 to early 2026]				
Marine Site Investigation Survey	2020	[Bar chart showing duration from 2020 to early 2023]				
Offshore Surveying and Positioning Services	2020	[Bar chart showing duration from 2020 to early 2023]				
Metal Expandable Packer (MEP) for Annular Barrier Equipment	2019	[Bar chart showing duration from 2019 to early 2023]				
Tender Assisted Drilling Rig	2021	[Bar chart showing duration from 2021 to early 2023]				
Jack up - Call out	2022	[Bar chart showing duration from 2022 to early 2024]				
Intelligent Circulation While Drilling Tool (iCWD)	2020	[Bar chart showing duration from 2020 to early 2023]				
Electric Wireline Effective Date	2021	[Bar chart showing duration from 2021 to early 2024]				
Core Analysis	2022	[Bar chart showing duration from 2022 to early 2025]				
Processing/Reprocessing	2021	[Bar chart showing duration from 2021 to early 2026]				



## B - Engineering, Construction and Projects

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b> Engineering, Procurement and Construction (EPC) of Fixed Offshore Structure	2018	[Bar spanning 2022-2025]				
<b>Integrated Upstream and Downstream</b> Engineering Services (Major)	2019	[Bar spanning 2022-2023]				
Engineering Services (Minor)	2013	[Bar spanning 2022-2023]				
<b>Individual - Upstream</b> Marine Warranty Survey and Technical Services for Offshore Facilities	2020	[Bar spanning 2022-2023]				
Integrated Hook-Up and Commissioning (HUC)	2020	[Bar spanning 2022-2026]				

## C - Equipment and Material

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b> Mechanical Rotating Equipment Services and Parts	2019	[Bar in 2022]				
<b>Integrated Upstream and Downstream</b> Maintenance and Services of HV/LV Motor and Alternator	2018	[Bar spanning 2022-2023]				
Instrument Maintenance and Services	2019	[Bar spanning 2022-2023]				
Heat Exchanger, Pressure Vessel and Utility Tank Maintenance	2019	[Bar spanning 2022-2023]				
Centrifugal and Reciprocating Type Gas Compressors	2019	[Bar spanning 2022-2025]				
General Electrical Equipment Services	2020	[Bar spanning 2022-2026]				
<b>Integrated Downstream</b> Repair and Refurbishment of Mechanical Seal	2020	[Bar spanning 2022-2023]				
Critical Flange Management Services	2019	[Bar spanning 2022-2025]				
Supply of Gaskets	2019	[Bar spanning 2022-2025]				
Maintenance for Switchgear and Transformer	2021	[Bar spanning 2022-2026]				
<b>Individual - Upstream</b> Pressure Relief Device Maintenance Services	2019	[Bar in 2022]				
Reciprocating Engine and Compressor Maintenance	2019	[Bar in 2022]				
Material Disposal Services	2019	[Bar in 2022]				
Valve Maintenance Services	2020	[Bar spanning 2022-2023]				

Notes:

- In contract [Bar]
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas.
- The list excludes OEM supplied item contracts.



## D - General Facilities Maintenance

## D - General Facilities Maintenance

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b>						
Inspection and Corrosion Monitoring Services (ICMS)	2018	■	■			
Underwater Services	2018	■	■			
Maintenance, Construction and Modification (PM-MCM)	2018	■	■			
Pipeline In-line Inspection Services	2022	■	■	■	■	■
<b>Integrated Upstream and Downstream</b>						
Pressurised Welding Habitat Services	2021	■	■	■		
Maintenance Services for Single Point Mooring (SPM) and Supply of Marine Hoses	2020	■	■	■		
Integrated Civil, Steel Structure and Building Maintenance	2020	■	■	■		
Online Leak Sealing Services	2021	■	■	■		
Integrated Turnaround Main Mechanical and Maintenance Mechanical Static	2019	■	■	■		
Atmospheric Storage Tank Maintenance Services	2022	■	■	■	■	■
<b>Integrated Downstream</b>						
Civil Maintenance Work for Process and Non-Process Area	2020	■	■			
Fire and Gas Maintenance Services	2020	■	■			
Support Services for Turnaround, Shutdown, Catalyst Change	2021	■	■	■		
Mechanical Pipelines Maintenance	2019	■	■	■		
<b>Individual - Upstream</b>						
Maintenance, Construction and Modification (OnMCM)	2018	■	■	■		
Marine Operations and Maintenance for Floating LNG	2019	■	■	■		
Integrity and Fitness for Service (FFS) Assessment of Pipelines	2019	■	■			
Pipeline Isolation Services	2019	■	■			
Maintenance, Construction and Modification (OffMCM)	2017	■	■	■		
Soil Investigation Services - Offshore	2021	■	■	■		
Living Quarters (LQ) and Modularised Offshore Buildings Maintenance and Fire Rated Doors (FRD)	2020	■	■	■	■	
Operational Pigging Services	2021	■	■	■	■	■
Alternative Blasting and Painting	2021	■	■	■		
Onshore Surveying and Positioning Services to check on ACV	2019	■	■	■		
Remotely Operated Vehicle (ROV)	2021	■	■			
Single Point Mooring (SPM) Refurbishment Work	2022	■	■	■	■	■
Splash Zone Structural Repair and Maintenance	2022	■	■	■		

Contract	Start	2022	2023	2024	2025	2026
<b>Individual - Downstream</b>						
General Maintenance Work at PETRONAS Stations	2019	■	■	■		
Fabricate and Reconditioning of LPG Cylinder and Supply of LPG Compact Valves	2019	■	■	■		
Requalification and Shot-Blast Repainting of LPG Cylinder	2019	■	■	■		
Civil Works Maintenance for Gas Pipeline	2022	■	■	■		
Main Cryogenic Heat Exchanger (MCHE) Repair	2019	■	■	■	■	
Refractory Inspection and Repair	2019	■	■	■	■	■
Repainting of LPG Cylinders	2018	■	■	■		
Inspection and Servicing Electrical Works at PETRONAS Stations	2020	■	■			
Facilities Maintenance, Associated Works and Bush Control	2020	■	■			
Maintenance of Fuel Dispenser, Accessories and Equipment for PETRONAS Stations	2020	■	■	■		
Overall Upgrading, Renovation and Decommissioning of PETRONAS Stations	2020	■	■	■		
Minor Geohazard Maintenance	2021	■	■			

Notes:

- In contract ■
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas.
- The list excludes OEM supplied item contracts.



## E - Chemicals

Contract	Start	2022	2023	2024	2025	2026
<b>Integrated Upstream</b>						
Chemical Treatment and Chemical Cleaning Services	2021	■				
Supply of Production Chemicals	2017	■				
<b>Integrated Downstream</b>						
Supply of Chloralkali	2018	■				
Supply of Sulphuric Acid	2018	■				
Supply of Caustic Soda	2019	■				
Supply of Ceramic Balls	2022	■	■	■	■	■
<b>Individual - Downstream</b>						
Catalyst and Adsorbent Change Out	2020	■				
Supply of Di-Iso Propanol Amine (DIPA) and Sulfolane	2020	■	■			
Integrated Flushing and Passivation Services for Boiler Feedwater and Cooling Water Systems	2018	■	■			

## F - Indirect Category

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b>						
Comprehensive Integrated Medical Services	2020	■				
<b>Integrated Upstream and Downstream</b>						
Flame Resistant Coverall and Headscarf	2019	■	■			
Environmental Monitoring and Analysis	2018	■				
Manpower Supply Services	2019	■	■			
Third-Party Professional and Support Services	2021	■	■	■		
Manpower Supply Turnaround Centralised Services	2021	■	■	■		
Talent Acquisition Services	2020	■	■			
Supply of Executive Non-Technical Manpower for PETRONAS	2018	■	■			
Provision of Technical Support Services	2020	■				
Immigration Services	2020	■	■	■	■	
Global Mobility Services	2020	■	■	■	■	
Environmental Impact Assessment	2019	■				
Media Advertising Services	2020	■	■			
Travel Management Agency Services	2020	■	■	■		
Digital Communication Agency Services for Website Development	2022	■	■	■	■	■
Above-The-Line (ATL) Creative Advertising Services	2018	■	■			
Below-the-Line (BTL) Creative Advertising Services	2019	■	■			
Brand Measurement	2022	■	■			
Brand Services	2022	■	■			
<b>Integrated Downstream</b>						
Pest Control Management	2020	■	■			
<b>Individual - Upstream</b>						
H <sub>2</sub> S Safety Equipment and Services	2019	■	■	■		
Quality Assurance / Quality Control and Inspection Services	2019	■	■	■		
<b>Individual - Downstream</b>						
Associated Services for Bagged Urea	2018	■	■	■		
Janitorial Services for Malaysia LNG	2019	■	■	■		
Supply of New Empty Steel Drum	2019	■	■	■		
Printing and Delivery of Promotional Materials	2020	■				
Vehicle Leasing for Onshore Plants	2020	■	■	■	■	

Notes:

- In contract ■
- The final procurement approach may change to fit PETRONAS' overall strategy.
- This list includes contracts for Gas
- The list excludes OEM supplied item contracts.

## G - Logistics and Warehousing

Contract	Start	2022	2023	2024	2025	2026
<b>Pan Malaysia</b>						
Offshore Support Vessels for PACs' Production Operations	2018	█				
OSV Services for Drilling and Project Activities	2019	█				
<b>Integrated Downstream</b>						
Intra-Plant Transportation and Related Services	2017	█				
<b>Individual - Upstream</b>						
Vessel Tracking System (VTS)	2019	█				
Marine Services and Marine Related Activities	2022		█			
Offshore Support Vessel and Rig Tank Cleaning Services	2021	█				
<b>Individual - Downstream</b>						
Transportation Services for Bulk Petroleum Products	2019	█				

## H - Digital and ICT

Contract	Start	2022	2023	2024	2025	2026
<b>Integrated Upstream and Downstream</b>						
Supply of Digital Microwave Radio and Auxilliary Services	2020	█				
Supply and Services of Desktop, Notebook and High-end Workstations	2018	█				
Intrinsically Safe Smart Devices	2018	█				
Access Control System (ACS)	2020	█				
Audio Visual Equipment and its Peripherals	2022	█				
Supply, Delivery, Installation, Testing, Commissioning, Maintenance and Support Services for Intel-Based Servers (IBS)	2019	█				
Uninterruptible Power Supply (UPS) and Smart Cabinet	2022	█				
Very Small Aperture Terminal (VSAT)	2021	█				
International Data Communication Link (IDCL)	2020	█				
Private Long Term Evaluation	2021	█				
Aspen Software Suites and its Associated Professional Services	2017	█				
Procurement Backbone Solution and Software License Subscription	2018	█				
Security Information and Event Management (SIEM), Threat Intelligence (TI) And Security Orchestration for Automated Respond (SOAR)	2019	█				
ICT Shared Services (SSC) Programme	2018	█				
Cyber Security IGA Managed Services and Application Onboarding Factory	2022	█				
IO Digital Capabilities for Integrated Operations (IO)	2021	█				
CLOUD Migration	2021	█				
Central Finance Implementation (CFIN)	2021	█				
PA Cyber Security Risk Skillsets	2022	█				
Data Engineering Professional Service	2020	█				
Professional Services for Software Engineering Works	2020	█				
<b>Individual - Upstream</b>						
Wells Real Time Center Services	2019	█				





# List of Abbreviations

Abbreviations used in the report

Definition	Used for
A2F	Access to Financing
AHTS	Anchor Handling Tug Supply
AI	Artificial Intelligence
CAPEX	Capital Expenditure
CCS	Carbon Capture and Storage
CO <sub>2</sub>	Carbon Dioxide
COVID-19	2019 novel coronavirus (or 2019-nCoV)
CPP	Central Processing Platform
CRA	Corrosion Resistant Alloy
DD	Directional Drilling
DSV	Diving Support Vessel
DTN	National Energy Policy 2022-2040
EoS	Economies of Scale
EPCIC	Engineering, Procurement, Construction, Installation and Commissioning
ESG	Environmental, Social and Governance
EV	Electric Vehicle
FCB	Fast Crew Boat
FPS	Floating Production Systems
FPSO	Floating Production Storage and Offloading
FSO	Floating Storage and Offloading
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GITA	Green Investment Tax Allowance

Definition	Used for
GITE	Green Income Tax Exemption
GLV	Gas Lift Valves
GPV	General Purpose Vessel
GTFS	Green Technology Financing Scheme
HTG	High Technology and Green Facility
HUC	Hook-Up and Commissioning
HWU	Hydraulic Workover Unit
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
JIP33	Joint Industry Programme 33
JUR	Jack-Up Rig
LCT	Landing Craft Tank
LCTF	Low Carbon Transition Facility
LNG	Liquefied Natural Gas
LT-LEDS	Long Term – Low Emissions Development Strategies
LWD	Logging While Drilling
MCM	Offshore Maintenance, Construction and Modification
MIC	Microbial Influenced Corrosion
MOPU	Mobile Offshore Production Unit
MPRC	Malaysia Petroleum Resources Corporation
MTJDA	Malaysia-Thailand Joint Development Area
MWD	Measurement While Drilling
NDT	Non-Destructive Testing
NZCE 2050	Net Zero Carbon Emissions by 2050

# Glossary

Industry terms used in the report

Definition	Used for
OCTG	Oil Country Tubular Goods
OGSE	Oil and Gas Services and Equipment
OPEC	Organization of the Petroleum Exporting Countries
OSV	Offshore Support Vessel
PAC	Petroleum Arrangements Contractor
PMoF	Project Management of the Future
PPP	Purchasing power parity
PSV	Platform Supply Vessel
R2B	Road To Bursa
ROV	Remotely Operated Vehicles
SAF	Sustainable Aviation Fuel
SBV	Standby Vessel
SSV	Straight Support Vessel
SURF	Subsea Umbilical, Riser and Flowline
TADR	Tender Assisted Drilling Rigs
USD	United States dollar
UV	Utility Vessel
VaaS	Vehicle-as-a-Service
VDP	Vendors Development Programme
VFP	Vendor Financing Programme

Definition	Used for
Artificial Intelligence	The simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.
Barrel	A standard unit of measurement for oil production. One Barrel contains 159 litres of oil.
Brent prices	The benchmark crude oil price in Europe, as traded on International Petroleum Exchange in London.
Brownfield	Field that has been previously developed and has reached its peak oil/gas production level.
Carbon neutrality	A state of net-zero carbon dioxide emissions. This can be achieved by balancing emissions of carbon dioxide with its removal (often through carbon offsetting) or by eliminating emissions from society (the transition to the "post-carbon economy").
Catalyst	One that precipitates a process or event, especially without being involved in or changed by the consequences.
Clean energy	Clean energy is energy gained from sources that do not release air pollutants, while green energy is energy derived from natural sources.
Decarbonise	To reduce the levels of carbon emissions (such as carbon dioxide) caused by or involved in (something, such as a facility, process, or organisation).
Energy transition	The energy transition is the ongoing process of replacing fossil fuels with low carbon energy sources.
Geopolitical	Geopolitics is the study of the effects of earth's geography on politics and international relations.
Greenfield	Field that has proven oil/gas reserves but has never been developed.



# Glossary

Industry terms used in the report (continued)

Definition	Used for
High Technology and Green Facility	Facility to help SMEs and innovative start-ups to grow their businesses and invest in strategic sectors and technologies fields (digital tech, green tech and biotech) for a sustainable and entrenched economic recovery.
Hydrogen	Hydrogen is a clean alternative to methane, also known as natural gas. It is the most abundant chemical element, estimated to contribute 75 per cent of the mass of the universe.
Liquefied Natural Gas	Natural gas that is liquefied under extremely cold temperatures of about minus 260 degrees Fahrenheit to facilitate storage or transportation in specially designed vessels.
Long-Term Low Emissions Development Strategies	A crucial policy tool that can help to place short-term actions in the context of the long-term structural changes required to transition to a low-carbon, resilient economy by 2050.
Low Carbon Transition Facility	Facility to support Small and Medium Enterprises (SMEs) that embark on a specific project and committed towards transforming their business operations into more sustainable and low carbon business practices.
Machine Learning	The scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence.
Natural gas	Natural gas (also called fossil gas or simply gas) is a naturally occurring mixture of gaseous hydrocarbons consisting primarily of methane in addition to various smaller amounts of other higher alkanes.
Petrochemical	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.
Renewable energy	Renewable energy is energy that is generated from natural processes that are continuously replenished.
Sustainable Aviation Fuel	A biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint.

Unit	Definition	Used for
bbl	One stock tank barrel, of 42 U.S. gallons liquid volume, used in reference to crude oil, bitumen, condensate or natural gas liquids	Volume
DC	Direct Current	Electricity
GW	Gigawatt	Power
GWp	Gigawatt peak	Power
hr	Hour	Time
km	Kilometre	Distance
MMscfd	Million metric standard cubic feet per day	Production Rate
MT	Metric tonne	Weight
MtCO <sub>2e</sub>	Million tonnes of Carbon Dioxide equivalent	Weight
mtpa	Million tonnes per annum	Capacity
MW	Mega watt	Electricity
MWp	Megawatt peak	Power

# Frequently Asked Questions (FAQs)

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

The outlook provided is based on activities per year and not on 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.

## 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 What is the outlook for crude oil prices in the long term and what does energy transition mean for the oil and gas market?

Long-term price outlooks point to a moderation from the current elevated prices as an acceleration in energy transition which means efficiency improvements and a shift away from fossil fuels. A conservative price outlook should translate into more robust strategies for the oil and gas sector in facing the changing energy landscape.

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

The intent of this outlook is to provide a general direction for the industry and be sufficient for players to make their high-level planning. We recommend players to also refer to other sources of data/information to complement their decision making.

## 5 How does this report benefit the smaller players in the oil and gas industry? WHP, CPP and rigs information are primarily for larger players.

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.

## 6 How does this report support the current trends of sustainability in the oil and gas industry?

This report provides insights of the current trends and challenges which will motivate the industry players to adapt and embrace the new normal by continue working together in addressing the current challenges and collaborate towards workable and mutually beneficial solutions to maintain its resiliency and agility and demonstrate strong commitment towards sustainability.

## 7 What is PETRONAS' aspiration towards sustainability?

PETRONAS declared its net zero carbon emissions by 2050 aspiration in 2020, and subsequently announced its Net Zero Carbon Emissions by 2050 (NZCE 2050) pathway in November 2022 that demonstrates its unwavering commitment to steer the energy transition and support Malaysia's agenda in reducing its carbon intensity. Through this aspiration, PETRONAS aims to deliver energy solutions by creating new and inclusive opportunities with its industry players to be on-board and provide innovative solutions that contribute positively to society and the environment.

## 8 Is this a one-off exercise or a regular effort?

This report is part of PETRONAS' effort to increase engagement with the OGSE sector. We endeavour to provide this report on an annual basis.





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