



# PETRONAS

## Activity Outlook 2025-2027



Passionate about Progress

## Cover Rationale

# Transforming Today for a Sustainable Tomorrow

The cover design tells the story of PETRONAS' business journey, charting its path in delivering more energy with less emissions, while also pursuing high-value, lower carbon new business opportunities towards achieving our Net Zero Carbon Emissions by 2050 aspiration. In capturing the essence of the theme, 'Transforming Today for a Sustainable Tomorrow', the cover design depicts PETRONAS' efforts and initiatives in progressing towards energy transition.

The layered circle motif enhances the design with depth and dimension, representing progress and innovation as the driving forces of this journey, reflecting PETRONAS' brand belief of being 'Passionate about Progress'.



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# About This Report

Dear Stakeholder,

Welcome to the PETRONAS Activity Outlook 2025 report. This report provides insights into industry trends, demand outlook and PETRONAS' forecasted activities for the next three years covering Upstream, Downstream, Gas and Maritime and Clean Energy businesses. The report is part of PETRONAS' efforts to engage the Oil and Gas Services and Equipment (OGSE) sector in sustaining a resilient ecosystem.

## Objective and scope

The intent of this report is to provide directions for industry players to develop respective high-level plans. It is recommended that industry players also refer to additional sources of data or information for comprehensive decision-making. The scope of reporting is as follows:

- Encompasses all operations and activities within PETRONAS and its subsidiaries (PETRONAS Group), and other Petroleum Arrangement Contractors (PACs) from 1 January 2025 to 31 December 2027 (unless specified otherwise).
- The outlook provided is based on activities for the year, and not on tender issuance or contract awards. 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.
- The data provided is based on the projection of activities with base scenarios indicating the project milestones at the time of release. Changes are expected in response to market dynamics and operational requirements.
- Includes a list of associated services, which may benefit smaller players.

## Forward-looking statements

This report was developed based on currently available information from internal and external sources. PETRONAS believes the predictions of its Management as reflected by such forward-looking statements are reasonable, based on information currently available to it. PETRONAS makes no representation on the accuracy or completeness of any information provided in this report and expressly disclaims any liability whatsoever arising from, or in reliance upon, the whole or any part of its contents.

This report contains forward-looking statements with words such as "believe", "anticipate", "intend", "seek", "will", "plan", "could", "may", "endeavour" and similar expressions used to represent our judgement and future expectations. These statements involve risk and uncertainty because they relate to future events and circumstances and should be considered in light of the various important factors. 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, that is stated only as of the date they were issued. Images are for illustrative purposes only and does not accurately represent a real technical workflow. They are visual aids intended for conceptual understanding and does not reflect specific technical details or procedures.

## Agreement

To optimise the benefits from the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), PETRONAS needs to be strategic in deciding categories or areas to attract foreign participation for competitiveness, and likewise to prioritise for local players in achieving meaningful participation. This will require support from all parties, including the OGSE sector and the greater ecosystem.

## Other information

For more information on PETRONAS, refer to the **PETRONAS Integrated Report 2023**. Please scan:



# From the Desk of Vice President, Group Procurement



Dear Esteemed Stakeholders,

We are pleased to bring you this year's edition of the PETRONAS Activity Outlook, covering insights on the industry and demand outlook from 2025 to 2027. This report is an important resource that provides insights and strategic guidance, helping our partners make informed decisions to remain competitive in the industry.

As PETRONAS celebrates 50 years, our industry's growth has been driven by the collaboration with our industry partners. Together, we have embraced opportunities, tackled challenges, and propelled our industry forward. We deeply appreciate your continued support and partnership, which have been instrumental in our industry's success. As we look ahead, it is imperative that we continue this collaborative spirit for the next 50 years, ensuring sustained innovation and progress.

## Agility is crucial for sustainability and growth.

We must adapt swiftly to changing market demands, harnessing digital transformation to optimise performance, enhance safety and reduce our environmental footprint. We need to evolve rapidly to meet the increasing energy demand while prioritising the security of our supply. This can be achieved through streamlined operations, improved operational efficiency and informed decision-making. PETRONAS will continue to support the industry in navigating challenges by producing and delivering energy solutions that power society's progress.

## Fostering collaborations is essential to drive change and innovation.

PETRONAS aspires to see the industry players thrive in supporting the broader Malaysian oil and gas industry. By co-creating solutions and maintaining open communication, we can drive meaningful change and innovation. Additionally, increasing partnerships and leveraging cross-industry experiences, insights and knowledge, will further enhance our capabilities.

## Developing capability and talent is crucial in fostering a competitive and sustainable industry.

A key approach involves continuous efforts to develop local vendors and talents through various curated programmes. These include the Vendor Development Programme (VDP), PETRONAS Supplier Support Programme (PSSP) and the Vocational Institution Sponsorship & Training Assistance (VISTA) programmes, which have increased employment opportunities and improved economic livelihood locally. Furthermore, technology and innovation remain at the forefront of this endeavour. There is an ongoing commitment to propel technology innovation and advancement by enabling strategic platforms.

As Malaysia's national oil company, our role is pivotal in supporting the nation's economic development. Therefore, we invite all of our esteemed partners to join us in this journey towards a sustainable and prosperous future. By working together, we can overcome the challenges ahead and build a stronger, more sustainable industry. We look forward to your continued support and partnership.

## Rashidah Alias

Vice President,  
Group Procurement



# Industry Overview

# 03



# Industry Overview

The global economy is set to grow as interest rates ease from decades-high levels, though high rates in the past few years are slowing growth in both developed and emerging markets. Global GDP growth is expected to moderate to 3.2 per cent in 2024, a slight decline from 3.3 per cent in 2023, before improving to 3.3 per cent in 2025, according to the IMF's July 2024 World Economic Outlook. Risks include China's slowing growth, which could erode consumer confidence and fuel consumption.

Oil prices are forecasted to stay between USD70-USD80 per barrel long-term, but volatility will rise

due to geopolitical conflicts disrupting trade routes, adding to transportation and insurance costs of shippers. Elevated costs across the oil supply chain persist due to disruptions since the pandemic.

OPEC+ remains influential, controlling over 40 per cent of global production. While the alliance continues to manage the oil market, there is concern that demand is weak amid elevated interest rates, heightened trade tension and geopolitical turmoil.

Gas demand is increasingly dependent on sudden weather changes, with cold snaps or heatwaves causing LNG price spikes. While LNG prices are

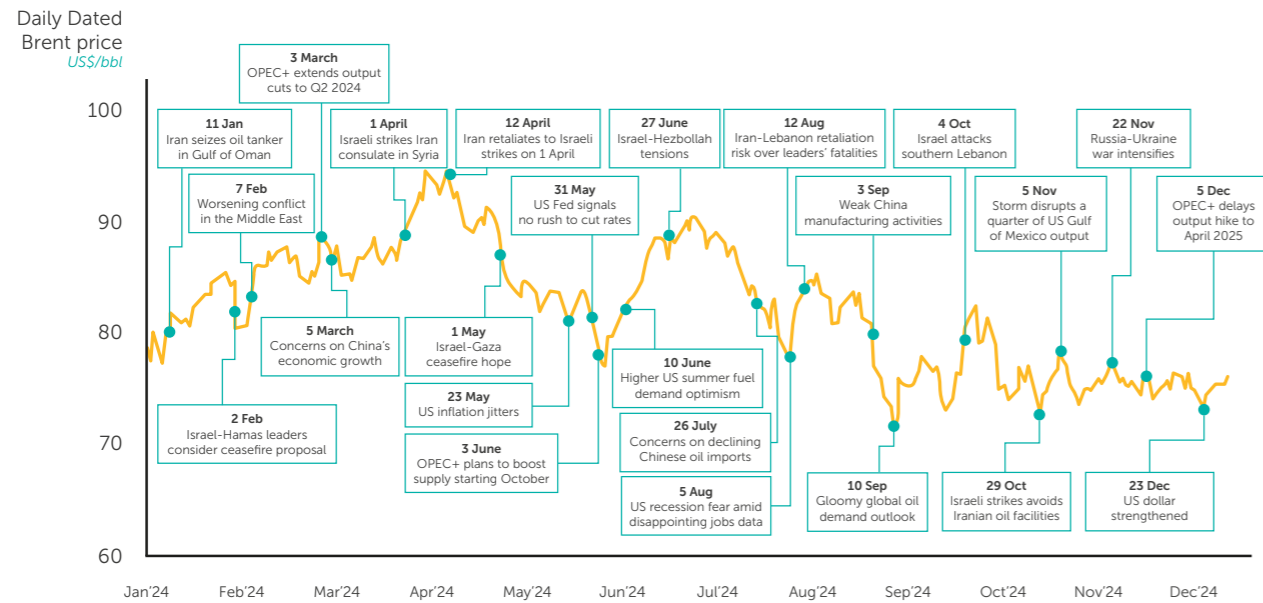
expected to stay high, the market will see more supply from the US and Qatar by 2025-2026. Long-term, natural gas demand is projected to outpace oil as emerging markets use it due to its lower carbon content as compared to oil. By 2050, under some scenarios, oil and gas could still make up over two-thirds of the primary energy mix, necessitating more exploration despite constrained spending due to investment in decarbonisation and obligation to shareholders.

In the downstream sector, weak refining margins are expected due to sluggish economic conditions, especially in China. An influx of refining capacity, led by China, Africa and the Middle East combined with weak domestic demand in these regions, lead to exports flooding global markets. As climate targets are tightened, refiners are increasingly pivoting to bio-based substitutes in their production of petrochemical products.

Electrified transport has seen the largest green investment in 2023 as it approaches critical mass in many regions, which will erode growth in diesel and gasoline sales used in transport. Electric vehicles (EVs) made up 17 per cent of global new vehicle sales in 2023, with projections by BloombergNEF and the International Energy Agency suggesting this could exceed 60 per cent by 2050. Meanwhile, the price of lithium-ion batteries has fallen by about 90 per cent over the past decade and is expected to keep declining due to economies of scale. However, larger scale adoption will hinge on addressing infrastructure gaps, reducing costs and maintaining consistent policy support to sustain growth as overcapacity looms.

Led by significant expansions in China, renewables surpassed 30 per cent of global electricity generation, driven primarily by rapid growth in solar and wind power despite coal and natural gas still dominating the power sector. In 2023, solar and wind power combined added more new energy capacity than fossil fuels. As nations commit to tripling renewable energy capacity and doubling energy efficiency by 2030 at COP28, these efforts must be paired with energy storage and grid modernisation solutions to address the intermittency challenges of renewable power.

Energy security remains central amid geopolitical and climate-related challenges. Nations are diversifying energy sources as supply chain vulnerabilities and infrastructure bottlenecks pose risks to energy security. As the world accelerates its transition to cleaner sources of energy, reliable, uninterrupted energy supply is required to meet growing demand and safeguard economic interest.



Source: PETRONAS Strategic Research Internal Analysis

# PETRONAS Overview

# 04





# PETRONAS Overview

Petroleum Nasional Berhad (PETRONAS) is a global energy and solutions company committed to produce and deliver energy solutions that contribute towards addressing growing energy needs responsibly and sustainably. Established in 1974 as Malaysia's national oil company to manage and develop the country's hydrocarbon resources, PETRONAS has a presence in over 100 countries and is ranked amongst the largest corporations on Fortune Global 500®.

The group continues expanding its portfolios including conventional and cleaner energy solutions, and a diverse range of fuel, lubricants and petrochemical products, to meet the growing and evolving needs in the face of energy transition. While ensuring sustainable practices across its operations, PETRONAS strives to become a valuable partner in the transition towards a lower-carbon future through efforts to ensure just and equitable outcomes.

## Growing value with our integrated business portfolio



Presence in over

**100 countries**



**Ranked 1<sup>st</sup>**

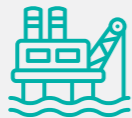
Most Valuable ASEAN Brand\*



Over

**50,000 employees**

globally



**Top 10**

Most Valuable Oil and Gas Brand\*



**Ranked 167<sup>th</sup>**

on Fortune Global 500

\*Brand Finance annual ranking for 2024

## Our main business coverage



### Upstream Business

The upstream business is responsible for exploring and developing hydrocarbon resources, as well as operating oil and gas production assets both within Malaysia and internationally across more than 20 countries. Through Malaysia Petroleum Management (MPM), PETRONAS oversees and directs the development of petroleum resources for the nation.



### Gas and Maritime Business

The gas and maritime business stands as a one-stop centre for lower-carbon energy and maritime solutions, offering a comprehensive range of natural gas solutions both in Malaysia and abroad.



### Downstream Business

The downstream business processes and converts resources into products for over 100 global markets. The operations include refining, marketing, and trading crude oil and petroleum products, as well as manufacturing and marketing petrochemicals, derivatives, and specialty chemicals.



### Clean Energy Solutions

Gentari Sdn Bhd (Gentari) is PETRONAS' subsidiary that aims to accelerate the adoption and commercialisation of clean energy and seize opportunities in the evolving energy landscape.

# In the Spotlight

# 05



# Synergy in Energy: Advancing Malaysia's Oil and Gas Ecosystem Through Collaboration

As nations worldwide accelerate efforts to achieve net zero ambitions, maintaining the delicate balance between energy transition and energy security has become critical. Our nation's journey of energy transition and energy security is guided by the Responsible Transition Pathway under the National Energy Transition Roadmap (NETR). With Total Primary Energy Supply (TPES) projected to grow from 95 million tonnes of oil equivalent (Mtoe) in 2023 to 102 Mtoe by 2050, natural gas is set to play a pivotal role as a transition fuel, increasing from 43 per cent to 56 per cent of TPES. Simultaneously, the share of renewables in the energy mix is anticipated to grow from four per cent to 17 per cent of TPES.

The oil and gas industry plays an essential role in these ambitions, ensuring stable energy production while advancing Malaysia's net zero commitments. This is consistent with PETRONAS' pathway to achieving Net Zero Carbon Emissions (NZCE) by 2050, focusing on initiatives such as eliminating routine flaring and venting, electrifying operations, improving energy efficiency, and developing carbon capture and storage (CCS) solutions to reduce greenhouse gas (GHG) emissions.

Pursuing this national ambition extends beyond the efforts of PETRONAS alone. It requires a concerted collaboration involving the entire OGSE ecosystem such as stakeholders, financial institutions and investors. As the backbone of the nation's oil and gas industry, the OGSE sector is instrumental in sustaining Malaysia's production target of 2,000 kilo barrels of oil equivalent per day (kBOE/D), providing workforce and executing critical projects on the ground.

Despite its importance, the OGSE sector recorded negative Profit Before Tax (PBT) in three of the five years from 2018 to 2022, as highlighted in the OGSE 100 report by Malaysia Petroleum Resources Corporation (MPRC). This demonstrates the sector's vulnerability to market volatility and external shocks. Addressing these challenges calls for synergy within the OGSE sector, coupled with collaboration among stakeholders focusing on innovation, sustainability, human capital development and financial resilience. Strengthening the sector's resiliency, competence, and competitiveness is crucial to support Malaysia's net zero journey effectively.

## Collaboration as catalyst for progress

Collaboration has driven the success of Malaysia's oil and gas industry, significantly contributing to 24.1 per cent of national income or 4.2 per cent as percentage of Gross Domestic Product (GDP) in 2023. Over the years, the cooperation between PETRONAS, Petroleum Arrangement Contractors (PACs), OGSE players and supported by federal and state governments, has established a robust and vibrant industry.

As global energy dynamics shift, collaboration is more critical than ever. Sustainability, innovation and operational efficiency demand a new approach in addressing today's challenges while seizing emerging opportunities. Below, PETRONAS explores key areas where collaboration can catalyse growth and transformation in the sector.

### 1. Accelerating innovation, research and development in line with industry requirements

Malaysia continues to face challenges in research and development (R&D), often lagging global benchmarks due to low investment in R&D of about one per cent to GDP. Apart from that, a recurring issue is the misalignment between academic or research outputs and industry needs, necessitating closer collaboration among ecosystem stakeholders and academia.

Aligning R&D efforts with industry priorities ensure investments deliver worthwhile outcomes and actively contribute to the sector's growth and development.

From the perspective of the OGSE sector, efforts should focus on improving operational efficiency in areas such as asset integrity, contamination management, health, safety, and environment (HSE), and process safety. Additionally, advancing net zero ambitions, such as reducing GHG emissions, integrating renewable energy and adopting sustainable practices are essential in keeping the industry competitive and future-ready. Achieving these goals demand integrated collaboration between academia and industry, ensuring research is driven by practical demands that result in effective solutions tailored to industry needs.

### Did You Know?

PETRONAS FutureTech Accelerator Programme, a 12-week growth accelerator, empowers technology-driven startups through mentorship, workshops, industry immersion, and connections with PETRONAS and corporate partners. In 2023, PETRONAS FutureTech 3.0 selected 10 standout startups aligned with five key themes: Frontier Technology, Sustainability, Future of Industry and Work, Future of Chemicals and Materials, and Future of Energy and Mobility. With over 540 applicants, 30+ graduated startups, and 80+ masterclasses, FutureTech exemplifies PETRONAS' dedication to driving startup growth and transformative technology.

**2. OGSE sector is poised to be the frontrunner in embracing sustainability and unlocking new opportunities**

Collaboration is essential for the OGSE sector to adopt sustainable practices and contribute meaningfully to Malaysia's energy transition. The global focus towards sustainability, and some of the potential policy shift highlighted in Malaysia's 2025 budget, including carbon tax in 2026 and the Carbon Capture, Utilisation, and Storage (CCUS) Bill, emphasise the need for early adoption to maintain market competitiveness and ensure long-term viability for OGSE players.

Disclosure of sustainability practices as well as adopting sustainable technologies, can strengthen OGSE companies' relationships with stakeholders like financial institutions, investors and customers. These measures enhance credibility and position OGSE companies as reliable partners in an increasingly eco-conscious market. Furthermore, demonstrating measurable commitments to sustainability can unlock financial benefits, such as preferential terms on sustainable loans, ultimately fostering resilience and long-term growth for the sector.

**3. Addressing human capital shortages and bridging competency gaps requires whole-of-ecosystem participation**

Whole-of-ecosystem solution is essential to address human capital shortages and bridging competency gaps in the OGSE sector. The misalignment between talent demand (what skills and roles are needed by the industry) and talent supply (availability of pool of talents with needed skills and qualifications) hampers effective workforce planning among the industry players. The lack of such data also challenges educational institutions and Technical and Vocational Education and Training (TVET) centres in determining which programmes to offer and the appropriate capacity, limiting the sector's ability to grow sustainably.

An industry demand-driven human capital development is necessary to enable effective development and rapid deployment that meets industry requirements. Mapping the supply and demand for OGSE human capital is a critical step, as it provides line of sight, enabling PETRONAS, PACs and OGSE companies to strategically manage and optimise manpower requirements. This guides educational institutions to offer relevant and timely programmes. By aligning these elements, capacity and competency gaps can be addressed with greater accuracy, ensuring a steady human capital pipeline to drive the sector's growth.

 **Did You Know?**

On 12 August 2024, PETRONAS launched the PETRONAS Supplier Support Programme (PSSP) in collaboration with the Joint Committee for Climate Change (JC3) Greening Value Chain Programme, Bursa Malaysia, and the UN Global Compact Network Malaysia & Brunei (UNGCMYB). This initiative is designed to equip PETRONAS suppliers with the necessary tools and training, plus facilitate access to financial support needed to adopt and disclose sustainability practices, accelerating their progress in line with the National Energy Transition Roadmap (NETR).

PSSP provides suppliers with access to:

- Environmental, Social, and Governance (ESG) knowledge and capacity building programmes.
- Centralised Sustainability Intelligence (CSI) Platform that assist businesses in measuring, managing and reporting their carbon emissions and sustainability risks.
- Sustainable financing including Bank Negara Malaysia's Low Carbon Transition Facility and High Tech and Green Facility, as well as other transition facilities by other financial institutions.



 **Did You Know?**

PETRONAS has spearheaded and collaborated in several initiatives to address the sector's human capital challenges, ensuring the availability of a competent and future-ready workforce as follows:

**1. Vocational Institution Sponsorship and Training Assistance (VISTA)**

Since 1992, the VISTA programme has supported 35 institutions nationwide, investing over RM90 million to train up to 12,000 graduates. The programme provides infrastructure, training materials, trainers, and industry-aligned curricula to ensure technical courses meet industry standards and produce a competent workforce.

**2. Industry Talent Framework (InTAF)**

Malaysia Petroleum Resources Corporation (MPRC), Malaysian Oil, Gas and Energy Services Council (MOGSC), and PETRONAS initiated this collaboration to bridge talent gaps by consolidating activity-driven demand data, establishing productivity norms, and aligning talent supply pipelines with sector needs. Once operational, this centralised platform will provide a holistic view of talent demand and supply across the entire OGSE value chain which will enable effective and informed decision-making among industry players.

#### 4. Supporting energy transition and energy security goes beyond OGSE sector alone

Collaboration between financial institutions and the OGSE ecosystem is essential for overcoming financing challenges and ensuring the sector's sustainability. This collaboration supports Malaysia's energy transition while balancing the energy trilemma (energy security, affordability and environmental sustainability). By working together, financial institutions can better understand the needs of OGSE companies, help mitigate perceived risks and offer tailored financing solutions that align with industry priorities.

Currently, some OGSE companies face barriers due to lack of understanding of financing requirements, as well as the sector's risks and market volatility. These challenges are further heightened as companies diversify into energy transition activities, such as renewable energy projects, which require specialised funding to adopt sustainable practices effectively.

Therefore, a more collaborative financing ecosystem can streamline access to funding. This includes connecting OGSE players with financial providers, offering clear guidance on application processes, and establishing a centralised information platform to improve accessibility.

In addition, by aligning financing mechanisms with the goals of NETR, these efforts would facilitate the diversification of Malaysia's energy mix and strengthen the OGSE sector's capacity to meet energy security needs and thrive in a sustainable, lower-carbon economy.

### Did You Know?

PETRONAS has initiated efforts to facilitate financing accessibility in collaboration with banks to enhance the financial resilience of OGSE vendors, enabling them to thrive in the competitive oil and gas industry:

#### 1. Vendor Financing Programme (VFP)

Launched in May 2018, VFP has facilitated RM2 billion approved financing value by nine partner banks across 326 applications. PETRONAS facilitates this by providing a verification platform on contracts awarded and performance of contractors.

#### 2. Special OGSE (SOS) Financing Programme

Introduced in September 2022 through partnership with Malaysian Industrial Development Finance (MIDF) Berhad, the

SOS Financing Programme complements the VFP by offering an alternative financing option for vendors with less than five years' of experience with small financing requirements that do not qualify for the VFP. The programme has approved RM65.5 million in financing for 42 applications to date.

#### 3. PETRONAS Supplier Support Programme

This programme provides access to sustainable financing such as Bank Negara Malaysia's Low Carbon Transition Facility and High Tech and Green Facility, as well as other transition facilities by financial institutions, including UOB Malaysia that pledged RM1 billion to finance PETRONAS suppliers' decarbonisation and energy transition journey.



## Shaping Malaysia's future energy landscape together

Creating a resilient and sustainable oil and gas ecosystem in Malaysia relies on the active involvement of OGSE players as key contributors to the industry's transformation. With supportive government policies through initiatives like NETR, and PETRONAS' commitment to sustainability, OGSE players have a significant opportunity to elevate their capabilities and strengthen their role in Malaysia's energy landscape.

Collaboration is critical in these areas, with industry players pooling resources and actively participating in or supporting initiatives led by others. Such efforts enable alignment with industry priorities, bridging competency gaps and adopting technologies that drive operational efficiency and sustainability. By fostering collaboration with local and international stakeholders, the OGSE sector can boost local content, drive innovation and access financing solutions tailored to support both current production needs and energy transition projects.

A well-developed OGSE sector, built on collaboration and forward-looking strategies, is essential for strengthening Malaysia's energy security, resilience and economic growth. Together, these efforts will shape a thriving, competitive and sustainable future for the nation's energy ecosystem.

# Boosting Upstream Sector Competitiveness While Pursuing a Sustainable Future

Malaysia's upstream industry is experiencing a surge of investments with more than 80 per cent of Malaysia's offshore acreage awarded to Petroleum Arrangement Contractors (PACs). The significant investment through these contracts indicates a promising long-term growth in hydrocarbon production, positioning Malaysia as a key player in the global oil and gas sector.

PACs have been instrumental in driving this growth, engaging in a wide range of activities from seismic acquisition and exploration drilling to field development projects. These activities have brought substantial capital investment into Malaysia, further solidifying its attractiveness as a destination for oil and gas ventures. The comprehensive efforts of PACs in exploring and developing new fields have not only boosted production, but also contributed to the overall economic development of Malaysia.

In the ever-evolving landscape of the upstream industry, it is crucial for the Oil and Gas Services and Equipment (OGSE) industry players to prioritise innovation and competitiveness to maintain economic prosperity and relevancy. By developing and implementing innovative solutions, the industry can ensure mutual benefits and contribute to a healthier ecosystem. This approach will not only support the viability of projects but also promote business sustainability for the industry to thrive in a competitive environment.

PETRONAS is committed to achieving net zero carbon emissions by 2050. This ambition underscores the importance of sustainable practices and the adoption of cutting-edge technologies to reduce environmental impact while enhancing operational efficiency. As of 2024, Malaysia's hydrocarbon production stands at 1.7 million barrels of oil equivalent (BOE).

## A propelling outlook

PETRONAS remains steadfast in its target to grow and sustain Malaysia's oil and gas production to two million barrels of oil equivalent per day (MMboe/d). This target will be realised through key projects such as Kasawari, Gumusut-Kakap Redevelopment, Bekok Oil Redevelopment, Tabu Redevelopment and Seligi Redevelopment, amongst others.

The future of the industry depends on the ability to adapt and innovate in response to evolving demands. Collaboration between industry stakeholders and OGSE vendors enables the development of solutions that can enhance competitiveness and efficiency while promoting business sustainability. It has been observed that project costs have continued to escalate while the industry's future hinges on its ability to adapt and innovate, in response to evolving demands for cost competitiveness. If OGSE players are unable to remain competitive, projects will not be viable, resulting in fewer sanctioned projects and reduced work opportunities. Therefore, fostering a closer collaboration between industry stakeholders and OGSE vendors is imperative. This is where solutions can be developed to enhance competitiveness and efficiency while promoting business sustainability towards achieving sustainable ecosystems for all.

For the next two years, approximately 15 exploration wells are forecasted to be drilled each year focusing on shallow water wells and deepwater wells. Apart from wells, exploration activities also include non-seismic, seismic and geological studies which are crucial for de-risking and maturing of prospects. Adoption of the latest technological advancements and innovative solutions by the OGSE sector will significantly enhance the success of the exploration activities.

The next phase for upstream operations is the development phase, where optimum efficiency and cost-effective activities will ensure the successful delivery of projects.

This, in turn, will create a cyclical impact, fostering the development of additional projects that benefit the entire ecosystem. Over the next three years, more than 400 wells are forecasted to be drilled, and 39 upstream projects are expected to be executed. This includes the construction of three offshore Central Processing Platforms (CPPs), three onshore facilities and fabrication and installation of approximately 900 km of pipelines. It is vital for the OGSE sector and industry players to rally together in achieving industry competitiveness, operational efficiency, and effective project deliveries. This collaboration will underpin a value-driven and sustainable ecosystem, ensuring the success of the development projects.

PETRONAS as the custodian of petroleum operations in Malaysia, aims to optimise oil and gas supply while enhancing production efficiency. To ensure optimal production of the producing fields and facilities, approximately 367 facilities improvement plans (FIPs) are planned annually for the next three years. These include KGA Pipeline Replacement, HP Compressor Engineering, Procurement, Construction, Installation and Commissioning (EPCIC) and F6 Rejuvenation Project Gas Turbine Generator (GTG) Replacement. Additionally, FIPs contribute to decarbonisation initiatives by helping to curb flaring at new onshore facilities.

Finally, the decommissioning activities of matured assets in Malaysian upstream operations are essential to restore the area to a safe and environmentally stable condition. Additionally, these activities include assessing unused assets for potential repurposing. For the next three years, decommissioning plans include the plugging and abandonment of approximately 153 wells and the abandonment of about 37 offshore facilities and one onshore facility relating to the section of the Sabah-Sarawak Gas Pipeline (SSGP) that runs through Lawas, Limbang, Miri and Bintulu in Sarawak.

## Towards a sustainable ecosystem

A robust and balanced ecosystem is essential for the sustainable growth of the upstream sector in Malaysia, ensuring industry competitiveness and successful project delivery. Therefore, it is imperative that OGSE players continue to pioneer technologies and innovative solutions, plus improve processes and efficiency aligned with industry benchmarks. This approach will promote business sustainability, enabling safety and reliability in operations.

It is also important that everyone prioritises health, safety and environmental protocols to safeguard the workforce, minimise adverse environmental impacts and adapt to the changing oil and gas landscape.

This success can only be achieved through effective collaborations, innovative solutions and sustainable practices. While PETRONAS will continue to champion local content, it is vital that the industry remain competitive. Embracing digital transformation and committing to environmental stewardship are crucial steps towards a resilient and prosperous future for all stakeholders involved. Together, we can build a sustainable and competitive ecosystem that supports the aspirations of PETRONAS and the Malaysian oil and gas industry.



# Skilled Manpower Landscape for PETRONAS Turnaround Activities

The oil and gas sector in Malaysia has long been a cornerstone of the nation's economy, contributing significantly to its Gross Domestic Product (GDP) income by providing numerous employment opportunities. Turnaround, shutdown and maintenance are standard practices aimed at maintaining the operational efficiency, safety and reliability of oil and gas facilities.

Turnarounds and shutdowns are among PETRONAS' key operations that are extensive and complex involving various critical activities. Typically, these activities include the following:

- i. Conduct detailed inspections of equipment and infrastructure to identify faulty parts, damage or corrosion.
- ii. Perform maintenance and repair of critical components such as piping, valve, compressor and boiler.
- iii. Clean and overhaul equipment, including catalyst unloading and loading.
- iv. Upgrade systems, conduct safety checks and perform regulatory compliance assessments.

The complexity and scope of a turnaround or shutdown may vary, and typically requires a large workforce with specialised skills to complete the tasks within the allotted timeframe. Hence, detailed key performance indicators (KPI) for successful turnaround and shutdown are crucial. Several KPIs are commonly used to measure the success of the said activities such as follows:

- i. Quality of work: Provide and maintain an acceptable level of standard as per contract specification with no quality deficiencies.
- ii. Schedule adherence: Completion of tasks within the planned timeframe.
- iii. Safety records: Number of incidents, accidents, or near-misses reported during the tasks.



## Present state of local manpower landscape

Given the importance of both turnarounds and shutdowns, skilled manpower is essential and will significantly impact the safety and efficiency of the plant operations, further highlighting the need to address any skill gap in the industry. Currently, this sector is facing a significant talent shortage of skilled manpower which could impact the future of Malaysia's oil and gas sector.

Demand for skilled manpower in Malaysia's oil and gas sector is high, driven by the need for expertise in operations, such as turnaround and maintenance. However, there is a noticeable gap between the skills required by the industry and the skills possessed by the available workforce. Based on an internal study conducted by PETRONAS, similar challenges are experienced by both offshore and onshore sectors. Commonly, the gap is exacerbated by several factors which include:

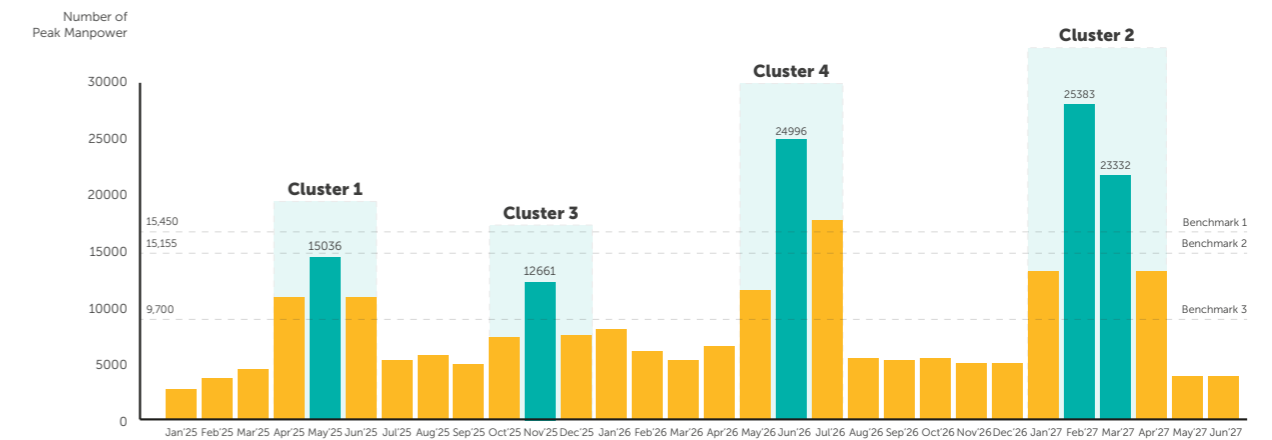
- i. Talent drain:**  
Malaysia is losing skilled workers who seek better opportunities elsewhere, creating a challenging void to fill.
- ii. Migration to gig economy:**  
Skilled workers in Malaysia's oil and gas sector are increasingly moving to the gig economy, attracted by its flexibility and autonomy.
- iii. Retention challenges:**  
High turnover rates due to factors such as uncompetitive salaries, limited career development opportunities and inadequate work-life balance.
- iv. Lack of awareness:**  
Potential talents have low awareness on available opportunities and training programmes due to limited exposure and promotions.

## Impact on key turnaround and shutdown activities

Based on PETRONAS' plan, approximately 50 turnarounds and shutdowns are scheduled from 2025 to 2027; mainly to be held in five regions i.e. Sabah, Sarawak, Kertih, Melaka and Pengerang. These activities require significant manpower, peaking at around 25,000 workers in Q2 2026 and Q1 2027. The dynamic and resource-intensive work demands skilled labour, highlighting potential gaps in trades like mechanical fitters, scaffolders and welders.

In managing numerous scheduled turnarounds and shutdowns efficiently, PETRONAS is clustering the events to optimise resources and ensure thorough review in doing the events sequencing. Additionally, adopting technology helps address potential resource challenges.

Graph below shows the summary of peak manpower for turnarounds and shutdowns scheduled from 2025 to 2027.



Note 1: Cluster refers to a group of turnaround schedules for PETRONAS based on region. Cluster 1: Sabah, Sarawak, Labuan and Kertih, Cluster 2: Pengerang, Cluster 3: Kertih and Cluster 4: Melaka and Sarawak.

Note 2: Benchmark 1, 2, 3 refers to highest recorded peak manpower at Plant 1 (15,450 pax, 4 million man-hours), Plant 2 (15,155 pax, 4.2 million man-hours), Plant 3 (9,700 pax, 2.3 million man-hours).

The shortage of skilled manpower has several impacts on Malaysia's oil and gas industry:

- i. Operational efficiency:**  
Lack of skilled manpower can lead to longer completion times, higher error rates and safety issues.
- ii. Economic implications:**  
Shortage of skilled manpower can lead to decreased sector performance, affecting employment rates and national revenue.
- iii. Safety and environmental risks:**  
Inadequately trained talents can pose significant safety and environmental risks.

## Potential solutions

Addressing this manpower shortage issue requires a multifaceted approach:

- i. Improve retention strategies:**  
Improving job prospects in this sector such as competitive salaries and career development opportunities.
- ii. Increase talent engagement:**  
Coordination between government agencies, certification bodies and OGSE players is crucial to educate talents about available training and development programmes to address skill gaps.
- iii. Foster youth interest:**  
Fostering interest among the younger generations through awareness campaigns and scholarship programmes can help cultivate a future talent pool.
- iv. Collaborate for sustainability:**  
Enhanced collaboration with government agencies and learning institutions such as Construction Industry Development Board (CIDB), Akademi Binaan Malaysia (ABM) and Human Resource Development (HRD) Corporation is vital to align learning modules with oil and gas requirements, ensuring graduates are prepared for the industry.
- v. Introduce educational reforms:**  
Aligning educational curricula with industry needs is fundamental. Partnerships between educational institutions and industry players can help ensure graduates possess relevant skills that benefit the industry.
- vi. Provide relevant training:**  
Properly trained talents are essential in maintaining high safety standards and ensuring environmentally responsible practices that minimise impact to the environment.

The skilled manpower shortage issue in Malaysia's oil and gas industry is a significant challenge that requires immediate focus. By implementing viable solutions, Malaysia shall facilitate its oil and gas industry in remaining competitive, innovative and capable of driving economic growth. A skilled workforce is essential for the sector's long-term success.



# PETRONAS Activity Outlook

# 06



# 6.1 Outlook Methodology

## Scope of Coverage

This section provides the activity outlook for core activities, 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, including activities from PETRONAS Group of Companies and other Petroleum Arrangement Contractors (PACs). Activities governed under the Malaysia-Thailand Joint Development Area (MTJDA) are excluded from this report.

For information related to Downstream and Gas and Maritime, 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 2025 to 2027. In oil and gas, activities typically would take two to three years to be executed. However, for the purpose of this report, the activity outlook is counted once based on the year of actual or planned contract award dates. For example, activity outlook for Offshore Fabrication is based

on the year of planned award date instead of the first steel-cut date. Similarly, plant turnaround activities beginning in December 2025 and ending in January 2026 are only accounted for once, i.e. in 2025.

## General narrative on the overall activity outlook

Continuous capital investment remains crucial to contribute towards the security of supply and to sustain production targets at competitive costs and lower emissions. Key projects like Kasawari, Rosmari and Marjoram are critical for energy security. As such, the outlook for Upstream development projects remains steady from 56 development wells in 2024 to 69 development wells in 2025.

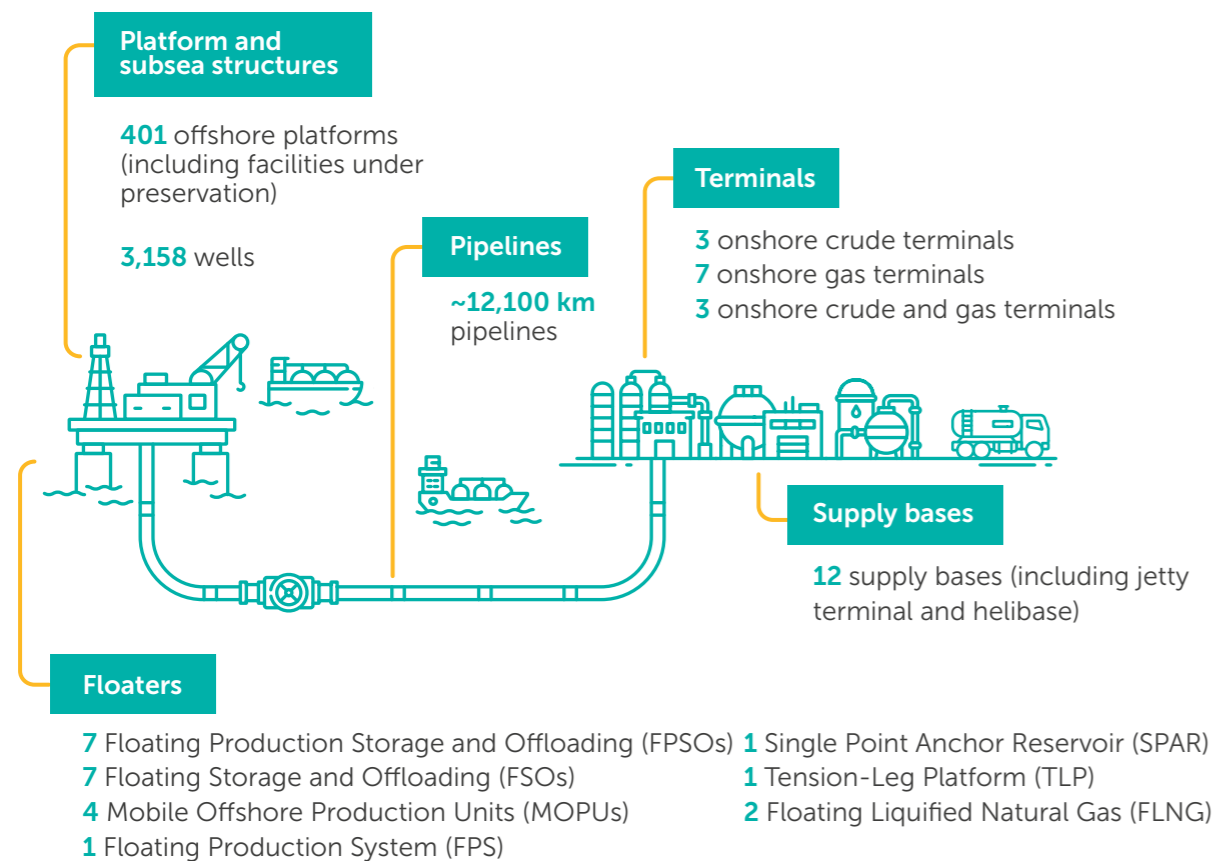
Meanwhile, a report titled S&P Global Commodity Insights dated June 2024 highlighted that rising market prices is expected for 2025, e.g. increase of Global Steel Asia (10006) in 2025. Taking cue from the escalation of prices and heated market, the industry's ability to adapt and innovate in response to demand for cost competitiveness is vital to ensure project viability therefore creating more work opportunities for the industry.



# 6.2 Upstream Outlook

## Business Overview

The role of upstream business function in Malaysia is to intensify oil and gas exploration, development and monetisation to serve domestic energy demands, maximise the integrated value chain and sustain the vibrancy of the domestic oil and gas ecosystem.



## Short-term outlook

To contribute towards the security of supply in Malaysia, the approach includes intensifying exploration activities of new plays and matured areas while expediting appraisal programmes to replenish resources to sustain production.

Upstream is focused on growing resources and meeting production targets at competitive costs and lower emissions, and addressing energy demands while positioning carbon capture and storage (CCS) as a pivotal business.

From 2024 to 2025, upstream will continue to revitalise the Malaysian exploration and production (E&P) landscape.

Timely maturation of resources, development of reserves and optimum recovery from producing assets remain vital to deliver base production. Key projects like Kasawari, Rosmari and Marjoram are critical for energy security. Upstream is making progress in decarbonising operations aligned with PETRONAS' Net Zero Carbon Emissions (NZCE) by 2050 pathway. Advancement in CCS, particularly with the Kasawari CCS project, is aimed at decarbonising operations and unlocking gas resources to meet business demand. Additional projects are in the pipeline to realise new values and contribute towards lower carbon goals. Upstream aims to position Malaysia as a regional centre for CCS solutions, fostering collaborative partnerships.

## Medium to long-term outlook

Looking forward, Upstream is committed to safeguarding production supply by meeting production targets and maximising shareholder value while decarbonising the value chain. Upstream is committed to deliver this through innovation and technology deployment as well as close collaboration with industry partners in Malaysia.

Upstream aims to open up more fields in Malaysia, to pursue its ambition of being a regional centre for CCS solutions through the Bujang, Inas, Guling, Sepat and Tujoh (BIGST) fields in Peninsular Malaysia.

The gas supply from the BIGST fields, the first CCS project in Peninsular Malaysia, is another key project for energy security, given the significant potential that exists within the cluster.

# Upstream Activity Phases



Exploration



Development/  
Project



Production/  
Operations



Abandonment

Geological and Geophysical		
Oil Country Tubular Goods (OCTG)		
Drilling/Wells Services		
Drilling Rigs		
Linepipe		
Gas Turbines		
Fabrication and Construction		
Transportation and Installation		Transportation and Installation
Hook-Up and Commissioning		
Subsea Structures		
Floaters		
Underwater Services		
Offshore Maintenance, Construction and Modification		
Helicopter Services		
Offshore Support Vessels		
Supply Base		
Chemicals		
Onshore Turnaround		
		Decommissioning

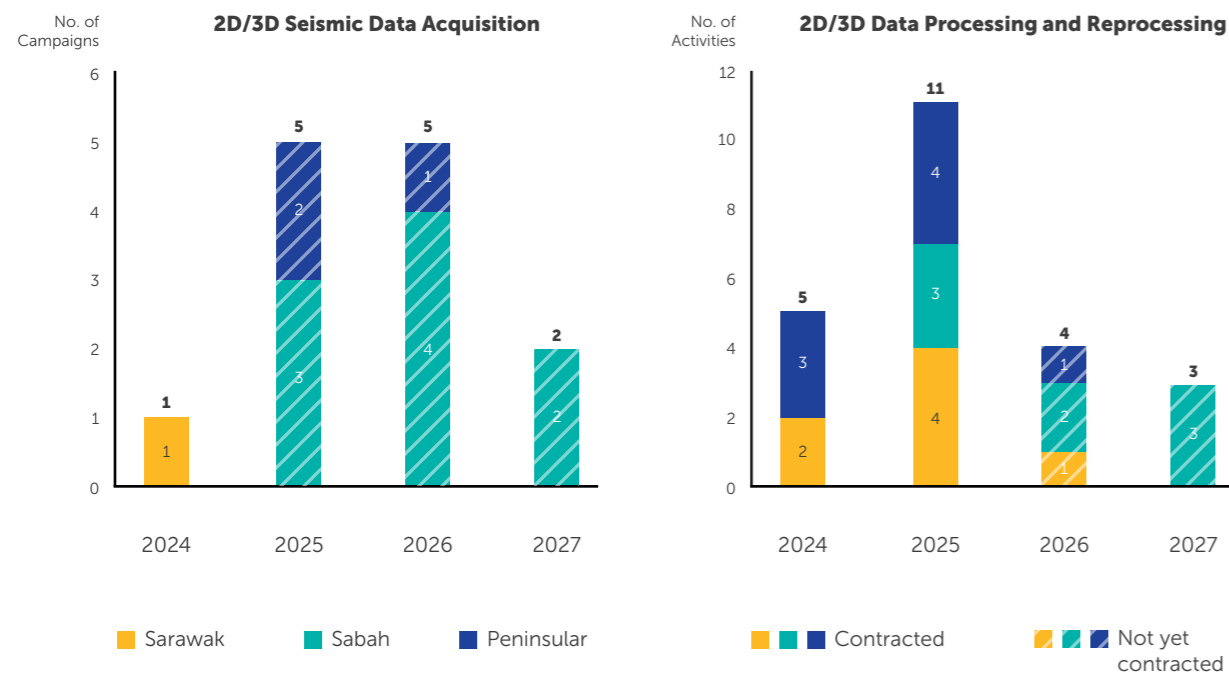
## A. Geological and Geophysical

Geological and Geophysical (G&G) involves exploring and analysing the Earth's subsurface to locate, evaluate and manage natural resources such as oil and gas.

The related services cover a range of specialised activities including G&G studies,

seismic acquisition and processing/reprocessing services, marine site investigations, offshore surveying and positioning, geochemistry analysis, core analysis and more, all aimed at providing detailed insights into subsurface conditions for resource exploration and development.

### Activity Outlook



### Insights

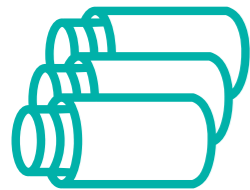
- Positive outlook for seismic data acquisition and processing activities in 2025 as compared to 2024.
- The outlook for 2026 and 2027 appears moderate.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Pan Malaysia Umbrella Contract for the Provision of Marine Streamer and Ocean Bottom Seismic (OBS) for 2D & 3D/4D Seismic Acquisition Services for Petroleum Arrangement Contractors (PACs)	2022 – Q4 2027	Conduct 2D/3D/4D marine streamer and Ocean-Bottom Seismometer (OBS) seismic data acquisition.
<b>Individual - Upstream</b>		
Umbrella Contract for Provision of Geological Samples and Laboratory Core Analysis Services	2024 – Q2 2025	Study of rock samples (cores) taken from a reservoir to understand/validate the reservoir's properties.
Umbrella Contract for the Provision of Seismic Data Processing/Reprocessing Services	2021 – Q2 2026	Conduct and deliver high quality seismic product (stacks, gathers, velocities and other activities) via reprocessing/processing.
Provision of Marine Site Investigation Survey Services	2023 – Q2 2026	Carry out the marine site investigation survey and associated activities.
Provision of Offshore Surveying and Positioning Services	2023 – Q3 2026	Cover activities of rig move and positioning, integrated positioning services for vessels and Landing Craft Tank (LCT) buoys deployments/installation and other associated activities.
Provision of Geochemistry Analysis Services	2023 – Q3 2026	Comprehensive geochemistry analysis which includes base analysis for downhole gas samples and additional analysis (Multicomponent kinetics and Diamondoids fingerprinting).
Provision of Geological and Geophysical (G&G) Studies	2024 – Q2 2029	Conduct G&G studies such as prospect maturation, fieldtrip and G&G data interpretation, stratigraphic modelling, structural analysis, seismic quantitative interpretation (QI) and other activities.

## B. Oil Country Tubular Goods (OCTG)

OCTG are specialised tubulars used in the exploration and production of oil and gas. These tubular goods are essential to the drilling and well construction as they provide a conduit for the extraction and transportation of crude oil and natural gas from wellbore to the surface.



### Application:

OCTG refers mainly to conductor, casing and tubing which are used in the construction of oil and gas wells.

### Conductor and casing:

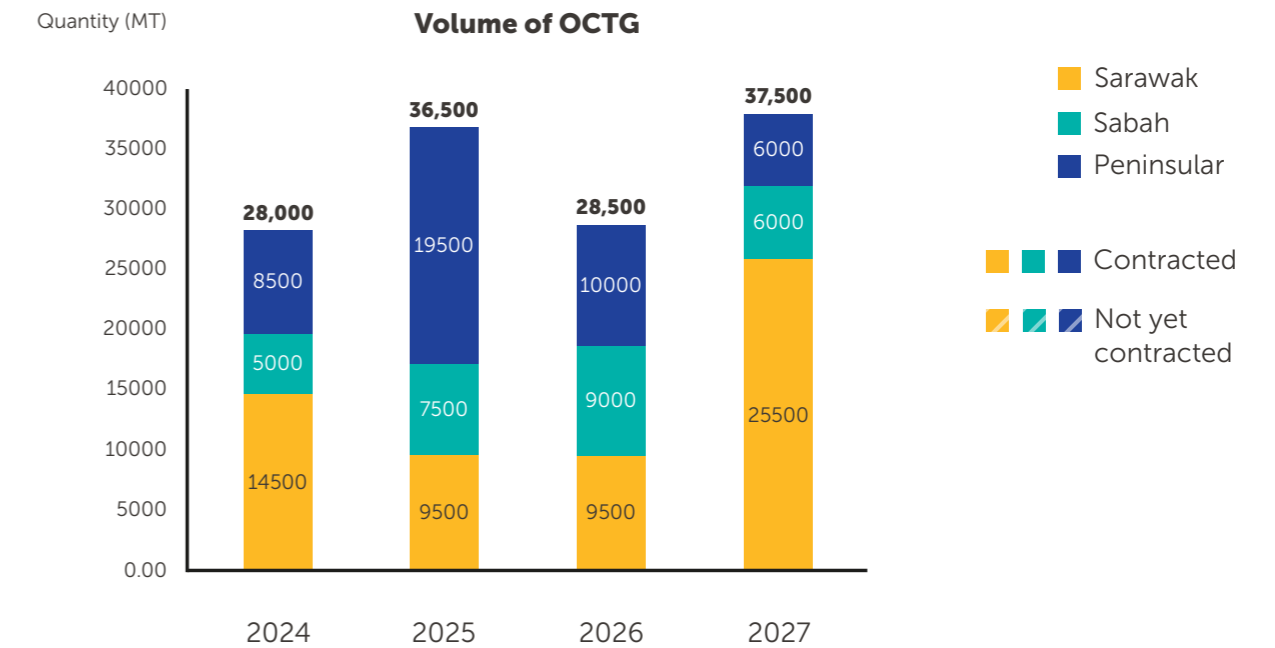
Tubular that is lined in the wellbore to keep the hole from collapsing during drilling and throughout its lifespan.

### Tubing:

Tubular that is inserted in the well during well completion operations and serves as the conduit for extracting the oil and gas to the surface.

OCTG tubulars are normally joined together with threaded connectors. These connectors come in various sizes and thread profiles depending on the use.

## Activity Outlook



## Insights

- The OCTG demand forecast is primarily driven by the utilisation of casing, tubing and conductor with connector (CwC). Among these, casing accounts as the largest contributor to OCTG demand since they are used to line the barehole and maintain well integrity.
- This demand forecast is based on the number of identified and planned development wells only.

## Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Supply and Delivery of Oil Country Tubular Goods (OCTG) and Conductor with Connectors (CWC)	2023 – Q4 2032	OCTG

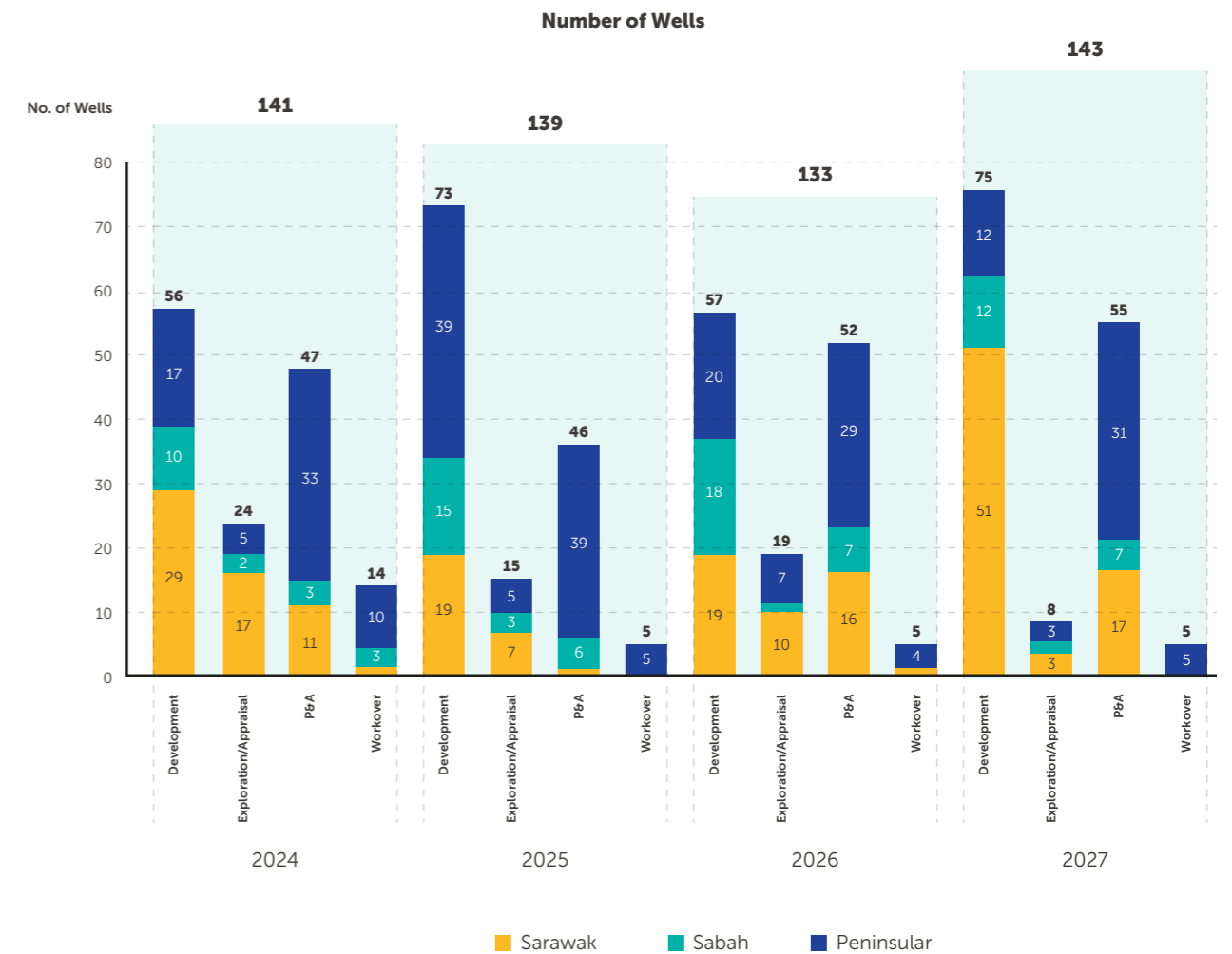


## C. Drilling/Wells Services

### Wells Services

<b>Exploration</b>	Search for hydrocarbon resources in new and existing fields.  Includes activities such as seismic surveys, drilling of exploration wells and data analysis to determine presence of hydrocarbons.	Key services i.e. directional drilling (DD) / measurement while drilling (MWD) / logging while drilling (LWD), cementing, fluids, completion, drilling bits, electric logging, fishing, mudlogging, tubular handling, well testing, wellhead and tree
<b>Appraisal</b>	Further evaluation to assess the size, quality and commercial viability of the discovered reservoir.  Additional appraisal wells may be drilled to gather more data.	
<b>Development</b>	This phase begins after appraisal result is positive and commercially viable.  During this stage, infrastructure and facilities are constructed, transported and installed to extract the oil and gas from reservoir.	
<b>Intervention Workover</b>	Interventions or maintenance performed on the production wells to enhance or restore their productivity. Operations may include workover, well stimulation, repair downhole equipment, or other well performance remedial works.	
<b>Abandonment</b>	Phase includes plug and abandon (P&A) the well, remove the equipment and restore the site to its original condition.  Decommissioning of wells, platforms, pipeline and other infrastructure once oil and gas fields mature and production declines.	
		Key services i.e. coiled tubing unit, electric logging, slickline, cementing, fishing and braided line

### Activity Outlook



### Insights

- Generally, 50 per cent of the wells will be executed by jack-up drilling rig and 20 per cent of the wells will be executed by tender-assisted drilling rig.
- Plug and Abandonment activity is expected to increase, with aspirations to abandon 80 wells per year from 2028 onwards.

Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Pan Malaysia Umbrella Contract for the Provision of Directional Drilling (DD) / Measurement While Drilling (MWD) / Logging While Drilling (LWD) (DD/MWD/LWD) Equipment and Services for Petroleum Arrangement Contractors (PACs)	2020 – Q1 2025	DD MWD LWD tools and personnel to perform planning, engineering, inspecting, monitoring and directionally controlling the drilling of exploration, appraisal and development wells.
Umbrella Contract for the Provision of Well Testing and Tubing Conveyed Perforations (TCP) for Petroleum Arrangement Contractors (PACs)	2022 – Q2 2025	Provide and maintain necessary tools, equipment, accessories and spare parts for well testing services and TCP.
Pan Malaysia Provision of Fishing Equipment and Services for PAC Operators' Drilling Program (Package A & Package B)	2020 – Q4 2025	Fishing equipment and services for conventional wells.
Pan Malaysia Contract for the Provision of Upper and Intelligent Completion Equipment and Services for Petroleum Arrangement Contractors (PACs)	2022 – Q2 2027	Upper completion and intelligent well completion system.
Provision of 5K Surface Wellhead and Christmas Tree Equipment, Tools & Services	2022 – Q3 2027	Provide complete set of 5K surface subsea wellhead equipment, tools and services.
Umbrella Contract for the Provision of Mudlogging Equipment and Services for Petroleum Arrangement Contractors (PACs)	2022 – Q4 2027	<ul style="list-style-type: none"> <li>Geological or formation evaluation such as evaluation logs, gas ratio log, composite master logs, plots and prints.</li> <li>Perform real time data processing/transmission system.</li> </ul>
Provision of Mud Cooler for Petroleum Arrangement Contractors (PACs)	2023 – Q2 2028	Mud cooler equipment package and services to reduce the temperature of drilling fluid. Full filtration equipment package and services to filter the completion fluids.
Pan Malaysia Integrated Contract for the Provision of Drilling Fluids, Cementing & Drilling Waste Management (Solid Control) Equipment & Services for Petroleum Arrangement Contractor (PACs)	2023 – Q3 2028	<ul style="list-style-type: none"> <li>Cementing pumping equipment, downhole tools and associated services.</li> <li>Drilling fluids (including barites, equipment and services), cementing pumping (equipment, downhole tools and associated services) and solid control for drilling waste management.</li> </ul>
Pan Malaysia Contract for Provision of Liner Hanger Equipment and Services for Petroleum Arrangement Contractors (PACs) Operators' Drilling Programmes	2023 – Q4 2028	Conventional liner hanger and expandable liner hanger equipment and services.
Panel Contract for the Provision of Drill Bits, Specialized Bits, Hole Enlargement Tools and Associated Tools/Services for Petroleum Arrangement Contractors (PACs)	2024 – Q1 2029	Drill bits, specialised bits and hole enlargement tools and associated tools/services.

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Onshore Liquid Mud Plant and Services	2024 – Q3 2029	Dedicated onshore Liquid Mud Plant (LMP) and Storage Facilities.
Pan Malaysia Umbrella Contract for the Provision of Integrated Well Continuity Services for Intervention, Workover, and Abandonment for Petroleum Arrangement Contractor (PACs)	2024 – Q4 2029	Integrated well intervention and completion services.
<b>Individual - Upstream</b>		
Provision of Coring Equipment and Services for Drilling Program	2022 – Q1 2025	Coring equipment for all formation types in conventional vertical wells, directional and extended reach wells as well as High Pressure, High Temperature (HPHT), Carbon Dioxide (CO <sub>2</sub> ), and sour gas (H <sub>2</sub> S) wells.
Provision of Tubular Handling, Conductor Installation and Slot Recovery Equipment And Services for Drilling Programs	2022 – Q1 2025	Tubular running, conductor driving and slot recovery services.
Provision of Remedial Sand Control Equipment Supply and Services	2022 – Q1 2025	Remedial sand control equipment and services including sand screen and chemical sand treatment.
Provision of Electric Wireline Logging (EWL) (Cased hole)	2023 – Q1 2025	EWL equipment and services for exploration, appraisal, development, production and workover wells.
Provision of Rental of Subsea Wellhead Equipment, Tools and Services	2022 – Q2 2025	Rental of subsea wellhead equipment, tools and services.
Provision of Surface Controlled Subsurface Safety Valve System Rectification, Maintenance and Services	2022 – Q2 2025	Surface controlled Sub-surface Safety Valve System (SCSSSV) installation, maintenance and services.
Provision of Downhole Well Integrity Evaluation	2022 – Q2 2025	Provide well leak detection including personnel and equipment including surface diagnostic services.
Provision of Drilling Rig Integrity and Inspection for Program	2022 – Q3 2025	Scope includes inspection of equipment and systems installed/planned to be installed on the drilling rig.
Provision of Self-cleaning Through Tubing Perforation	2022 – Q4 2025	Perform self-cleaning of perforation tunnel and reduce the perforation debris upon well job completion.
Provision of Electric Submersible Pump Equipment And Services	2023 – Q1 2026	Design, supply, install and retrieve if required, and maintenance, monitoring and troubleshooting of the Electric Submersible Pump (ESP) system.
Provision of Gas Lift Valves (GLV) & Insert Strings Equipment, Accessories and Services	2023 – Q1 2026	Provision of GLV equipment and services.

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Subsea Production Equipment Maintenance	2023 – Q1 2026	Manpower, tooling, spares, refurbishment, equipment, project management and engineering in subsea equipment maintenance and repair services such as but not limited to subsea wellhead, subsea tree, control system, umbilical, distribution system, hardware, structure and tooling.
Provision of Project Management Services (Exploration)	2023 – Q3 2026	Manpower for technical and non-technical position for wells and exploration.
Provision of Maintenance For Permanent Downhole Gauge (PDG)	2021 – Q4 2026	Supply complete PDG unit including surface equipment and software.
Provision of Sand Control & Stimulation Equipment and Services	2022 – Q1 2027	Provision of sand control downhole tools, surface pumping services and mechanical retrievable packer and bridge plug.
Provision of Cement Evaluation Services	2024 – Q1 2027	Evaluation of cement quality and conditions behind casing with logging application for deployment inside existing completion tubing.
Provision Of 10K Surface Wellhead and Christmas Tree Equipment, Tools, and Services	2023 – Q2 2027	Provide complete set of 10 surface subsea wellhead equipment, tools and services.
Well Control & Blow Out Emergency Response	2022 – Q3 2027	Well control and blowout emergency response for minimising risks and safety operation.
Provision of Electric Wireline Logging (EWL) (Open hole)	2024 – Q3 2027	To provide Electric Wireline Logging (EWL) equipment and services for exploration, appraisal, development, production and workover wells.
Provision of Extended Reach Drilling (ERD) Detail Engineering Study and ERD Operation Supervision	2022 – Q4 2027	Perform ERD study for Front End well engineering study.
Provision of Surface Sand Management	2023 – Q1 2028	Perform sand management monitoring and study. Scope include rental, purchase and maintenance of surface sand equipment.
Provision of Well Leak Repair Equipment and Services (Sealant Based)	2024– Q1 2029	Well leak rectification services including personnel, product and equipment.
Provision of Casing Accessories and Auxiliary Cementing Equipment and Services	2024 – Q3 2029	For cementing and remediation applications for drilling and plug and abandon (P&A) wells.








## D. Drilling Rigs

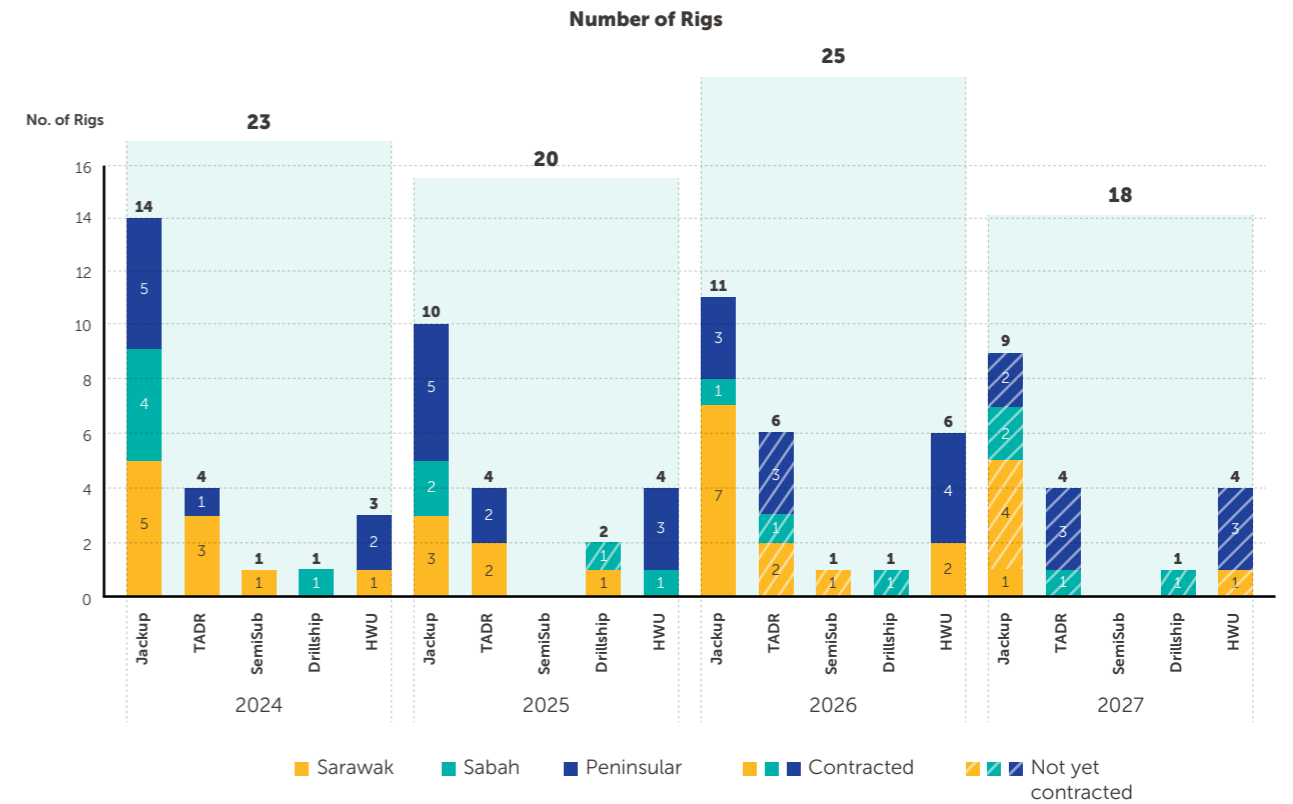
Activity outlook is provided for all types of rigs operating in Malaysia i.e. Jack-up Rigs (JURs), Tender Assisted Drilling Rigs (TADRs), Semi-Submersible Rigs and Drillships.

Workover refers to any well intervention process which helps to repair the wells using an invasive technique.

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.

Type of Rigs	Activity Phase	Application	Associated Services
 JUR	Exploration Development Abandonment	The most common type of offshore rig due to its flexibility. Typically used for drilling in shallow water.	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.
 TADR	Development	Typically used in deeper water with space/load/ approachability limitations e.g. deepwater spars, tension leg platform (TLP), etc.	
 Semi-Submersible	Exploration	The most stable type of rig, typically used for drilling in deepwater and/or harsh environment.	
 Drillship	Exploration	Typically used for drilling in deepwater/ultra deepwater. Can also be used for well maintenance, completion and capping works.	
 HWU	Production Abandonment	Typically used for workover operations e.g. recompletion, well repair and barrier placement.	

## Activity Outlook

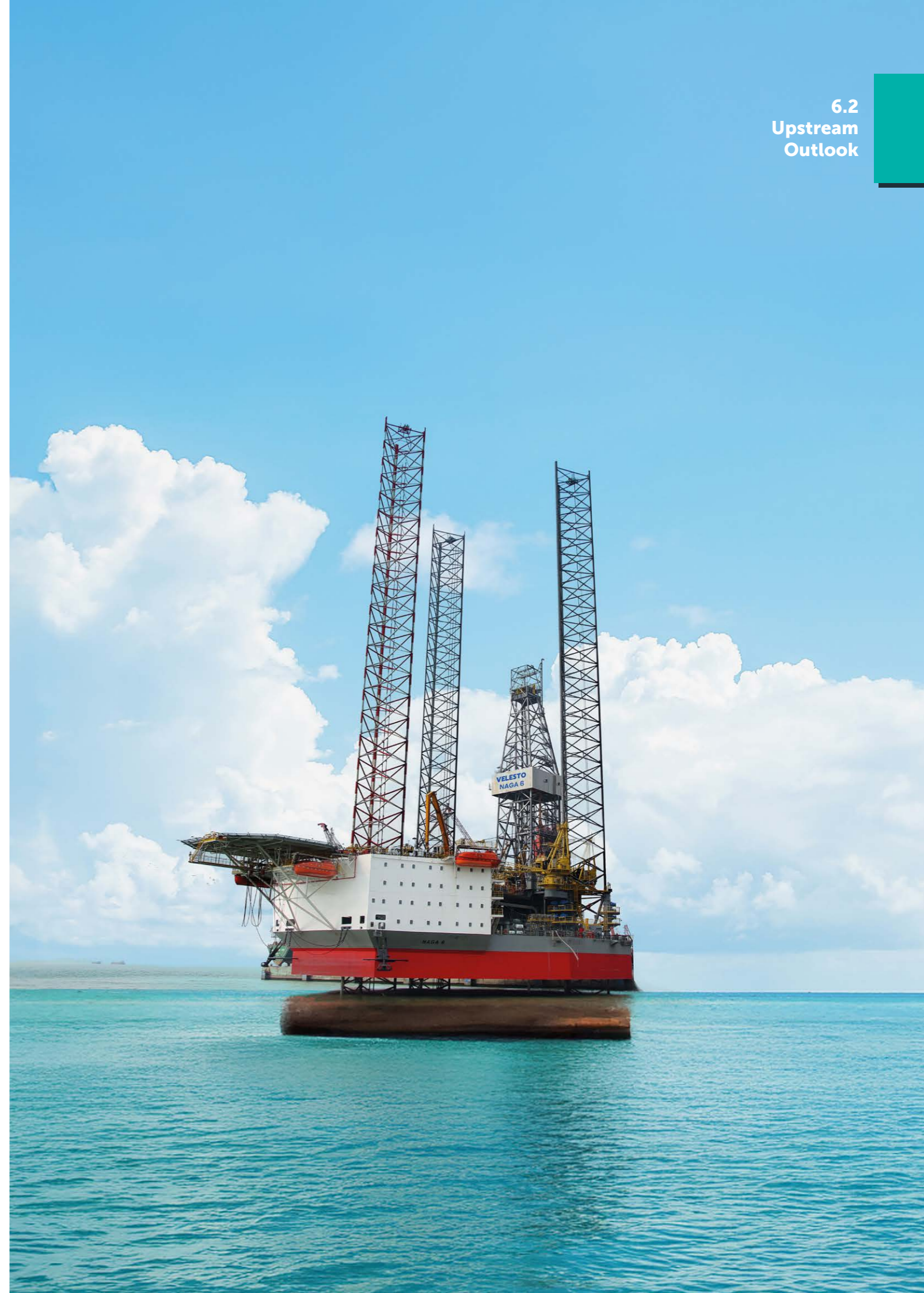


## Insights

- Post 2027, moderate outlook is expected for total rigs activities while continuing to focus on enhancing rig capability to deliver operational excellence and cost-effective solutions.
- Malaysia upstream wells activities in 2025 will remain steady throughout the year, utilising current available resources in the country.

Key Contract List

Contract Name	Contract Duration	Scope
<b>Individual - Upstream</b>		
Provision of One (1) 15k Jack-up Drilling Rig For PAC's 2023-2024 Drilling Programs – NTP - PTTEP	2022 – Q1 2025	Jack-up rig
Provision Of Tender Assisted Drilling Rig - Contract 1	2023 – Q2 2025	Tender assisted drilling rig and associated equipment
Provision Of Tender Assisted Drilling Rig - Contract 2	2023 – Q2 2025	Tender assisted drilling rig and associated equipment
Provision of A Jack-Up Drilling Rig "PVD III" for PAC	2023 – Q2 2025	Jack-up rig
Provision of One (1) Jack-up Drilling Rig and Services - PAC	2024 – Q2 2025	Jack-up rig
Provision of Jack-up Drilling Rig For - Contract 2	2023 – Q1 2026	Jack-up rig
Provision of Jack-up Drilling Rig for Drilling Program	2023 – Q1 2026	Jack-up rig
Provision of Jack-up Drilling Rig - Contract 1	2024 – Q1 2026	Jack-up rig
Hydraulic Workover Unit (HWU) and Services	2023 – Q2 2026	Hydraulic workover unit
Provision of Drilling Rig for PAC's Rotan Re-development Programs- PAC	2023 – Q4 2026	Jack-up rig
Tender Assisted Rig & Services (Sapura Berani)- PAC	2024 – Q1 2026	Tender assisted drilling rig and associated equipment
Provision of Low-Cost Jack-up Drilling Rig for Plug and Abandonment Program	2024 – Q4 2027	Jack-up rig
Provision Of Drilling Unit For 2021-2025 Deepwater Drilling Activities	2021 - Q2 2025	Drillship



## E. Linepipe

### Supply of linepipe

Rigid linepipe and flexible pipes are used to transport oil or gas between two or more facilities to cater for both upstream and downstream requirements. In this report, pipeline requirements are indicated by its type, i.e. rigid linepipe, flexible pipe, or both.

#### Rigid linepipe application:

Generally used for longer distances, typically for platforms to onshore plants. Rigid linepipes are the veins of the oil and gas industry and are mainly used to transport high pressure water and chemicals to maintain hydrocarbon pressure in the reservoir as well as to transport produced hydrocarbons to onshore facilities.



#### Rigid Linepipe

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

#### Flexible pipes application:

Generally used 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:

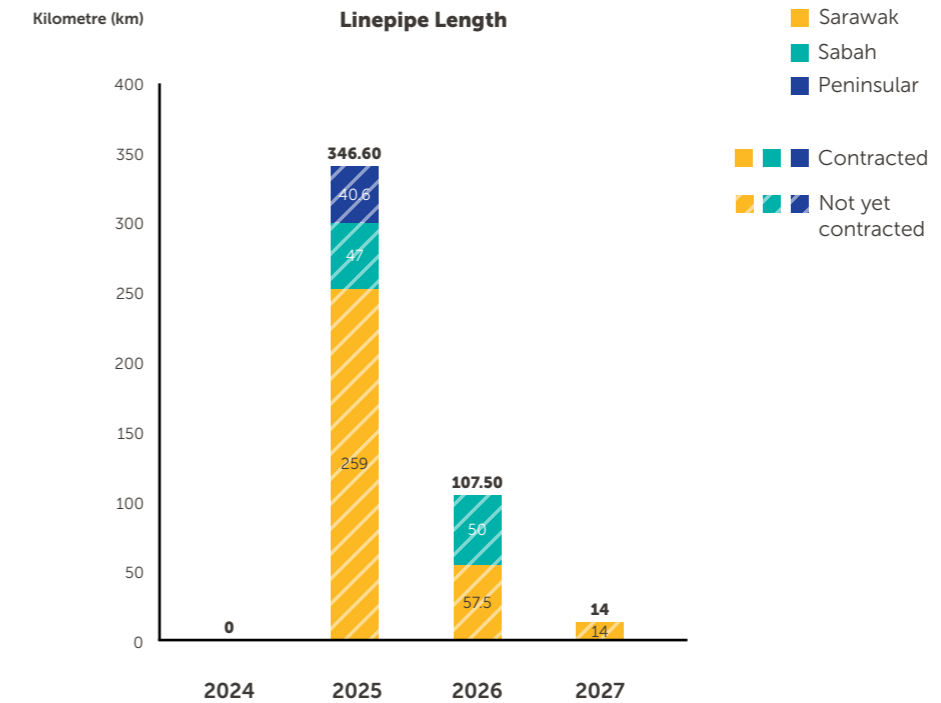
Engineering, pre-commissioning services, logistics, coating services (only for linepipe).



#### Flexible Pipes

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

## Activity Outlook



## Insights

- The demand outlook is focused on future greenfield projects and does not include requirement for pipeline replacement programme. This is to be read together with outlook for Pipeline Installation.
- Considering the requirement for the next three years, Carbon Steel Longitudinal Submerged Arc Welded (LSAW) and High Frequency Welding (HFW) pipes are foreseen to be in high demand for linepipe due to their size specifications in meeting greenfield projects' requirement, with the majority ranging from 12 inches to 34 inches, and most greenfield projects requiring Carbon Steel X65 grade.

## Key Contract List

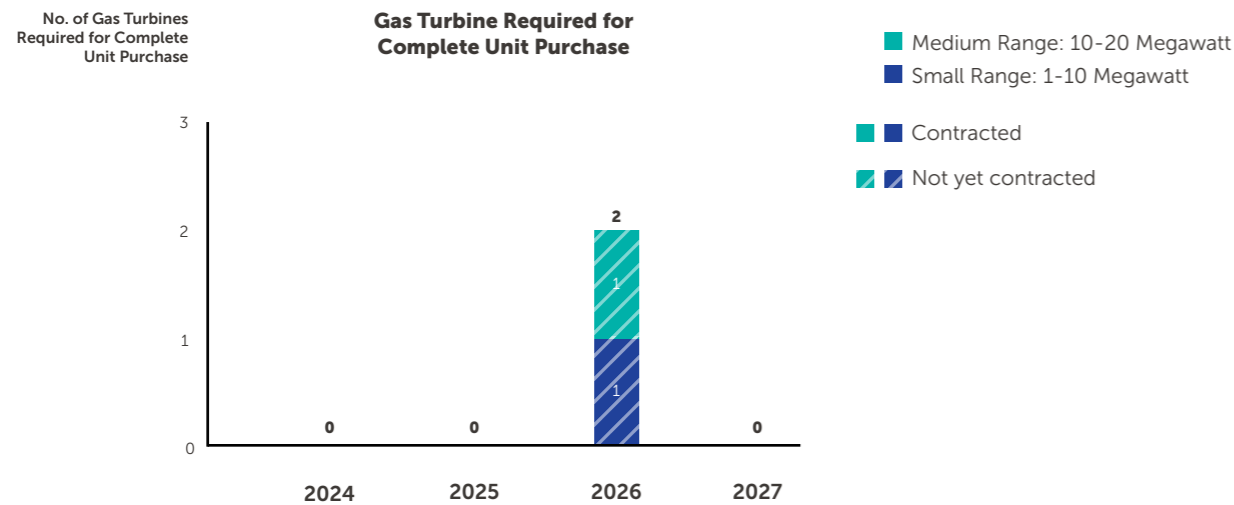
Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Price Agreement for Coating Services of Linepipe and Bends for PETRONAS Group of Companies (PGOC) and Petroleum Arrangement Contractors (PACs)	2022 – Q4 2026	Linepipe coating services
<b>Individual - Upstream and Downstream</b>		
N/A		

## F. Gas Turbines



A gas turbine is a type of internal combustion engine that uses pressurised hot gases to produce mechanical power and electricity. It consists of three main components: a compressor, a combustion chamber, and a power turbine. The compressor sucks in air and compresses it, the combustion chamber burns fuel with the compressed air, and the turbine converts the hot gases into mechanical energy. Gas turbines are used in a variety of applications, including power generation and mechanical drive in industrial machinery.

### Activity Outlook

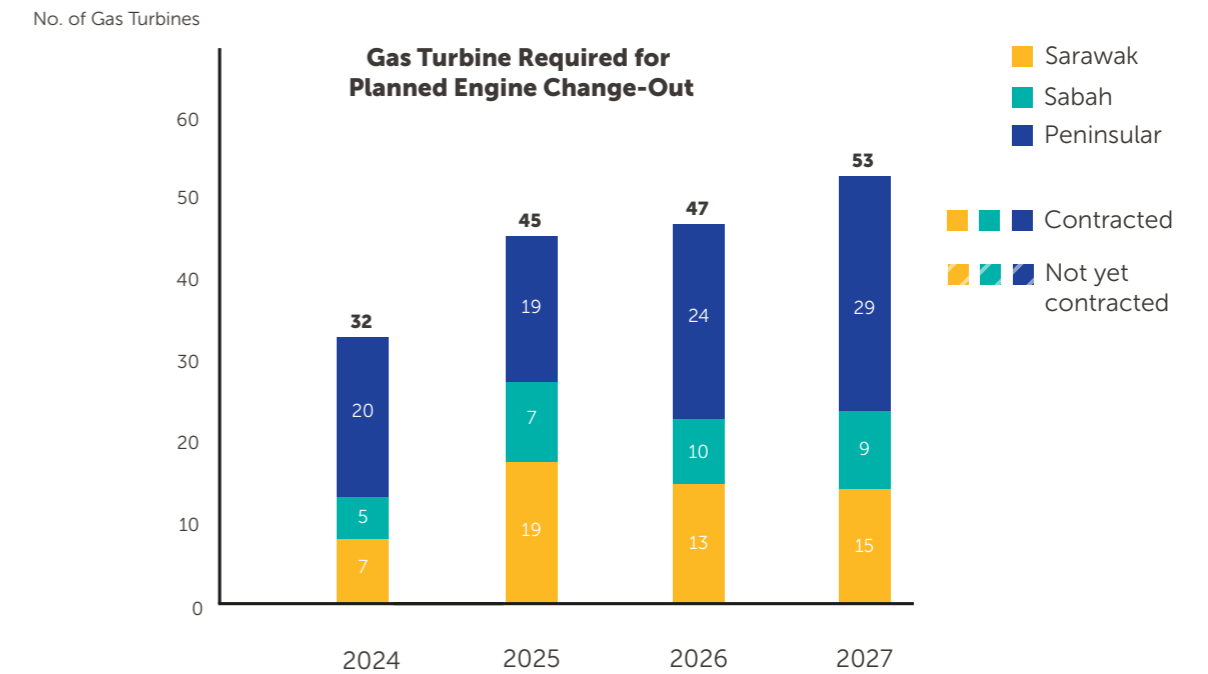


Note: Volume allocation will be subjected to mini bidding exercise among Global Frame Agreement (GFA) players.

### Insights

- The outlook for gas turbine complete unit purchases depends on offshore, onshore and floater projects.
- Technology advancement is key for PETRONAS to implement decarbonisation efforts, of which Original Equipment Manufacturers (OEM) have the competency to offer.
- Delivery lead time of a typical gas turbine is up to 15 months, depending on power range. The industry is currently facing delayed delivery and extended overhaul turnaround time for aeroderivative gas turbines (models of PGT, LM and SGT-series) due to current competing demand with the aviation industry.

### Activity Outlook



### Insights

- The outlook for gas turbine engine change-out depicts gradual increasing demand from year-to-year. Engine change-outs for gas turbines are typically performed after accumulating between 30,000 and 40,000 running hours, in line with Original Equipment Manufacturer's (OEM) recommendations.
- Maintenance schedules may be adjusted to optimise performance, extend the lifespan of components, or align with financial and operational constraints.
- OPUs and PACs may opt for extended mean time between overhauls (MTBO), potentially reducing the frequency of engine change-outs. In some cases, engine change-outs are timed to coincide with other planned upgrades, such as control panel or compressor improvements, as a means to optimise operational efficiency and minimise downtime.
- The maintenance programme of respective Operating Plant Units (OPUs) and Petroleum Arrangement Contractors (PACs) are based on respective business units' requirement, operational demands, equipment condition, and unforeseen factors such as part availability, emergency repairs, or regulatory updates.

Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Global Frame Agreement - Supply & Delivery of Gas Turbine for PETRONAS Group of Companies and Petroleum Arrangement Contractors (PACs)	2023 – Q3 2030	Gas turbine complete equipment supply.
<b>Individual - Upstream</b>		
Individual Gas Turbine Maintenance Contracts by respective Operating Plant Units (OPUs) and PACs	Various contract durations	Gas turbine maintenance, repair, overhaul and supply of spare parts which encompasses project management, corrective maintenance, preventive maintenance, personnel, engineering, technical support services, overhaul, equipment exchange, spare parts, etc.







## G. Fabrication and Construction

The outlook for fabrication and construction is provided for fixed and floating structures, with actual or planned contract award date to indicate the start of fabrication activity.

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

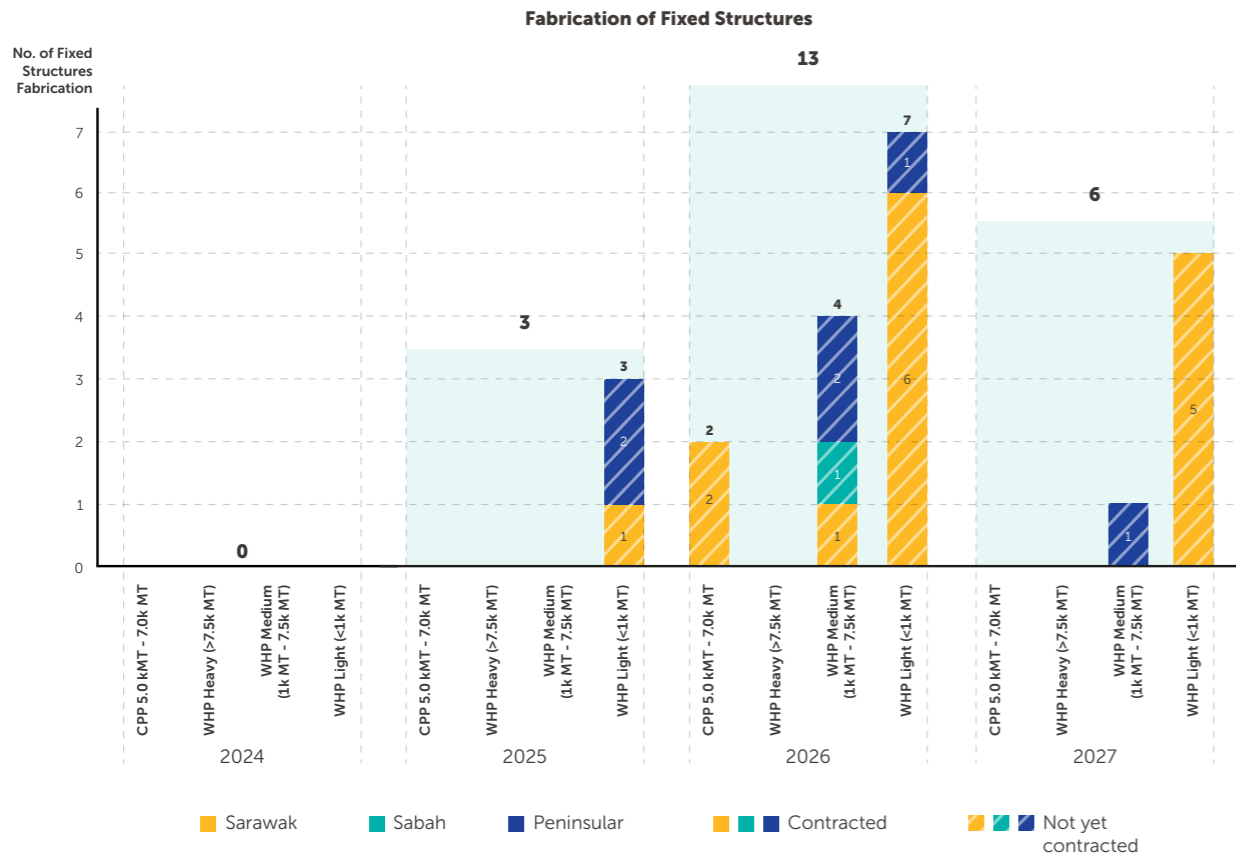
#### Wellhead Platform (WHP) application:

Used to house wellheads and machinery to extract oil and gas from the seabed and serve as a platform for drilling activities. Typically, it is designed to include an integral deck, utility system, wellhead system, helideck and drilling facilities.

#### Central Processing Platform (CPP):

Used to receive and process the extracted hydrocarbon before sending to shore or evacuation through tankers. CPP typically acts as the central hub for the entire field complex.

### Activity Outlook



### Insights

- Fabrication activities will take an average duration of 24 months for each CPP, 16 months for each WHP and 10 months for each Lightweight Structure (LWS) within the project timeline.
- Positive outlook for offshore fabrication with 22 projects planned for execution, which includes two CPPs and five WHPs. The remaining 15 projects are all light weight WHPs with a topside weight below 1,000 MT.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
PETRONAS Frame Agreement For The Provision Of Engineering, Procurement And Construction (EPC) of Fixed Offshore Structure Works	2018 – Q4 2025	Engineering, Procurement, and Construction (EPC) of Fixed Offshore Structure Works

## H. Transportation and Installation



### Structural Installation – Heavy Lift

**Application:**

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

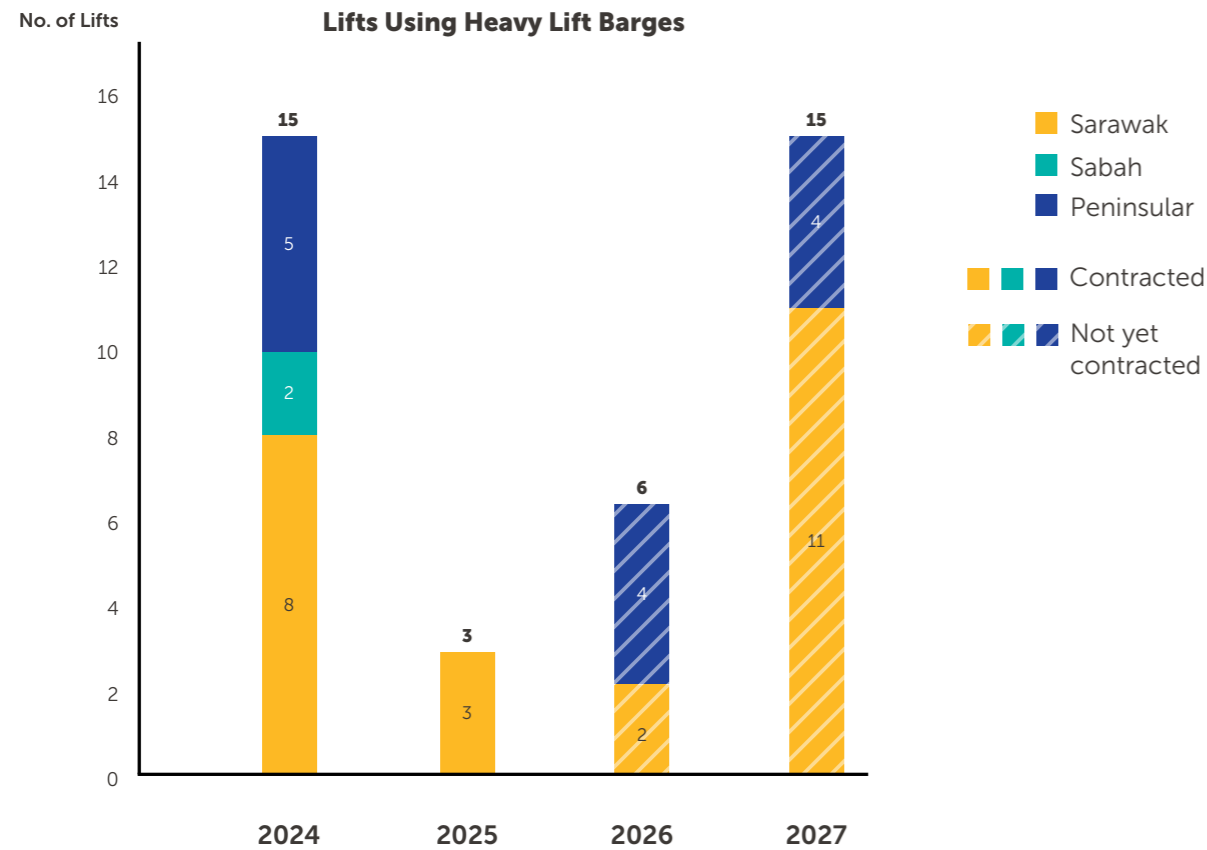
**Associated services:**

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

### Insights

- Outlook number is measured in terms of number of lifts, counted separately for each jacket and topside, and excludes heavy lift utilisation for decommissioning activities.
- Positive demand in the oil and gas and wind sector will continue to drive heavy lift barges utilisation until 2030, posing challenges in security of supply.
- This outlook may be read together with the outlook for Fabrication and Construction based on respective project phases.

### Activity Outlook





**Structural Installation – Floatover**

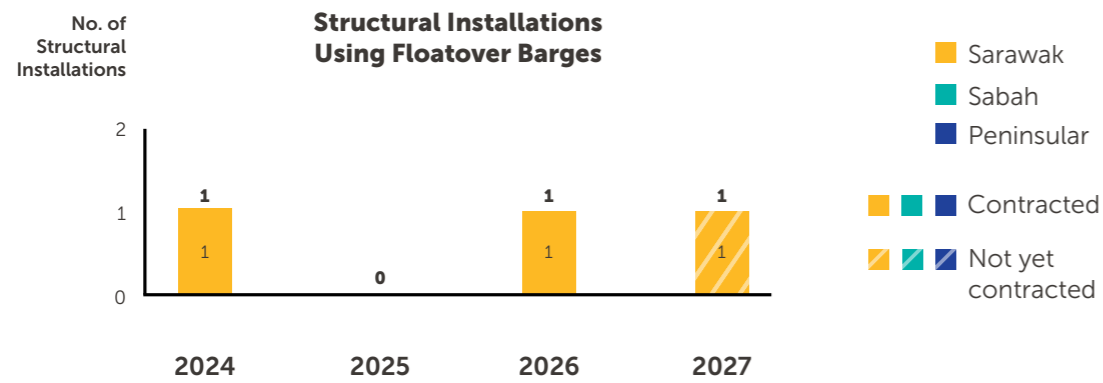
**Application:**

Used for installation of heavier or integrated topsides (for CPPs)

**Associated services:**

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

**Activity Outlook**



Note:  
Volume for 2026 has been contracted through Engineering, Procurement, Construction, Installation, Hook-up and Commissioning (EPCIC).

**Insights**

- Numbers indicated are measured in terms of numbers of activities.
- Modest outlook is expected for floatover barges with lower number of projects requiring CPPs.
- This outlook may be read together with the outlook for Fabrication and Construction based on respective project phases.





### Pipeline Installation – Pipelay

**Application:**

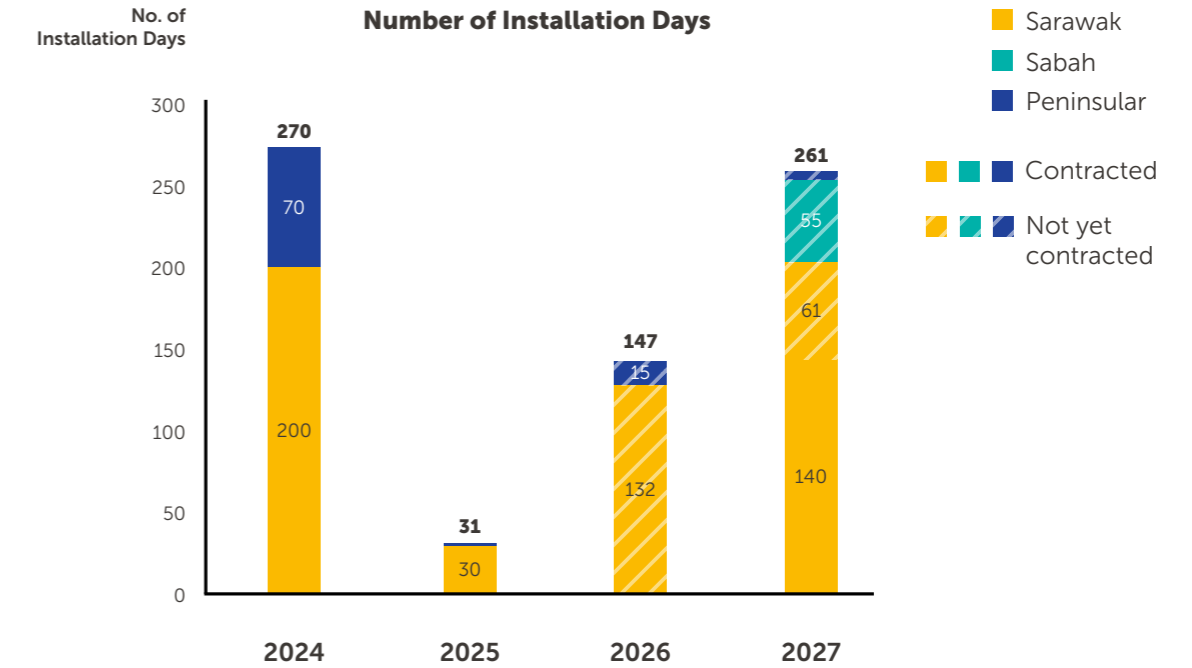
Used to install rigid linepipes (e.g. carbon steel, Corrosion Resistant Alloy (CRA), etc.) for offshore projects.

**Associated services:**

Supporting vessels, diving and remotely-operated vehicles (ROVs), fill joint coating services, welding and non-destructive testing (NDT).

Project	Length (km)
<b>Projects Under Execution</b>	
Rosmari Marjoram	227
Block H - Alum, Bemban, Permai	48
Berantai - E	3.6
Kasawari CCS	135
Irong Timur	20
Dulang FAC	0.15
<b>Upcoming Projects</b>	
Project 1	50
Project 2	84
Project 3	7
Project 5	0.5
Project 7	32
Project 17	120

### Activity Outlook



### Insight

- Installation days are calculated based on average laying rate of 160 joints or 2 km per day.

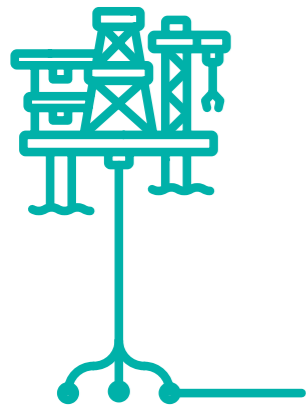
### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Transportation and Installation (T&I) of Offshore Facilities	2023 – Q3 2025	Transportation and installation services

## I. 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

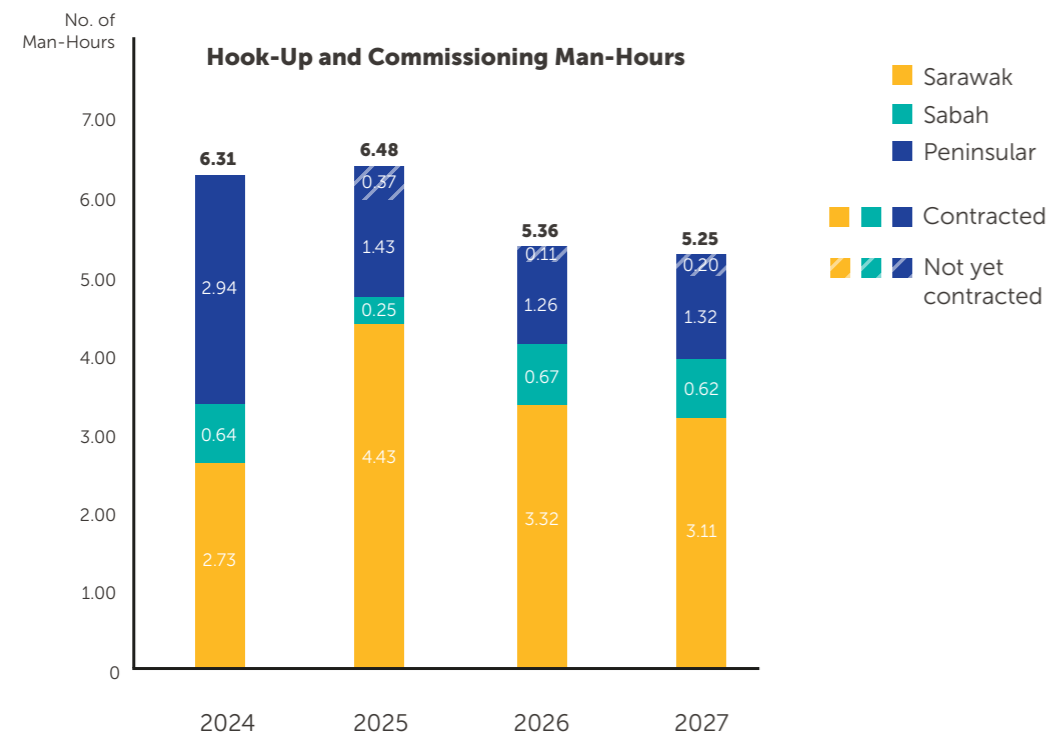
**Application:**

Greenfield HUC involves works on newly installed platforms during Development stage. Brownfield HUC involves works on existing offshore facilities and equipment, including rejuvenation/redevelopment, general topside modification and infill drilling activity, among others.

**Integrated services:**

Associated services: Marine spread (accommodation work barge, workboat, fast crew boat), logistics services, pre-commissioning services, inspection services and others.

### Activity Outlook



### Insight

- Outlook is expected to remain steady where the activities will be subjected to project host tie-in and commissioning requirement.



### Did You Know?

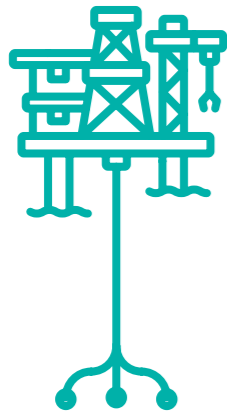
HUC works for 2025 to 2027 have been contracted through dedicated HUC contracts or integrated with offshore maintenance, construction and modification (MCM) scope under Pan Mal MCM-HUC contracts awarded in 2024, which are valid until Q4 2029. Nevertheless, there are still opportunities for HUC works with other non-participating PACs or new greenfield projects.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Pan Malaysia Offshore Maintenance, Construction, Modification (MCM) and Hook-Up & Commissioning (HUC) Services- PACs	2024 – Q3 2029 Extension option: 3 + 2 years	<ul style="list-style-type: none"> <li>• Maintenance, construction, modification (MCM)</li> <li>• Hook-up and commissioning (HUC) services</li> </ul>
<b>Individual - Upstream</b>		
Provision of Pan Malaysia Offshore Hook-Up & Commissioning (HUC) Services	2024 – Q3 2029 Extension option: 3 + 2 years	<ul style="list-style-type: none"> <li>• Hook-up and commissioning (HUC) services</li> </ul>

## J. 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.), assembly of subsea system and installation.

### 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.



#### Subsea umbilicals:

Cables that provide power, control, and communication between the surface and subsea equipment.

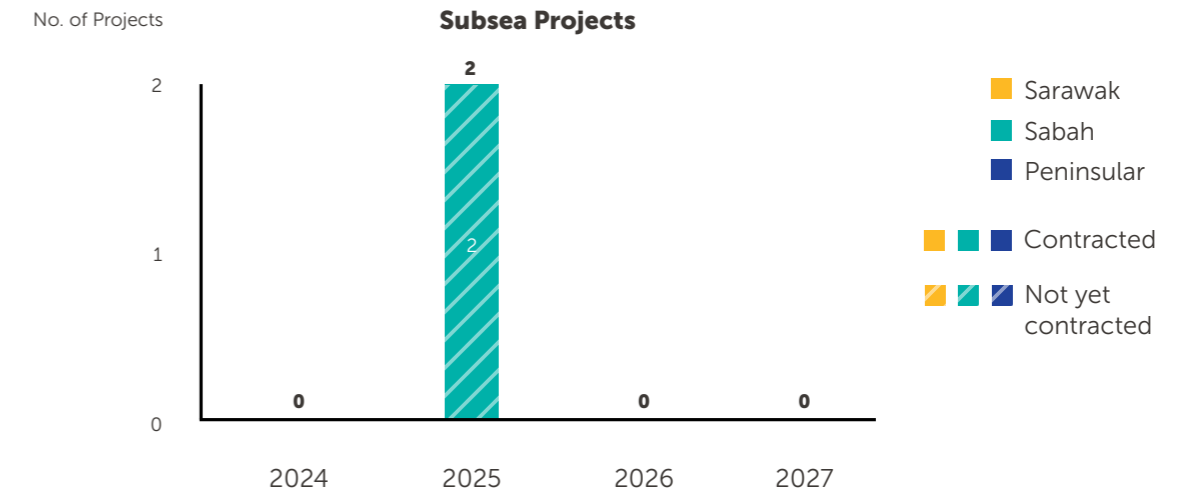
#### Risers:

Pipelines or conduits that transport produced fluids (oil, gas, and water) from the seabed to the surface facilities. Could be rigid or flexible, depending on the specific requirements of the project.

#### Flowlines:

Pipelines that transport the produced fluids between subsea wells and risers or between subsea processing facilities.

## Activity Outlook



## Insight

- Cost for subsea system is observed to be on the high side, threatening project viability. A low-cost solution is expected from the market for the project to be economically feasible.

## Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
	N/A	
<b>Individual - Upstream</b>		
	N/A	

## K. Floaters

Floating production system (FPS) or floaters, refers to the non-fixed structures involved in processing and/or storage of hydrocarbons, i.e. Floating Production Storage and Offloading (FPSO), Floating Storage and Offloading (FSO) including Mobile Offshore Production Units (MOPU).

### Application:

Used as relocatable production facilities, generally to evacuate hydrocarbons from marginal or isolated oil and gas fields without connectivity to export facilities (pipeline or tie-back) in the vicinity.

### Associated services:

Engineering, structural steel/bulk material, equipment supplies (e.g. mechanical, electrical, instrument, station-keeping, etc.), fabrication yards, shipyards, transportation and installation, hook-up and commissioning, Marine Warranty Surveyor, Operations and Maintenance (O&M) and demobilisation/decommissioning.



### Floating Production, Storage and Offloading (FPSO)

Floating facility used for the processing of hydrocarbons and oil storage before being offloaded onto a tanker for transportation at specified intervals.



### Floating Storage and Offloading (FSO)

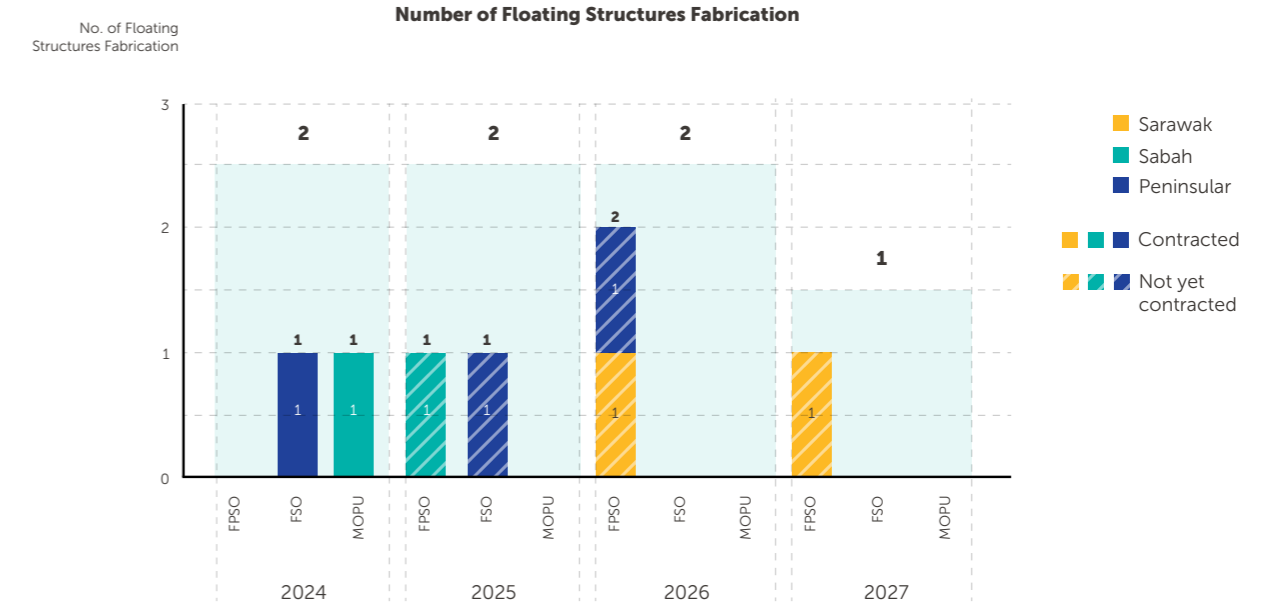
Floating facility to receive processed crude from other processing facilities, for oil storage and subsequently offloading onto a tanker at specified intervals.



### Mobile Offshore Production Unit (MOPU)

Portable structure in offshore well production, referring to portable processing facility or self-elevating production (including injection) facilities.

## Activity Outlook



### Insight

- For Malaysian waters, the most common floater sizes in demand are Aframax, Panamax or smaller.



## Did You Know?

Floaters are one of the unique offshore facilities which are regulated by two regulatory bodies; the Marine Department of Malaysia and Department of Occupational Safety and Health. Although it appears to be a marine vessel, floaters are considered as 'Offshore Terminals' once installed at the producing fields.

## Key Contract List

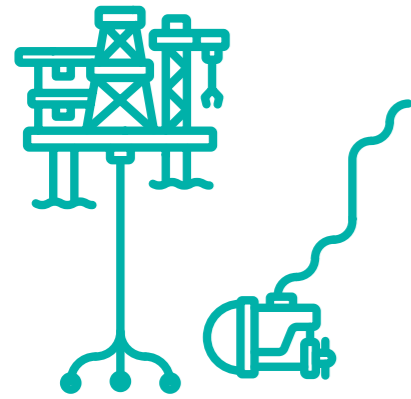
Contract Name	Contract Duration	Scope
<b>Individual - Upstream</b>		
N/A		



## L. Underwater Services

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

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

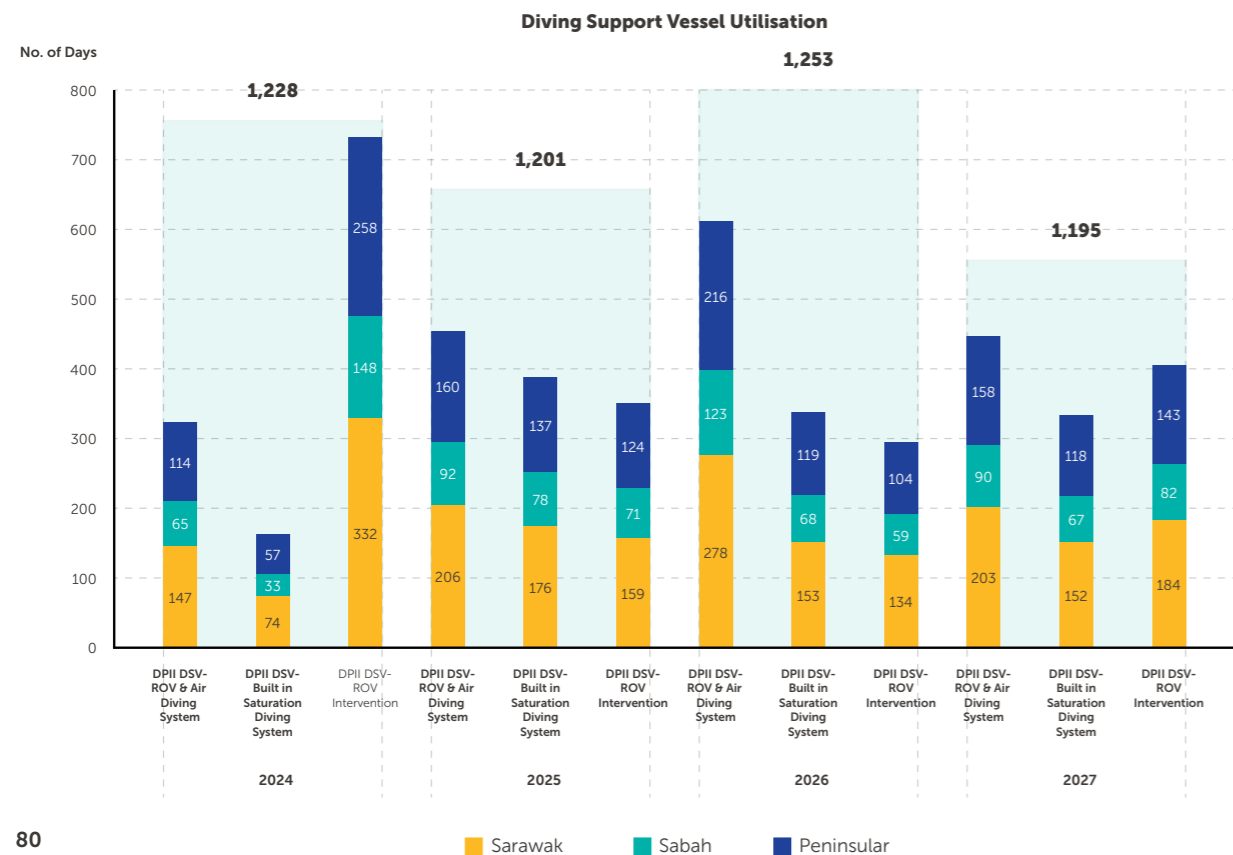


**Activity phase:** Development and Production

**Application:** Inspection, Repair and Maintenance (IRM) activities for continuity of services, safety and integrity of underwater structures e.g. platform jackets, pipelines, subsea intervention, underwater inspection in lieu of drydocking (UWILD) for Floating Production, Storage and Offloading (FPSO), among others.

**Associated services:** Diving and support vessel, air diving system, saturated diving system (SAT), remotely operated vehicles (ROV) and project management team (PMT) including specialised manpower (air diver, saturation diver, ROV, supervisor/pilot, among others).

### Activity Outlook



### Insights

- Demand for 2025 onwards is projected to remain steady.
- Outlook is based on forecasted number of days for execution of underwater activities utilising Dynamic Positioning Diving Support Vessel (DPDSV) where the estimated volume for each vessel specification (ROV/Air Dive/SAT) may vary depending on specific scope requirements by PACs.
- Approximately six to eight ROV/Air Dive/SAT vessels are required for the next three years for the PACs Underwater Services campaign.
- Based on historical trends, 45 per cent of the works are in Sarawak region, followed by Peninsular Malaysia (35 per cent) and Sabah region (20 per cent). Other scope prioritisation, ad hoc or emerging requirements may influence the outlook of the project needs.



### Did You Know?

The new Pan Malaysia Underwater Services contract has been awarded in Q1 2024 for a period of five years. Despite the current integrated contract approach for underwater services, there are opportunities for ancillary services such as divers, mini remotely operated vehicles (ROV), consumables and supply of ROV for well services intervention.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Underwater Services for PETRONAS Group of Companies and Petroleum Arrangement Contractors (PACs)	2024 – Q1 2029	<p>Inspection, maintenance and repair (IMR) for underwater facilities such as platform jackets, pipelines, subsea equipment and offloading facilities.</p> <p>Resources required:</p> <ol style="list-style-type: none"> <li>Air and saturation diving system</li> <li>Remotely Operated Vehicle (ROV) system</li> <li>Project Management Team (PMT), onshore and offshore personnel</li> <li>Inspection and supporting equipment</li> <li>Diving and support vessel                             <ul style="list-style-type: none"> <li>Dynamic Positioning (DP) II Support Vessel - 300m<sup>2</sup></li> <li>DP II Diving Support Vessel (DSV)- 500m<sup>2</sup></li> <li>DP II ROV Intervention Support Vessel - 500m<sup>2</sup></li> <li>DP II DSV- 500m<sup>2</sup> (Built-In Saturation Diving System)</li> <li>DP II DSV - 700m<sup>2</sup> (Built-In Saturation Diving System)</li> <li>DP II Intervention Support Vessel - 700m<sup>2</sup></li> <li>DP II DSV- 1000m<sup>2</sup> (Built-In Saturation Diving System)</li> <li>DP II Intervention Support Vessel – 1000m<sup>2</sup></li> </ul> </li> </ol>

## M. Offshore Maintenance, Construction and Modification

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

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



**Activity phase:** Production

**Application:**

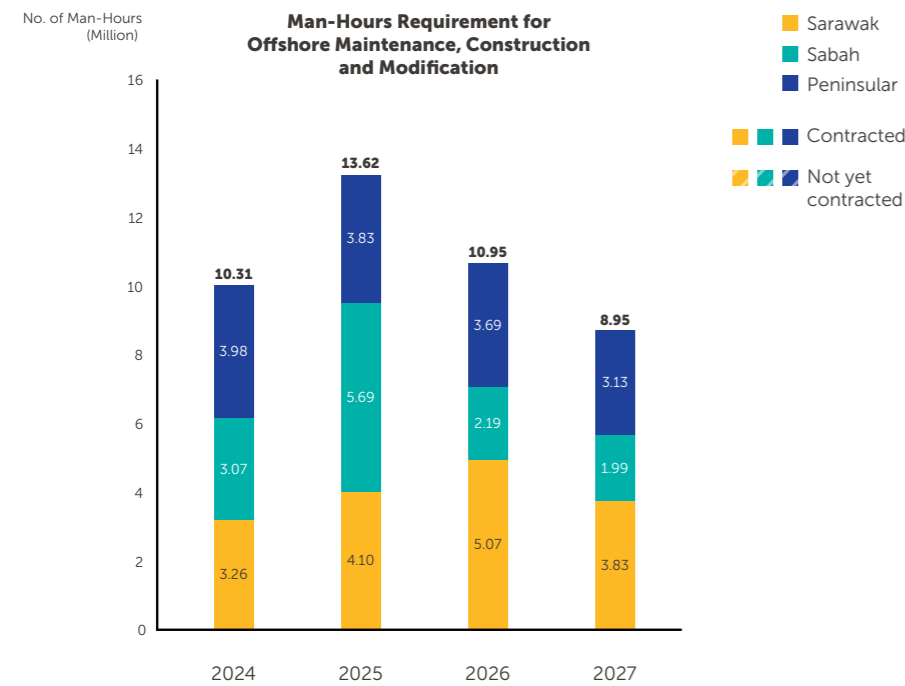
MCM involves two types of activities:

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

**Associated services:**

Supply vessel, inspection services, blasting, painting services, riser and pig trap system maintenance etc.

### Activity Outlook



### Insight

- Steady outlook can be expected for MCM activities for the next three years due to its cyclical nature and asset restoration to comply to facilities maintenance requirement.



### Did You Know?

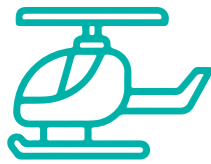
The main integrated contract for Offshore MCM scope for Petroleum Arrangement Contractors (PACs) has just been awarded for a period of five years until Q4 2029.

There are sub-contracting scope opportunities e.g. welding habitat, vessel cleaning, engineering design and many others.

### Key Contract List

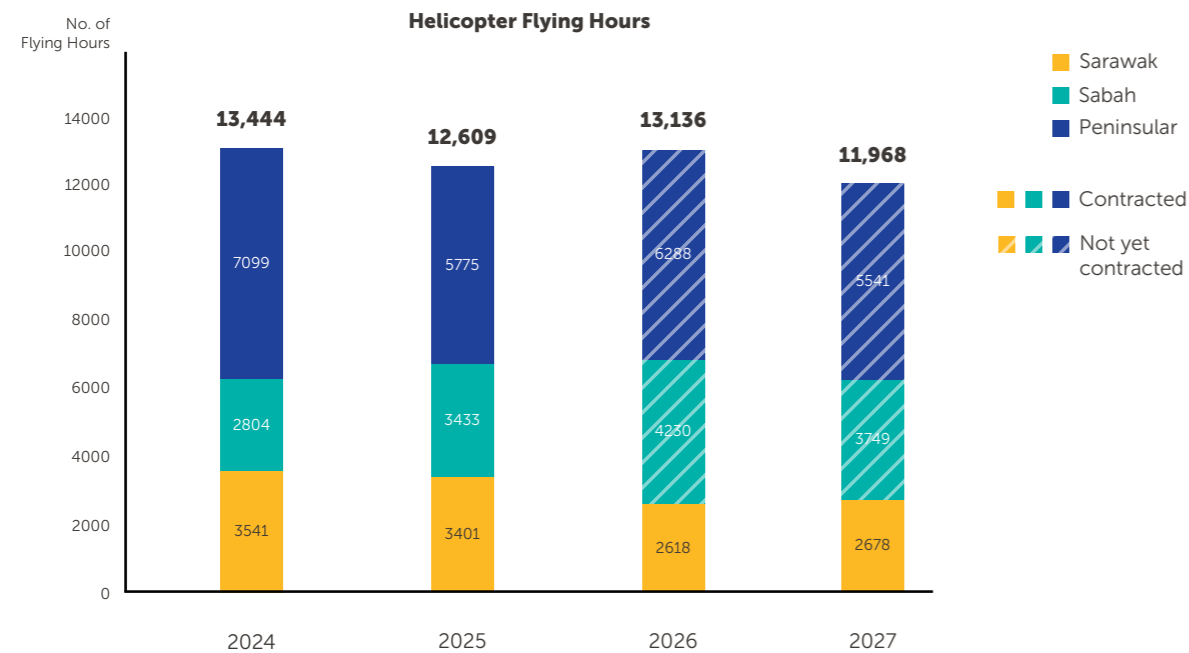
Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Pan Malaysia Offshore Maintenance, Construction, Modification (MCM) and Hook-Up & Commissioning (HUC) Services- PACs	2024 – Q3 2029 Extension option: 3 + 2 years	<ul style="list-style-type: none"> <li>Maintenance and construction modification (MCM)</li> <li>Hook-up and commissioning (HUC) services</li> </ul>
<b>Individual - Upstream</b>		
Provision of Rectification Works and Associated Services for Asset Integrity Findings (AIF)	2023 – Q4 2026 Extension option: 1 year	<ul style="list-style-type: none"> <li>Maintenance and rectification works</li> </ul>
Provision of Pan Malaysia Offshore Maintenance, Construction, Modification (MCM)	2024 – Q3 2029 Extension option: 3 + 2 years	<ul style="list-style-type: none"> <li>Maintenance and construction, modification (MCM)</li> </ul>

## N. Helicopter Services



Helicopter Services scope mainly cover the requirement of fully equipped aircraft(s), crew and facilities to undertake the transportation of personnel, Medical Evacuation (MEDEVAC) support and limited search and rescue deployment between helibases and any offshore locations for PACs' operations in Malaysia.

### Activity Outlook






### Insights





- The number of offshore helicopters are determined based on the forecasted Flying Hours (FHs) to meet business needs, particularly production, drilling campaigns and projects.
- The demand for production operations is forecasted to stabilise with annual average FHs of 9,000 (75 per cent), while FHs for drilling/projects will fluctuate between 2,000 - 4,000, accounting for 25 per cent of the total demand.
- Post 2027, the demand for production will maintain with some fluctuation in drilling demand between 2,000 - 3,000 FHs in 2028.
- All requirements post 2026 have not been contracted except for Sarawak requirement (active up to 2028).
- PETRONAS is embarking on a feasibility study to consider the potential for Sustainable Aviation Fuel (SAF) utilisation to reduce Carbon Dioxide (CO<sub>2</sub>) emissions by up to 80 per cent, with minimum target of 1 per cent SAF blend by 2028.
- The helicopter utilisation is based on 150 hours per unit per month. The demand outlook was based on Petroleum Arrangement Contractors' (PACs) forecast as of Q3 2024 and excludes ad hoc demands from wells, projects or turnaround.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Rotary Wing Aircraft, Equipment and Services (for Medium Type Aircraft) for Kertih Operations	2021 – Q1 2026	Helicopter services scope cover transportation of personnel between helibases and any onshore/offshore locations for Malaysia operations
Provision of Rotary Wing Aircraft, Equipment and Services (for Medium Type Aircraft) for Kota Bharu	2021 – Q1 2026	
Provision of Aviation Services (Monsoon Season) for Kertih Operations	2021 – Q1 2026	
Provision of Aviation Services for Sabah Operations	2021 – Q1 2026	
Provision of Offshore Helicopter Services for Miri Operations	2023– Q1 2028	

## O. Offshore Support Vessels (OSV)

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

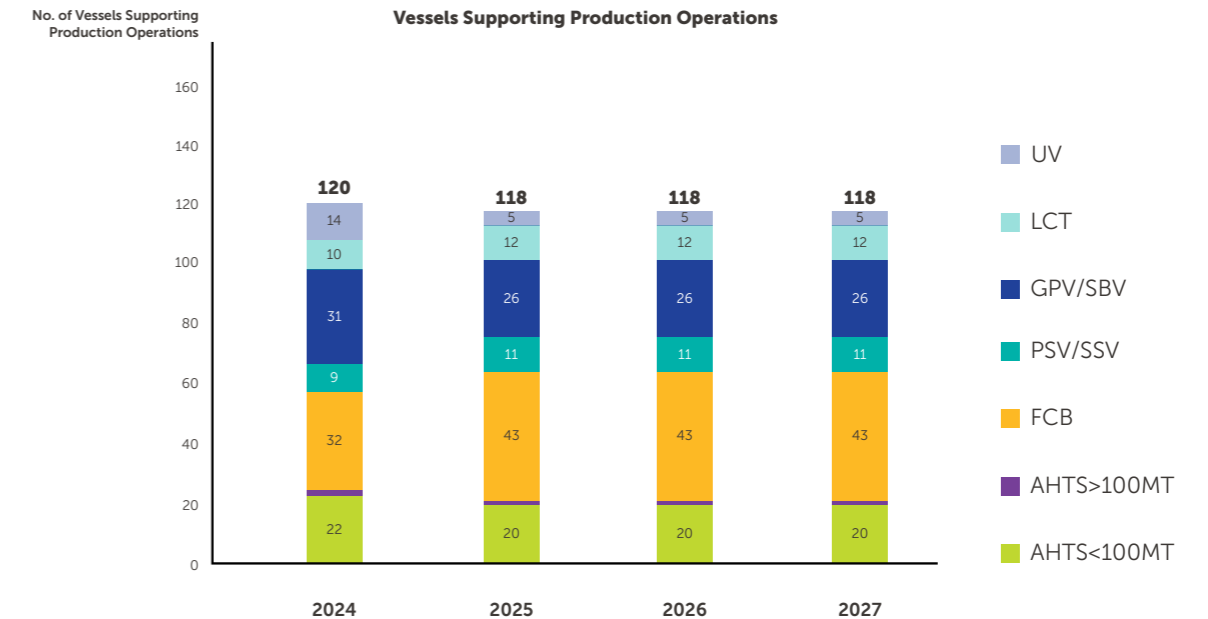
Type of Vessel	 Workboat/ Work Barge	 General Purpose Vessel (GPV)/Standby Vessel (SBV)	 Utility Vessel (UV)	 Fast Crew Boat (FCB)
Activity Phase	<ul style="list-style-type: none"> <li>Development</li> <li>Production</li> <li>Abandonment</li> </ul>	<ul style="list-style-type: none"> <li>Development</li>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



### Did You Know?

Based on supply and demand analysis of OSVs in Malaysia, there will be a critical shortage of AHTS < 80MT beyond 2030, unless owners acquire new vessels.

## Activity Outlook



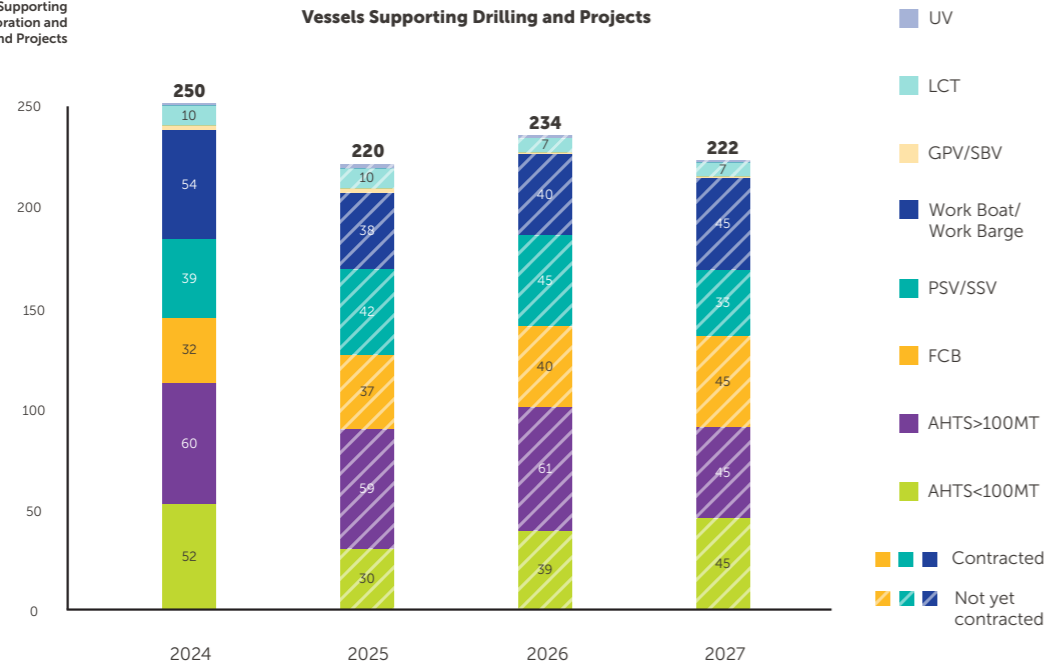
## Insights

- Workbarge/workboat is repositioned under Drilling (Exploration and Development) and Projects segment instead of Production Operations.
- The offshore support vessel (OSV) demand by region is forecasted at 45 per cent, 37 per cent and 18 per cent for Sarawak, Peninsular Malaysia and Sabah respectively.
- A steady demand trend is projected from 2025 to 2027 attributed to the stability in production activities during this period. The vessels required for 2025 to 2027 have been contracted under Production Operations Vessel (POV) contract.
- The high number of ageing vessel servicing production operations is a concern if there are insufficient newbuilds coming into the market within the next three years. OSV owners embarking on fleet renewal should consider fuel efficient technologies including diesel electric vessels to reduce total operational cost for PACs.

Activity Outlook

No. of Vessels Supporting Drilling (Exploration and Development) and Projects

Vessels Supporting Drilling and Projects



Note: Volume allocation will be subjected to Work Order/Mini Bidding exercise

Insights

- The requirement above represents the vessel requirement with varied contract durations based on planned project/activity timeline. Vessel requirement is typically higher in Q2 and Q3 period.
- The majority of vessel required to support Drilling (Exploration and Development) and projects will be sourced via PAC's panel contractor contract.
- Outlook for the next three years depicts a moderate requirement in 2025 with minor fluctuations in demand until 2027 which is reflective of the planned drilling, MCM, HUC and T&I activities during that period.

Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Panel Contractor Contract (PCC) for Offshore Support Vessel (OSV) Services	2024 – Q2 2027	Vessels supporting drilling and projects
Provision of Production Operations Vessels (POV)	2024 – Q4 2027	Vessels supporting production operations



## P. Supply Base

Oil and gas supply bases are strategically positioned to facilitate extensive exploration and production operations in both East and West Malaysia. These bases function as logistical hubs for the storage, consolidation, and transportation of supplies and equipment to ensure seamless offshore operations. Currently there are four locations as follows:

1. Kemaman Supply Base, Terengganu
2. Asian Supply Base, Wilayah Persekutuan Labuan
3. Tok Bali Supply Base, Kelantan
4. Borneo Oil and Gas Supply Base, Sarawak (BOG) (formerly known as Bintulu Port)

### Insight



- All four supply bases are projected to have sufficient storage capacity to accommodate current and upcoming offshore production operations and continuous field exploration activities in Peninsular Malaysia, Sabah and Sarawak for the next three years.

### Key Contract List

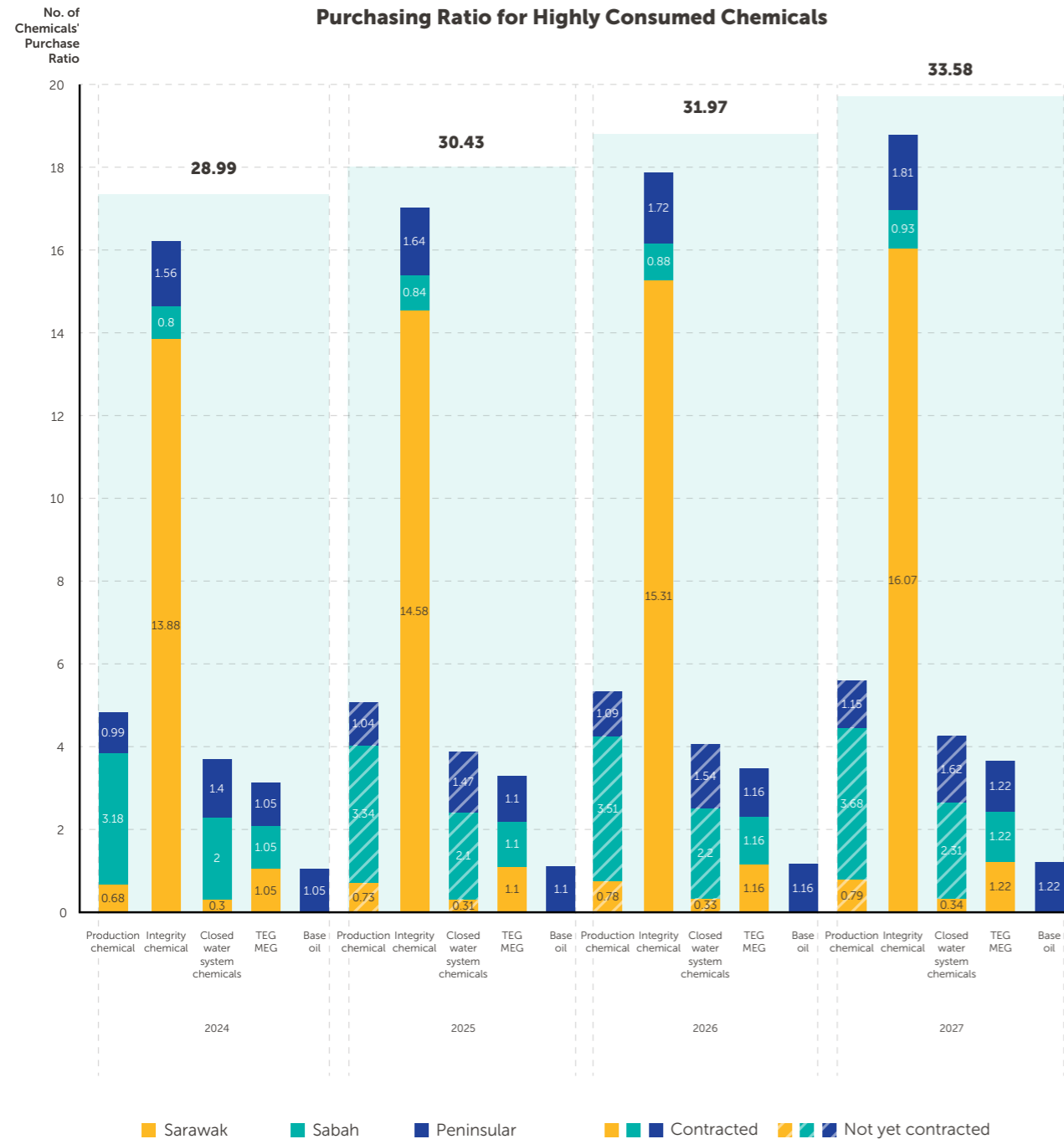
Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Provision of Supply Base Facilities with Associated Services and Lease of Premises at Tok Bali Supply Base (TBSB)	2023 – Q2 2025	Supply base covers the provision of supply base facilities such as warehouse, open yard, offices etc. and its associated services such as material handling equipment, crew change operations, berth facility, schedule waste management and manpower services.
Provision of Supply Base Facilities, Services and Tenancy of Premises for Petroleum Arrangement Contractors (PACs) at Bintulu Port Sdn Bhd (BPSB)	2023 – Q2 2025	
Provision of Supply Base Facilities, Services and Tenancy for Petroleum Arrangement Contractors (PACs) at Asian Supply Base (ASB)	2022 – Q2 2031	
Provision of Supply Base Facilities, Services and Tenancy for Petroleum Arrangement Contractors (PACs) at Kemaman Supply Base (KSB)	2023 – Q3 2032	

## Q. Chemicals

Chemicals are consumed in upstream business, mainly during operation and maintenance activities.

	 <b>Process Chemicals</b>	 <b>Commodity Chemicals</b>
<b>Description</b>	Chemicals that are specialised and used to accelerate plant processes, maximise asset reliability and/or improve productivity.	Chemicals that are standardised and commonly used in process and operations.
<b>Examples</b>	<ul style="list-style-type: none"> <li>i. Closed Water System chemicals</li> <li>ii. Corrosion Inhibitors and Biocides</li> <li>iii. Production Chemicals</li> </ul>	<ul style="list-style-type: none"> <li>i. Base oil</li> <li>ii. Glycols</li> </ul>
<b>Outlook</b>	<ul style="list-style-type: none"> <li>• Key elements for price of chemicals refer to cost of raw materials and logistics.</li> <li>• Key drivers for PETRONAS chemicals demand are dependent on factors such as ageing assets, turnaround and shutdown (TASD), new projects, new plants onstream, longevity and lifespan of the chemicals.</li> <li>• Base oil and production chemicals are the major contributors of chemicals spend.</li> <li>• Chemicals consumption may not be extensive however it is essential to collaborate with others for the advancement of chemicals technology, which is not limited to product delivery but also in product management and sustainability.</li> <li>• Chemicals and/or chemical services that extend longevity of assets, optimise and/or improve reliability and productivity are advantageous.</li> </ul>	

Activity Outlook



Note: Chemicals' purchase ratio is based on the forecasted purchase in comparison to actual purchase in base year 2023 for production chemical, integrity chemical and closed water system chemicals covering only PETRONAS Upstream activities.

Insights

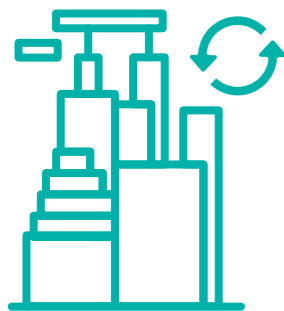
- Production Chemicals: The production chemical utilisation is very dependent on the field production, thus the values for 2025 to 2027 are based on the field production profile that has been established.
- Integrity Chemicals: The upcoming utilisation of Integrity Chemicals is projected to be significant, with a steady increase in the following years. Continuous requirement is needed in ensuring asset integrity and reliability especially to protect the pipeline, equipment and piping from corruptions or leaks.
- Closed Water System Chemicals: The requirement for Closed Loop Cooling Water (CLCW) is expected to have a notable expenditure, with a gradual increase in 2026 and 2027. There is a continuous need for purchases and services related to the cooling water system to maintain the integrity and reliability of our assets.
- Triethylene Glycol (TEG) and Monoethylene Glycol (MEG): The spend outlook for TEG and MEG are projected to be high, with a steady increase in the following years with secured long-term contract.
- Base Oil: Requirements for Base Oil will continue to have substantial expenditure in 2025 and is expected to gradually increase in 2026 and 2027.

Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream</b>		
Price Agreement For The Supply & Delivery Of Base Oil For Petroleum Arrangement Contractors (PACs)	2024 – Q1 2029	Base Oil delivery
Price Agreement For The Supply And Delivery Of Triethylene Glycol (TEG) And Monoethylene Glycol (MEG) For Petroleum Arrangement Contractors (PACS)	2023 – Q2 2028	TEG and MEG delivery
<b>Individual - Upstream</b>		
Supply Of Integrity Chemicals (Biocide & Corrosion Inhibitor) And Associated Services	2023–Q3 2030	Integrity Chemicals delivery
Provision Of Chemical Treatment And Chemical Cleaning Services Of Closed Loop Cooling Water (CLCW) Systems	2023– Q1 2025	Closed Water System Chemicals delivery

## R. Onshore Turnaround

Onshore plant turnaround refers to the planned turnaround or periodic shutdown of an onshore process plant to perform equipment maintenance, overhaul, inspection, repairs, replacement, catalyst change out and other activities. These operations are meticulously planned and executed to minimise downtime and optimise the plant's performance. The critical aim of plant turnaround is to enhance the plant's efficiency, ensure regulatory compliance and extend the lifespan of the equipment. Turnaround activity is a labour intensive work, hence activity outlook is stated in man-hour units.



**Activity phase:** Operations

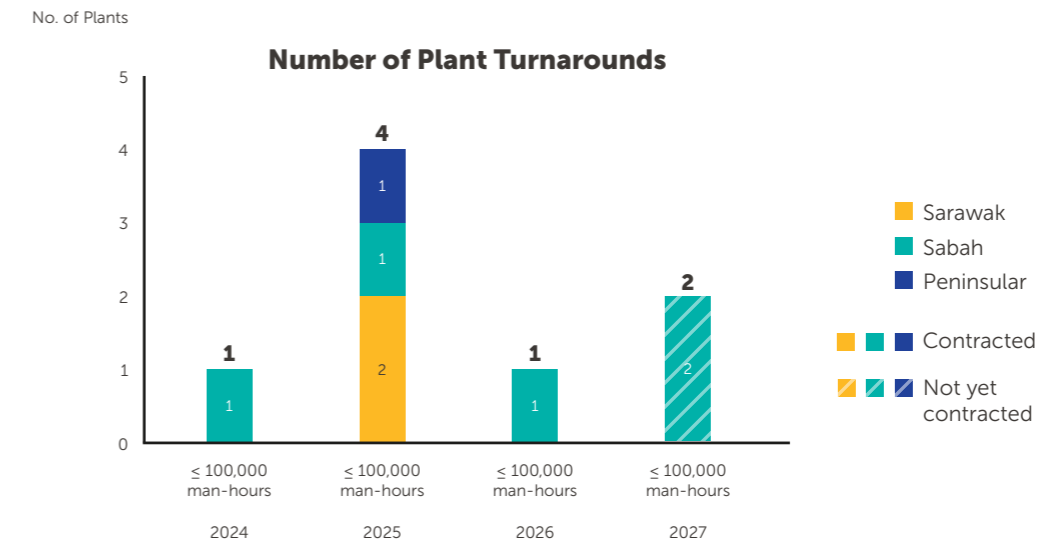
**Application:**

Onshore plant turnaround is scheduled periodically in which the entire facility is taken off-stream for a certain period to conduct maintenance and inspection activities in achieving smooth functioning, safety and efficiency of plant facilities.

**Associated services:**

Equipment services (e.g., mechanical, electrical, instruments, etc.), inspection services, manpower and equipment supply and rental.

### Activity Outlook



### Insights

- Increase in onshore plant turnaround activities for 2025 is driven by the alignment with the turnaround or shutdown of downstream plants and offshore platforms. The shutdown of offshore platforms allows the upstream onshore terminals to conduct major maintenance activities during this period, as there is no product flow to the terminal.
- The turnaround or shutdown activities for 2026 are scheduled according to the offshore platforms shutdown plan. Meanwhile in 2027, the activities are planned to cater for the Special Scheme Inspection (SSI) at terminals.

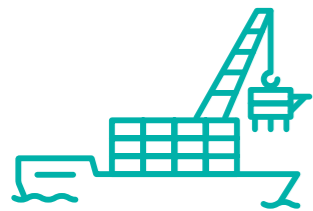
### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Upstream, Downstream and Gas</b>		
Groupwide Master Service Agreement (MSA) for Integrated Turnaround Main Mechanical Works & Maintenance Mechanical Static (TA4MS)	2024 – Q1 2025 Extension option: 1 year	Turnaround, shutdown and maintenance for mechanical works on static equipment (including piping and structures) i.e. equipment maintenance, replacement, overhaul, inspection, repair, etc.



## S. Decommissioning

Decommissioning in the oil and gas industry represents the end of productive lives of wells and facilities, comprising of permanently closing wells and the removal of assets as approved and/or directed by PETRONAS, and in doing so minimising further impact to the environment.



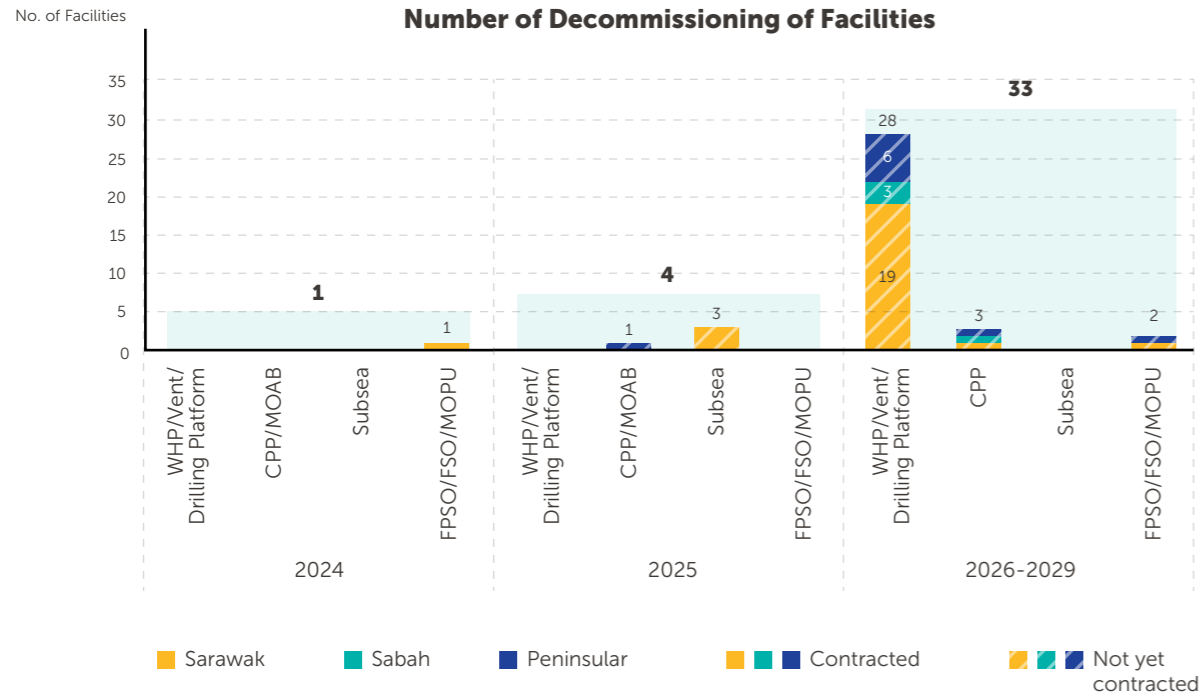
**Activity phase:** Abandonment

**Application:**

Permanent make safe of facilities, including Wellhead Platform (WHP), Central Processing Platform (CPP), subsea facilities, floaters, pipeline and onshore receiving terminals.

**Associated services:**

Drilling rigs and Hydraulic Workover Unit (HWU), wireline and slickline services, third-party drilling services, offshore support vessels, heavy lift vessels, engineering services, cutting services, pipeline flushing, conductor removal, transport, yard facility and many others.



MOAB: Mobile Offshore Application Barge

WHP: Wellhead Platform

CPP: Central Processing Platform

FPSO: Floating Production, Storage and Offloading

FSO: Floating Storage and Offloading

MOPU: Mobile Offshore Production Unit

### Insights

- PETRONAS continues to explore innovative decommissioning solutions focusing on technologies, reuse/repurpose options, integrated multi-year execution approach for economies of scale, as well as identifying potential alternatives that can introduce cost compression. Thus, participation and collaboration are encouraged from all parties.
- PETRONAS is set to embark on large-scale facilities decommissioning exercise to address the increasing number of mothballed facilities and return the sites to an environmentally stable condition.



### Did You Know?

PETRONAS, in collaboration with the Department of Fisheries, launched the 10-year Malaysia Master Reefing Plan (MMRP) in December 2024, which outlines potential reefing candidates and reefing locations, as part of sustainability efforts.

### Key Contract List

Contract Name	Contract Duration	Scope
Individual - Upstream	N/A	

# 6.3 Downstream Outlook



## Business Overview

PETRONAS' Downstream Business maximises and transforms our resources into high-quality, value-added products, catering to over 100 markets globally. It encompasses a diverse set of activities, including refining, marketing and trading of crude oil and petroleum products, as well as manufacturing and marketing of chemical products. These include:

Petroleum products	Chemical products	
<ul style="list-style-type: none"> <li>Petrol</li> <li>Diesel</li> <li>Lubricants</li> </ul>	<b>Commodity chemicals</b> <ul style="list-style-type: none"> <li>Methanol, aromatics and Methyl Tertiary Butyl Ether (MTBE)</li> <li>Ammonia and fertilisers</li> <li>Olefins, glycols and derivatives</li> <li>Polymers</li> <li>Isononanol</li> </ul>	<b>Specialty chemicals</b> <ul style="list-style-type: none"> <li>Resins and coatings</li> <li>Engineered fluids</li> <li>Advanced materials</li> <li>Animal nutrition</li> <li>Silicones</li> <li>Lube oil additives and chemicals</li> </ul>
Convenience business		
<ul style="list-style-type: none"> <li>Setel</li> <li>Cafe Mesra</li> </ul>		

The current immediate focus for Downstream is sustaining operational and commercial excellence to capture growing market opportunities while diversifying its product portfolio to align with evolving customer preferences.

Refining and Trading	Petrochemical	Marketing
<p><b>3</b></p> <p>Melaka, with a capacity of more than 275 thousand barrels per day (kbpd)</p> <p>Terengganu, with a capacity of more than 120 kbpd</p> <p>Johor, with a capacity of approximately 300 kbpd</p>	<p><b>19</b></p> <p>Manufacturing sites, with a production capacity of approximately 15 million tonnes per annum (MTPA)</p>	<p><b>&gt;1,100</b> Retail Stations</p> <p><b>10</b> Lube Oil Blending Facilities</p> <p><b>6</b> Joint Venture (JV) Depots and Facilities</p> <p><b>10</b> Bunkering Facilities</p> <p><b>38</b> Terminals</p>



### Did You Know?

#### Pengerang Integrated Complex (PIC)

Measuring more than 6,000 acres, the Pengerang Integrated Complex expands the downstream value chain from refining to steam cracking and further into other petrochemical plants. PIC maximises its value chain through sustainable growth and long-term profitability in the energy sector.

## Specialty Chemicals

PETRONAS has been actively pursuing growth in specialty chemicals since 2017, to future-proof against the cyclical nature and volatility of the oil and gas industry.

Through the capabilities of the Specialty Chemicals division under PETRONAS Chemicals

Group Berhad (PCG), which includes the BRB Group and Perstorp Group, PETRONAS offers a diverse portfolio of products encompassing resins and coatings, engineered fluids, advanced materials, animal nutrition, silicones and lube oil additives and chemicals, all designed to advance customers' everyday lives.

## New Plastics Economy

PETRONAS is committed to driving the transition towards a circular economy as part of its efforts to contribute to a lower-carbon future.

A key milestone in this effort is PCG's development of Malaysia's first advanced chemical recycling plant in Pengerang, which will transform end-of-life plastic waste into pyrolysis oil, providing feedstock for sustainable plastics production.

As part of PCG's New Plastics Economy strategy, this initiative supports the phasing out of single-use plastics by fostering the development of a sustainable plastics ecosystem and encouraging innovation throughout Malaysia's plastics value chain, providing opportunities for all stakeholders to engage actively in the circular economy.

## Biofuels

Through our partnership with Enilive and Euglena, PETRONAS will produce biofuels through a biorefinery, which is slated to be operational by the second half of 2028 in the Pengerang Integrated Complex.

The biorefinery will have the capability to produce Sustainable Aviation Fuel (SAF) and other biofuels such as Renewable Diesel or Hydrogenated Vegetable Oil (HVO) to cater to the growing demands of the global aviation and transportation industries by tapping each partner's expertise.

## Electric Vehicle Fluids

PETRONAS is one of the pioneers in the industry to introduce a dedicated range of fluids for electric vehicles, PETRONAS Iona.

PETRONAS Iona enables customers and businesses to accelerate the efficiency of their electric vehicles while supporting the world towards a lower-carbon future.

PETRONAS Iona helps customers and businesses enhance energy efficiency and sustainability in electric vehicles and beyond.

Recently, PETRONAS Lubricants International has introduced PETRONAS Iona Tera, a range of high-performance dielectric fluids engineered to cater for immersive cooling setups and effectively thermal manage the hardware components delivering optimised performance and durability for today's precision liquid cooling solutions.

Through solutions developed with key industries, PETRONAS Iona is actively contributing to overcoming global energy challenges to achieve net zero carbon emissions by 2050.

## Convenience Business

Through its marketing arm, PETRONAS Dagangan Berhad (PETRONAS Dagangan), PETRONAS is transforming its stations into lifestyle hubs that go beyond just providing fuel. By delivering convenience and digital services, PETRONAS Dagangan aims to meet the evolving needs of today's on-the-go customers.

At the core of this transformation is Kedai Mesra, PETRONAS Dagangan's network of convenience stores which offers a wide range of products and services. From snacks, beverages and local delicacies to essential items, Kedai Mesra is dedicated to making life simpler and better for every visitor.

Complementing this, Café Mesra stands out as a down-to-earth, no-frills café that serves quality coffee and food at affordable prices. Focused on delivering value with its customer-centric service, Café Mesra offers a simple yet satisfying experience, making it a go-to spot for quick meals or a relaxing break.

On the digital front, Setel, a mobile app for motorists who are constantly on the go, has been growing from strength to strength, delivering greater convenience to customers. With just one app, customers are able to pay for fuel, locate nearby charging stations for electric vehicles, pay for on-street or building parking, insurance and road tax.

# Downstream Activity Phases



Refinery



Petrochemicals



Chemicals

Plant Turnaround

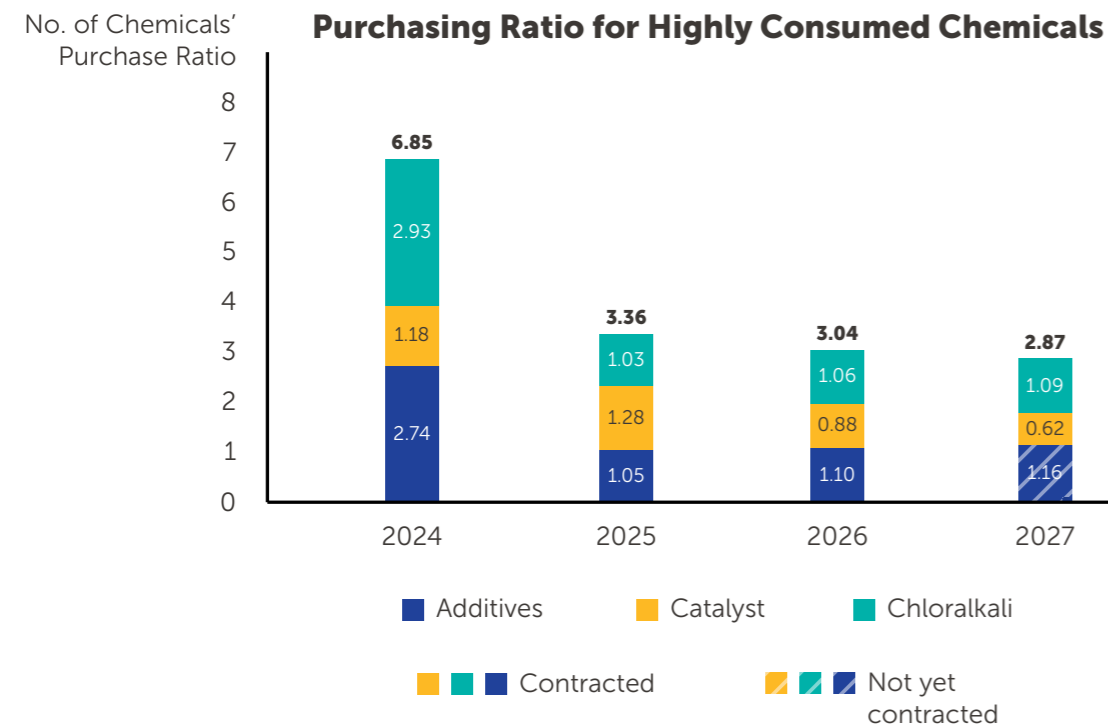
Equipment, Machineries and Facilities Maintenance



## A. Chemicals

	 <b>Process Chemicals</b>	 <b>Commodity Chemicals</b>
<b>Description</b>	Chemicals that are specialised and used to accelerate plant process, maximise asset reliability and/or improve productivity.	Chemicals that are standardised and commonly used in process and operations.
<b>Examples</b>	<ul style="list-style-type: none"> <li>Additives</li> <li>Catalyst</li> </ul>	<ul style="list-style-type: none"> <li>Chloralkali</li> </ul>

### Activity Outlook



Note:  
Chemicals' Purchase Ratio is based on the forecasted purchase in comparison to actual purchased in base year 2023 for catalyst.

### Insights

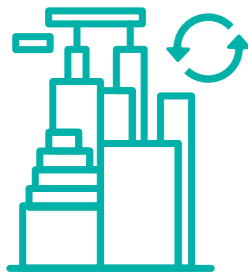
- Additives:** Continuous requirement for purchases and services related to additives across PETRONAS Operating Plant Units (OPUs) in ensuring product quality for the years 2025 to 2027.
- Catalyst:** Continuous requirement for purchases and services related to catalyst and internal media across OPUs in view of multiple change-out or top-up requirements for the years 2025 to 2027.
- Chloralkali:** Continuous requirement for purchases and services related to chloralkali in ensuring neutralisation of unwanted byproducts and/or asset integrity/reliability for the years 2025 to 2027.
- Key drivers for PETRONAS chemicals demand are dependent on asset operation requirements, turnaround and shutdown (TASD), new projects, new plants onstream, longevity and lifespan of the chemicals.
- Chemicals consumption may not be extensive. However, it is essential to collaborate with others for advancement of chemicals technology, which is not limited to product delivery but also in products management and sustainability.
- Chemicals and/or chemical services that extend assets longevity, optimise and/or improve reliability and productivity are advantageous.
- More companies are embracing sustainability to improve processes, pursue growth and add value to their companies instead of focusing on reputation only. Research shows that companies aligned with sustainability have higher valuation - thus adoption of holistic approach to ESG is essential in the long run.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Individual - Downstream</b>		
Supply of Catalyst	2023 – Q4 2024	Supply of catalyst
Supply of Chemical Additives	2023 – Q4 2026	Supply of chemical additives
Supply of Catalyst and Operational Technical Support	2023 – Q4 2028	Supply of catalyst and technical support services
<b>Integrated - Downstream and Gas</b>		
Supply of Catalyst and Adsorbents	2023 – Q4 2028 Extension option: 5 years	Supply of catalyst and adsorbents
Supply of Caustic Soda	2023 – Q4 2028	Supply of caustic soda

## B. Plant Turnaround

Plant turnaround refers to the planned turnaround or periodic shutdown of onshore process plant to perform equipment maintenance, overhaul, inspection, repairs, replacement, catalyst change out and other activities. These operations are meticulously planned and executed to minimise downtime and optimise the plant's performance. The critical aim of plant turnaround is to enhance the plant's efficiency, ensure regulatory compliance and extend the lifespan of the equipment. Turnaround activity is a labour intensive work, hence activity outlook is stated in man-hour units.



**Activity phase:** Operations

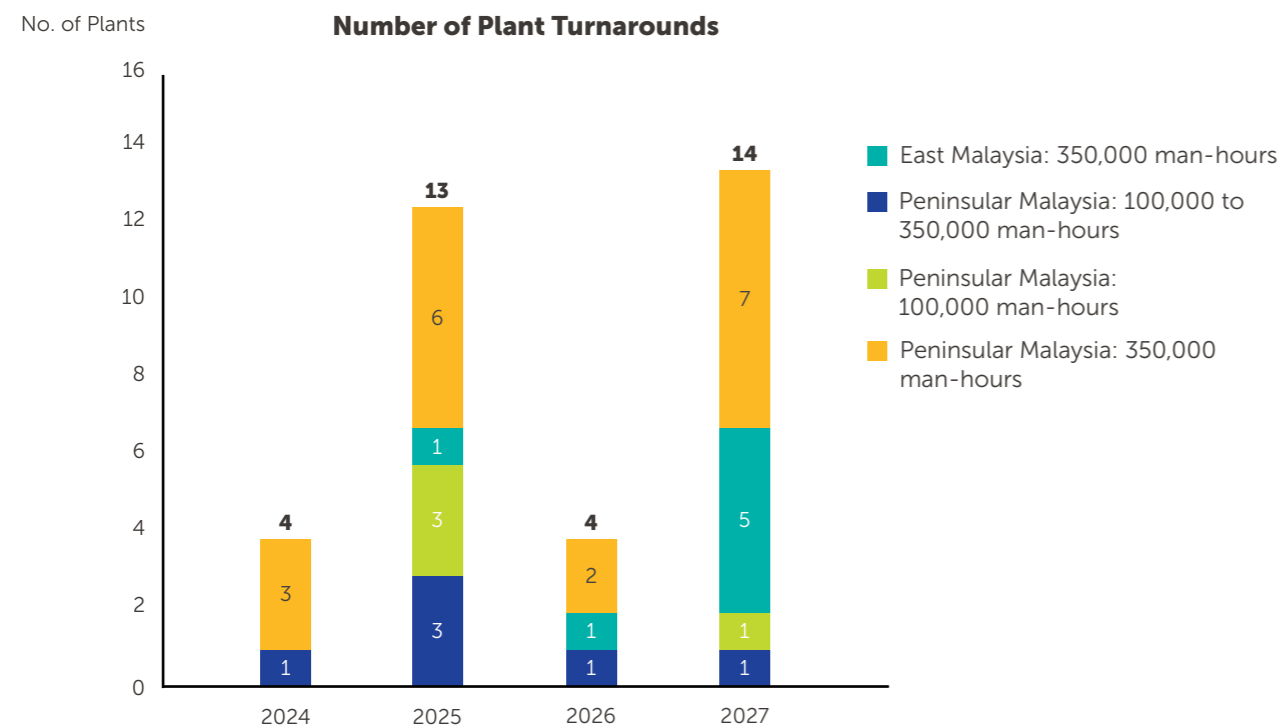
**Application:**

Plant turnaround is scheduled periodically in which the entire facility is taken off stream for a certain period to conduct maintenance and inspection activities in achieving smooth functioning, safety and efficiency of plant facilities.

**Associated services:**

Equipment services (e.g. mechanical, electrical, instruments, etc.), inspection services, manpower and equipment supply and rental.

### Activity Outlook



### Insights

- All requirements for 2024 to 2026 have been contracted.
- Positive outlook is expected for the next three years, especially for the years 2025 and 2027. Significant increase in number of turnarounds contributed by requirement at Peninsular Malaysia, East Coast, Pengerang and Sarawak.
- While a majority of the main mechanical package has been contracted out, there are opportunities for involvement in scopes such as catalyst change-outs, equipment supply, support services and others.
- PETRONAS is embarking on a Self Regulation (SR) initiative which is expected to reduce the number of turnaround post SR certification while shifting focus to maintenance.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Gas, Downstream and Upstream</b>		
Integrated Turnaround Main Mechanical and Maintenance Mechanical Static	2019 –Q1 2027 Extension option: 2 years	Turnaround, shutdown and maintenance for mechanical works on static equipment (including piping and structures) i.e. equipment maintenance, replacement, overhaul, inspection, repair, etc.

## C. Equipment, Machineries and Facilities Maintenance

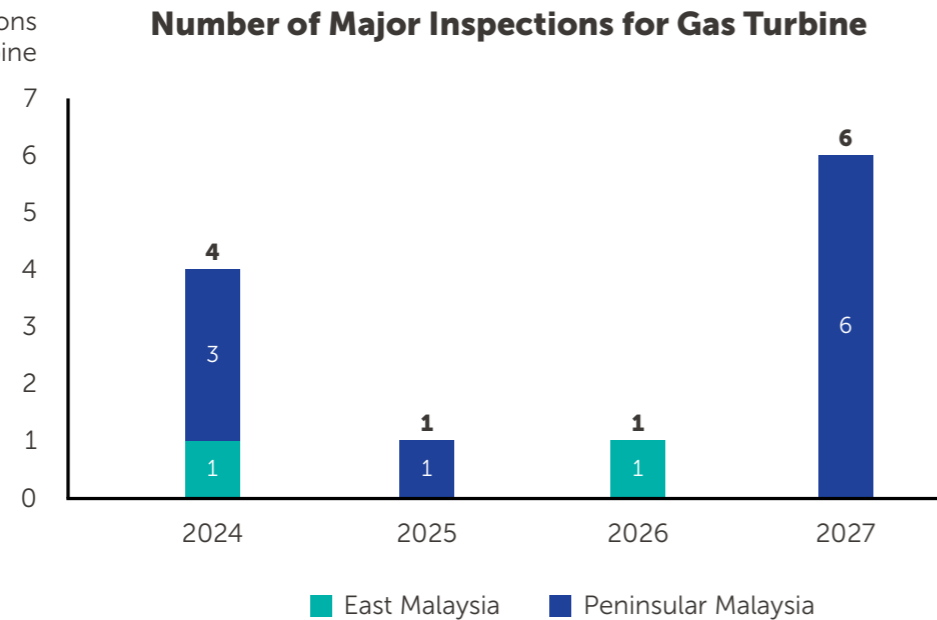
**Gas turbine services** – Major inspection (MI) gas turbine parts are subjected to high temperature and cyclic stresses during normal operation. The aim of a major inspection is to examine all rotor and stator inner parts. The inspection shall ensure the integrity of the parts, and the gas turbine can be operated with high availability and reliability until the next scheduled inspection interval. Different size of gas turbines have different running hours interval which could reach up to 60,000 running hours (approximately five years) for every cycle.

**Associated services:**

Disassembling, engine exchange, examining critical components and replacing worn parts.

### Activity Outlook

No. of Major Inspections for Gas Turbine



### Insights

- Actual inspection intervals or mean time between inspection (MTBI) for any particular gas turbines should be based on operating procedures, maintenance practices and strategies.
- The condition of the engine and compressor assemblies is the key driver in planning a major inspection. Historical operation and machine conditions can be used to tailor maintenance programmes such as optimised repair and inspection criteria to a specific operating unit or machine.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Downstream and Gas</b>		
GFA Supply and Delivery of Gas Turbines	2024 – Q3 2030	Gas turbines
<b>Individual - Downstream</b>		
Maintenance Services for Dry Low NOx (DLN) Gas Turbine Generator	2014 – Q4 2029	Gas turbine generator maintenance services
Maintenance Services for Gas Turbines Turbomachinery	2016 – Q4 2034	Gas turbine turbomachinery maintenance services
Maintenance Services for Gas Turbine Instrumentations & Control	2014 – Q2 2044	Gas turbine instrumentations and control maintenance services

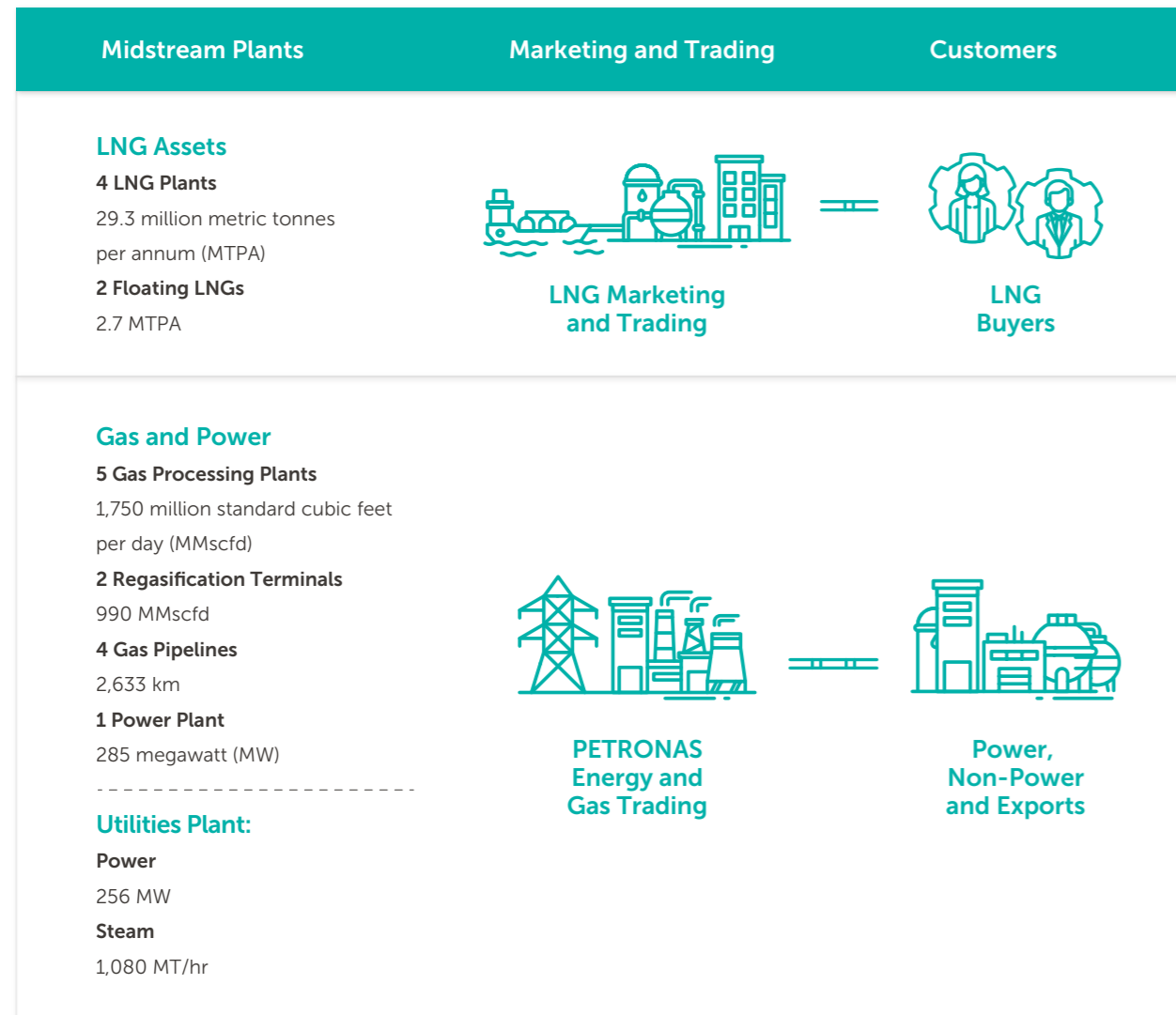
# 6.4 Gas and Maritime Outlook





The Gas and Maritime Business showcases our position as a one-stop-centre for lower-carbon energy and maritime solutions, equipped with integrated value chain capabilities to ensure a reliable supply of natural gas and liquefied natural gas (LNG).

The illustration below outlines the domestic value chain for Gas and Maritime Business.



The illustration below outlines the value chain for Maritime Business.

Segments	Our Solutions	Customers
<p><b>Energy Transportation</b></p> <p><b>Gas Assets and Solutions (GAS)</b> 38 vessels</p> <hr/> <p><b>Petroleum and Product Shipping</b> 64 vessels</p>	 <p>LNGC, LBV, FSU, VLEC</p>  <p>VLCC, Suezmax tankers, Aframax tankers, DPST, LSV, LR2</p>	<p><b>LNG producers, oil majors, offshore energy operators</b></p>
<p><b>Offshore Floating Productions and Storage</b></p> <p><b>Offshore Business</b> 13 floaters</p>	 <p>FPSO, FSO, Semi-FPS</p>  <p>Ammonia carrier, LCO<sub>2</sub> carrier, CSOV</p>	
<p><b>New Energy</b></p>		
<p><b>Marine and Heavy Engineering</b></p> <p><b>Heavy Engineering Assets</b> 2 fabrication yards for EPCIC of complex structures for onshore and offshore facilities</p> <hr/> <p><b>Marine Business Assets</b> 3 drydocks 2 land berths 7 quays/berth 1 ship lift</p>	 <p>Energy offshore construction (including deepwater facilities, marine repair, conversion services and marine refurbishment)</p>	<p><b>LNG producers, oil majors, offshore energy operators</b></p>
<p><b>Marine Services</b></p> <p><b>Integrated Marine Services</b></p> <hr/> <p><b>Port Management and Maritime Services</b></p>	<p>Ship management, technical advisory services and various maritime services such as port and terminal management, maintenance, ship vetting, vessel inspection, marine assurance and consultancy.</p>	<p><b>Shipowners and port operators</b></p>
<p><b>Maritime Education and Training</b></p> <p><b>Akademi Laut Malaysia (ALAM)</b> 1 campus</p>	<p>Maritime courses including nautical and marine engineering programmes, maritime and offshore safety courses, simulator based courses and maritime management programmes, research and consultancy services.</p>	<p><b>Shipowners and various stakeholders</b></p>

## Gas Operating Plant Unit (OPU) Business Overview

### A. Malaysia Liquefied Natural Gas (MLNG)

Malaysia LNG Sdn Bhd (MLNG) was established on 14 June 1978, as a joint venture between PETRONAS, Shell, and Mitsubishi Corporation, becoming Malaysia's first Liquefied Natural Gas (LNG) project.

MLNG's first LNG plant commenced operations in 1983, with its inaugural cargo delivered to Japan's Sodegaura Terminal on 29 January of that year.

To meet growing LNG demand, MLNG expanded with two additional joint ventures, MLNG Dua on 1 June 1992, and MLNG Tiga on 8 November 1995, enhancing capacity and market reach.

MLNG operates nine production trains at the PETRONAS LNG Complex (PLC) in Bintulu, Sarawak, dedicated to safe and reliable LNG production for clients in Japan, South Korea, China, Taiwan and other regions.

Spanning 303 hectares, the PLC is among the world's largest LNG facilities in a single location, with a capacity of 29.8 million tonnes per annum (MTPA), inclusive of boil-off gas reliquefaction facility, translating into potential deliveries exceeding 400 LNG shipments annually.

In line with the commitment to reduce the carbon footprint of LNG production process, the PLC began utilising green electricity from hydro sources in 2024. This ongoing transition will enable MLNG to decommission outdated and inefficient gas turbines. By importing 90 MW of power from Sarawak Energy Berhad (SEB), MLNG expects to reduce GHG emissions by 0.5 million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) per year.



### B. PETRONAS Floating Liquefied Natural Gas (PFLNG)

PETRONAS operates two Floating Liquefied Natural Gas (FLNG) facilities, PFLNG SATU and PFLNG DUA, enabling efficient production of LNG from challenging offshore natural gas reserves.

This positions PETRONAS as the first global energy company to own and operate two FLNG units, enhancing its capability to access remote gas fields while minimising impact to the environment.

Our FLNG facilities exemplify PETRONAS' commitment to leveraging cutting-edge technology for efficient and responsible energy production.



PFLNG SATU

Launched in 2016, PFLNG SATU was initially moored at the Kanowit Field, 180 km offshore Bintulu, Sarawak. In March 2019, it was successfully relocated to the Keabangan Field, 90 km offshore Kota Kinabalu, Sabah, achieving first gas in May 2019. With a production capacity of 1.2 million tonnes per annum (MTPA) of LNG, PFLNG SATU is the world's first floating facility integrating production, storage, and offloading for LNG. This innovation allows for the development of stranded and marginal gas fields that would otherwise be uneconomical to exploit via conventional pipelines.

Building on this success, PFLNG is developing its first shore-based floating LNG facility, with target to commence operations in 2027.



PFLNG DUA

Commissioned in 2021, PFLNG DUA made first contact with natural gas at the Rotan Field, 140 km offshore Kota Kinabalu, Sabah, in February 2021. It has a production capacity of 1.5 MTPA of LNG and is designed to handle larger output. The floater reached the Rotan Field in the first quarter of 2020, further enhancing PETRONAS' ability to harness offshore gas resources.

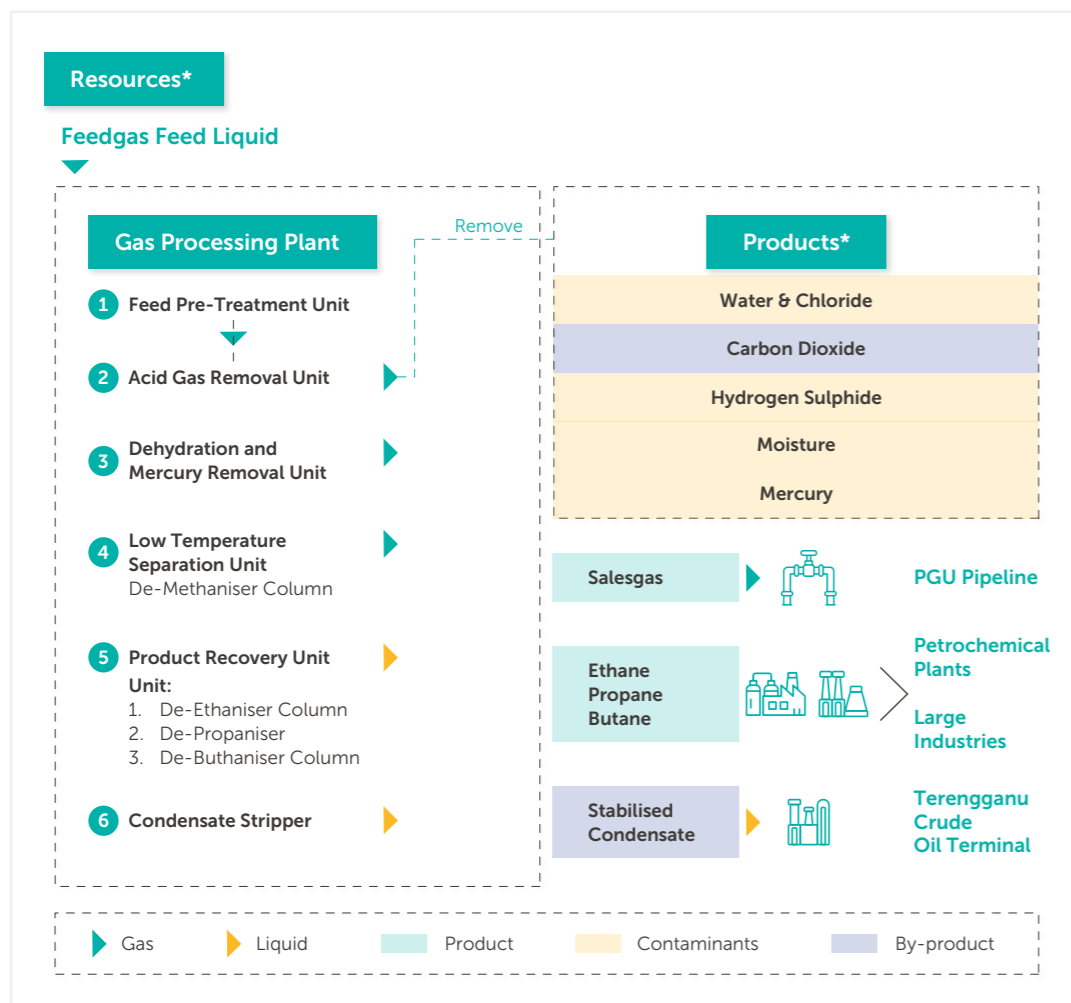
C. PETRONAS Gas Berhad (PGB)

PETRONAS Gas Berhad (PGB) is a leader in providing power and energy solutions, with operations comprising:

i. Gas Processing Plant

The gas processing plants handle PETRONAS' upstream natural gas from offshore Peninsular Malaysia to serve customers in power generation and various industries such as petrochemicals. These operations are carried out at five plants located within two complexes in Terengganu: Gas Processing Kertih (GPK) and Gas Processing Santong (GPS).

With a combined capacity 1,750 million standard cubic feet per day (mmscfd) of feed gas, the plants produce sales gas, ethane, propane and butane. In 2023, the Gas Processing segment has sustained 100 per cent Product Delivery Reliability (PDR) in delivering sales gas, ethane, propane and butane. Additionally, the segment recorded an impressive Overall Equipment Effectiveness (OEE) of more than 99 per cent for sales gas, ethane, propane and butane.



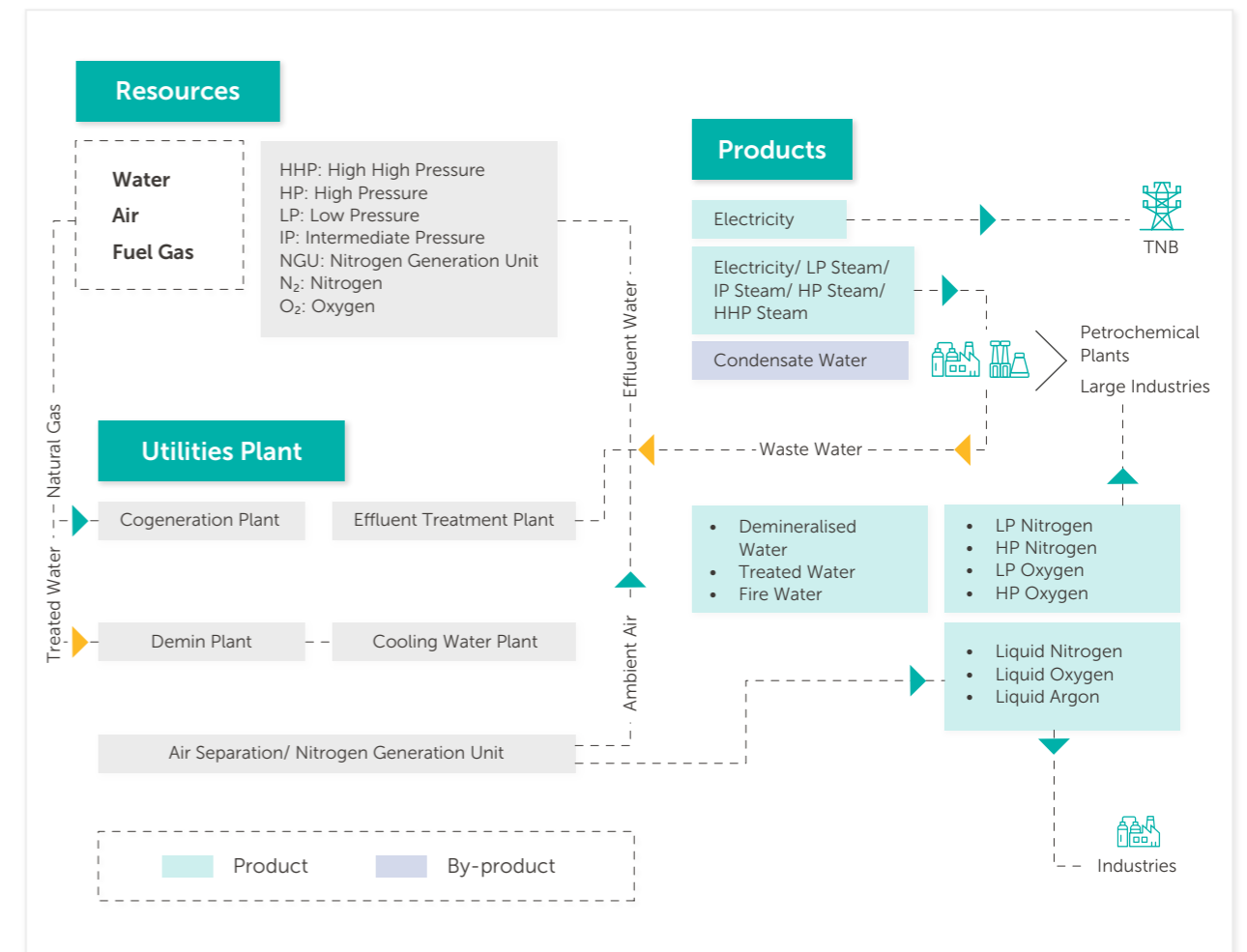
\*Resources and products belong to customer

ii. Utilities Facilities

Utilities production serves customers across various industries by offering a wide range of products tailored to meet specific needs. Operations are carried out at two complexes: Utilities Kertih (UK) in Terengganu and Utilities Gebeng (UG) in Pahang. Strategically positioned next to the Kertih Integrated Petrochemical Complex and the Gebeng Industrial Area, these centralised utilities provide a competitive edge to petrochemical plants and surrounding industries through a reliable supply of essential products.

In 2023, the Utilities business sustained more than 99 per cent reliability in product delivery and Overall Equipment Effectiveness (OEE) for electricity, steam, and industrial gases.

Additionally, we supply steam, power and industrial gases to customers within the Kertih Integrated Petrochemical Complex in Terengganu and the Gebeng Industrial Area in Pahang.



### iii. Gas Transmission and Regasification Facilities

In Malaysia, natural gas accessibility is facilitated through our extensive Peninsular Gas Utilisation (PGU) pipeline network, which delivers processed natural gas to customers such as major power plants, refineries and industries across the country, as well as to Thailand and Singapore.

At present, this pipeline network which has the capacity to transport 1,750 mmscfd of gas is being remotely monitored and controlled from PETRONAS Gas Control Centre. PGU's transmission tariffs are regionally competitive and regulated by the Energy Commission of Malaysia.

The offshore LNG Regasification Terminal in Sungai Udang, Melaka (RGTSU) and the LNG Regasification Terminal in Pengerang, Johor (RGTP) are key components of our Regasification business. RGTSU commenced commercial operations in the second quarter of 2013, while RGTP began in the fourth quarter of 2017.

These facilities receive LNG vessels from around the world and provide a range of services, including:

- LNG regasification with capacities of 500 mmscfd at RGTSU and 490 mmscfd at RGTP
- LNG reloading
- Gassing Up Cooling Down (GUCD)
- LNG truck loading

In support of the Malaysian Government's aspiration for gas market liberalisation under the 12th Malaysian Plan, PGB is opening available capacity at its regasification terminals and pipelines for use by qualified shippers.

This initiative promotes the importation of LNG and stimulates growth in the national gas industry, further contributing to the Energy Commission's mission to secure and manage energy supply for Malaysia's expanding domestic demand and economic growth.



### D. MISC Group

Established in 1968 as Malaysia's first shipping line, MISC stands as the nation's largest maritime company, proudly listed on the Kuala Lumpur Stock Exchange.

As a leading maritime expert, MISC offers a comprehensive range of services and solutions, catering to various sectors within the maritime-related energy value chain. These services encompass energy shipping, offshore solutions, marine and heavy engineering, and integrated marine services, each tailored to meet the dynamic needs of the market.

At the core of MISC's success is its modern and diversified fleet, which includes LNG carriers, petroleum and product tankers, as well as offshore floating facilities. This expansive fleet is supported by the expertise and dedication of a highly skilled global workforce, both at sea and onshore, ensuring operational excellence and reliability in service delivery.

MISC consistently invests in advanced technologies and sustainable practices across its group of companies to enhance efficiency and reduce the environmental impact of

its operations. Guided by a commitment to innovation, safety, and sustainability, MISC and its group of companies are driving the maritime industry toward a lower-carbon future and aligning with global aspirations for a just energy transition.

As a future-focused organisation, MISC continues to forge strategic partnerships and explore new opportunities that create value for its stakeholders while advancing the energy industry's transition towards cleaner, more resilient solutions. This approach not only solidifies MISC's position as a market leader but also underscores its role in shaping a more sustainable future for the maritime and energy sectors.

In addition to its operational capabilities, MISC is committed to developing Malaysia's future maritime talents through Akademi Laut Malaysia (ALAM), which it operates and manages. By equipping future seafarers and maritime professionals with the necessary skills and expertise, ALAM contributes to the nation's aspirations in shaping a thriving and progressive maritime sector, reinforcing Malaysia's global standing in the industry.



# Gas Activity List



PFLNG



MLNG



PGB

Plant Turnaround

Operations and Maintenance



## A. Plant Turnaround

Plant turnaround refers to the planned turnaround or periodic shutdown of onshore process plant to perform equipment maintenance, overhaul, inspection, repairs, replacement, catalyst change out, and other activities. These operations are meticulously planned and executed to minimise downtime and optimise the plant's performance. The critical aim of plant turnaround is to enhance the plant's efficiency, ensure regulatory compliance and extend the lifespan of the equipment.

### Overview of turnaround activities

**Activity phase:** Operations

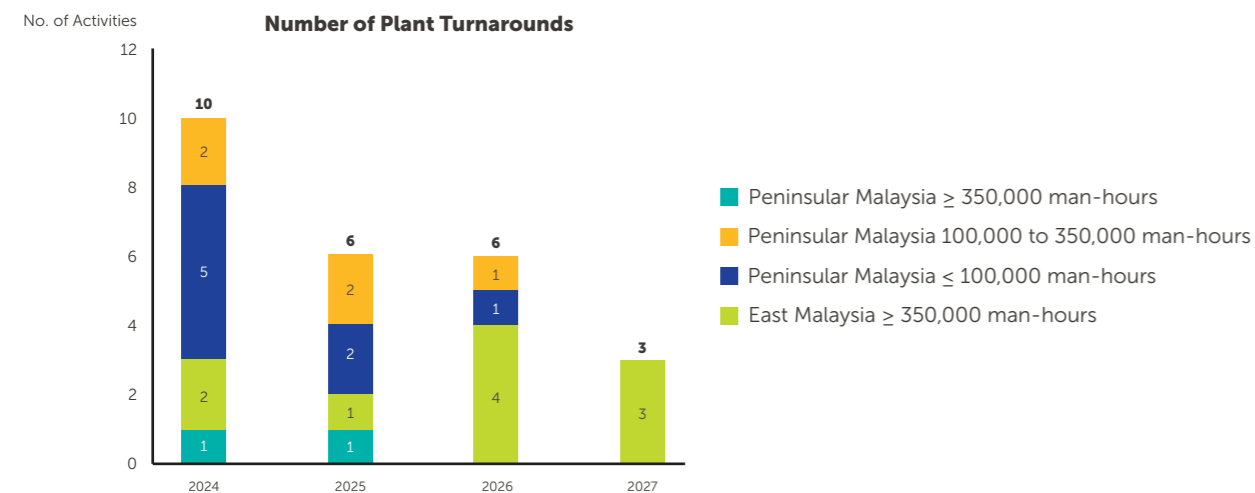
#### Application:

Plant turnaround is scheduled periodically in which the entire facility is taken off stream for a certain period to conduct maintenance and inspection activities in achieving smooth functioning, safety and efficiency of plant facilities.

#### Associated services:

Equipment services (e.g. mechanical, electrical, instruments, etc.), inspection services, manpower and equipment supply and rental.

### Activity Outlook



### Insights

- Management of turnaround activities focuses on continuous improvement and excellence in quality, timely completion, and cost effectiveness without compromising safety.
- In 2025, turnarounds are scheduled throughout the year, with the first three quarters projected to be particularly intensive.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Integrated - Gas, Downstream and Upstream</b>		
Master Service Agreement (MSA) For Integrated Turnaround Main Mechanical & Maintenance Mechanical Static (TA4MS)	2024 –Q1 2027	Turnaround management <ul style="list-style-type: none"> <li>• Turnaround or maintenance</li> </ul>
<b>Individual - Gas</b>		
Price Agreement For The Supply And Delivery Of Mixed Oxides Catalyst For Sulphur Removal Units For Turnaround And Shutdown Activities	2023 –Q1 2025	Turnaround management <ul style="list-style-type: none"> <li>• Turnaround or maintenance</li> <li>• Catalyst change out</li> </ul>
Provision Of Maintenance, Construction And Modification (MCM) And Turnaround (TA) Services	2023 –Q3 2026	Turnaround management <ul style="list-style-type: none"> <li>• Turnaround or maintenance</li> </ul>

## B. Operations and Maintenance

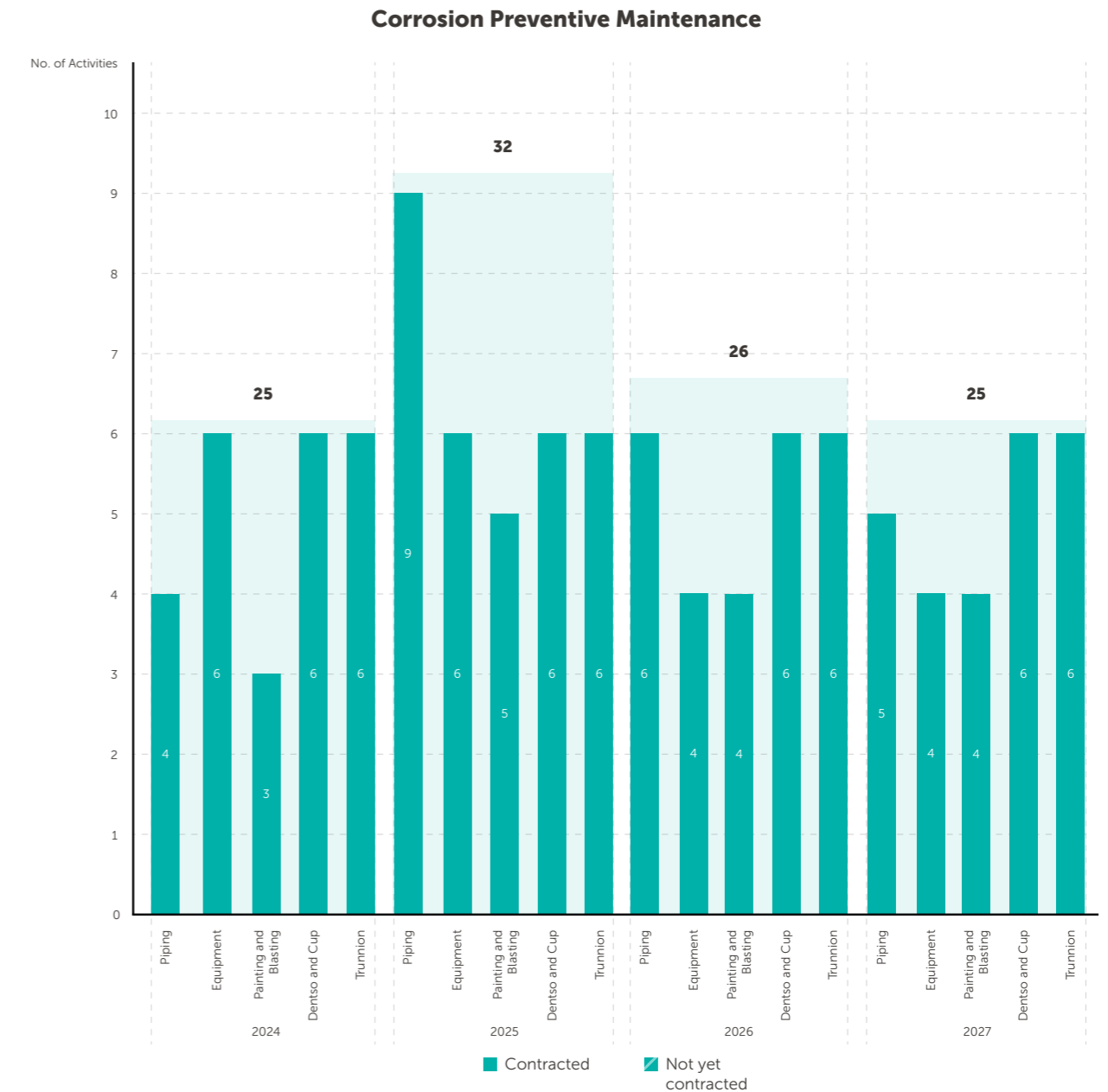
Gas Business is committed to enhancing plant reliability and maintenance practices to drive operational excellence, ensuring high performance and long-term sustainability.

To achieve this, Gas Business OPU's are improving proactive and preventive routine maintenance practices to address inefficiencies and recurring issues. These efforts include regular inspections, testing, modifications, upgrades, equipment replacements and infrastructure development, such as Sea Cooling Water (SCW) underground piping maintenance and aboveground piping replacement, Sea Water Lift Pump reliability enhancement, and the gas turbine reliability programme.

In addition to routine maintenance, extensive plant reliability initiatives are planned through 2027 to address more critical areas. These include corrosion under insulation for piping and equipment, external corrosion and other priority concerns as outlined in the next page.

### i. Key areas for plant reliability

#### Activity Outlook



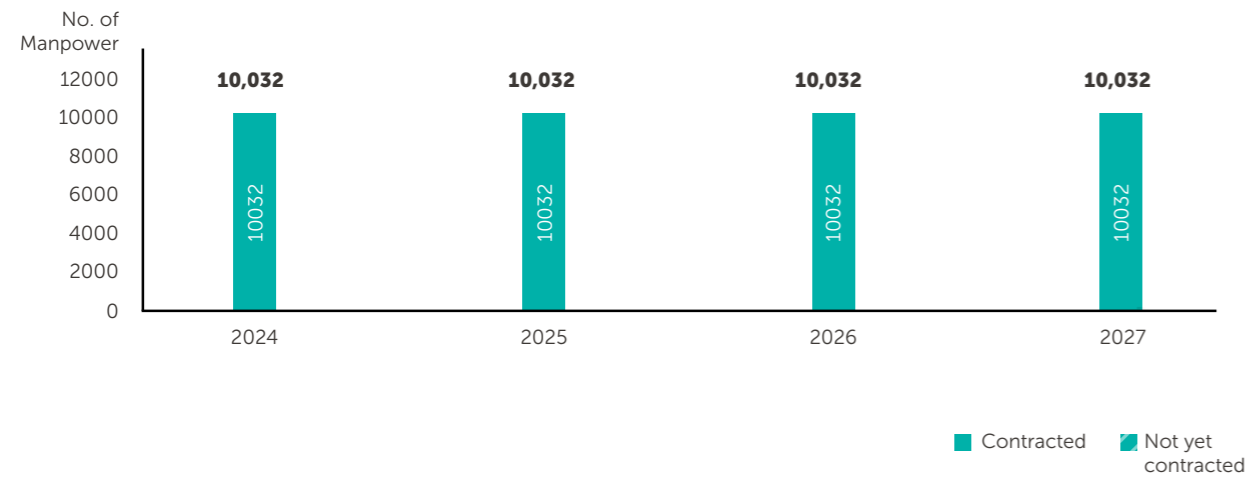
#### Insights

On top of the critical areas mentioned, below are other focus areas for maintenance in Gas OPU's:

- Main Cryogenic Heat Exchanger (MCHE) replacement
- Sea Cooling Water (SCW) underground piping maintenance and aboveground piping replacement
- Sea Water Lift Pump reliability enhancement
- Gas turbine reliability programme e.g. trip reduction
- Waste Heat Recovery Unit

ii. Manpower for maintenance activities

Activity Outlook



Insight

- The annual average estimated manpower required for plant maintenance activities is approximately 10,000 personnel. This includes the execution of proactive and preventive maintenance to address the plant’s persistent issues, including but not limited to various inspections/tests, modification work, upgrades, equipment/instrument replacements, and the construction of facilities and infrastructure.



Key Contract List

Contract Name	Contract Duration	Scope
<b>Critical areas: Corrosion under insulation for piping and equipment, external corrosion</b>		
Multiple Individual/Integrated OPUs Contracts (Two Contracts) for Manpower Services	2024 – Q3 2027	Manpower services
Multiple Individual/Integrated OPUs Contracts (Four Contracts) Related to Inspection/Maintenance for Corrosion	2023 – Q2 2028	Inspection/maintenance/corrosion
<b>Other routine maintenance</b>		
Individual OPU Contract for Sea Water Lift Pump (SWLP)	2023 – Q4 2024	Sea Water Lift Pump (SWLP)
Multiple Individual OPUs Contracts (Eight Contracts) for Maintenance/Inspection Services	2021 – Q1 2025	Maintenance/inspection
Individual OPU Contract for Sea Cooling Water (SCW)	2024 – Q3 2025	Sea Cooling Water (SCW)
Individual OPU Contract for Mechanical Rotating	2015 – Q4 2025	Mechanical rotating
Multiple Individual OPU Contracts (10 Contracts) for General Maintenance/Others	2022 – Q4 2025	General maintenance
Multiple Individual OPUs Contracts (Three Contracts) for Heat Exchanger/Maintenance	2022 – Q2 2027	Heat exchanger/maintenance
Individual OPU Contract for Maintenance	2020 – Q3 2027	Maintenance
Multiple Individual OPU Contracts (Two Contracts) for General Maintenance	2019 – Q4 2027	General maintenance
Individual OPUs Contracts For Maintenance	2023 – Q1 2029	Maintenance
Individual OPU Contract for Instrument/Control Valve	2023 – Q4 2029	Instrument/control valve
Multiple Individual OPU Contracts (Two Contracts) for Mechanical Rotating	2021 – Q4 2030	Mechanical rotating



### iii. Chemicals

Chemical utilisation is one of the critical elements in Gas Business mainly during operations and maintenance activities (either routine or turnaround activities). Out of five chemical common categories (i.e. commodity chemicals, gases, laboratory chemicals, process chemicals and chemical services), below are the two categories that are highly consumed within the OPU under Gas Business:

	 Process Chemicals	 Commodity Chemicals
<b>Description</b>	Chemicals that are specialised and used to accelerate plant process, maximise asset reliability and/or improve productivity.	Chemicals that are standardised and commonly used in process and operations.
<b>Examples</b>	<ul style="list-style-type: none"> <li>• Adsorbent</li> <li>• Catalyst</li> </ul>	<ul style="list-style-type: none"> <li>• Chloralkali</li> </ul>

- The demand for PETRONAS chemicals is influenced by several factors, including ageing assets, turnaround and shutdown activities (TASD), new projects and new plants coming onstream.
- The longevity and lifespan of chemicals also play a crucial role. While chemical consumption may not be extensive, collaboration in chemical technology advancement is essential. This includes not just product delivery but also product management, sustainability and related areas.
- Chemicals and chemical services that extend asset lifespan, improve reliability and enhance productivity provide significant advantages.

### Overview of chemical requirements

**Activity phase:** Operations and maintenance

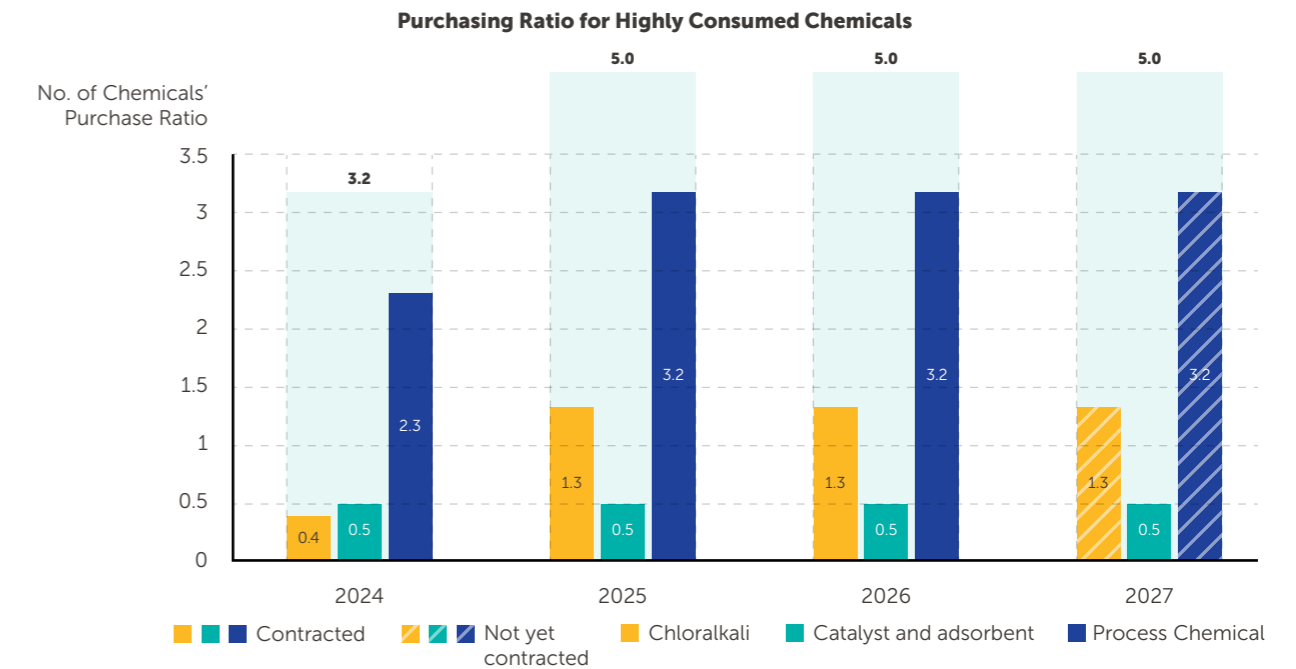
**Application:**

Chemical requirements vary based on their applications, which may include routine change-outs or adjustments based on plant performance to ensure smooth functioning, safety, and operational efficiency.

**Associated services:**

Supply and delivery and technical services

### Activity Outlook



Note: The Chemicals' Purchase Ratio is based on the forecasted purchases compared to actual purchases in the base year 2023 for catalyst.

### Insights

- **Catalyst and adsorbent:** Continuous requirement for purchases and services related to catalysts and internal media across OPU, considering multiple change-out or top-up needs for the years 2025 to 2027.
- **Process chemicals:** Continuous requirement for purchases and services related to various process chemicals to optimise plant processes, maximise asset reliability and improve productivity for the years 2025 to 2027.
- **Chloralkali:** Continuous requirement for purchases and services related to chloralkali to ensure the neutralisation of unwanted byproducts and maintain asset integrity or reliability for the years 2025 to 2027.

### Key Contract List

Contract Name	Contract Duration	Scope
<b>Individual - Gas</b>		
Price Agreement for Supply and Delivery of Dipa and Sulfolane	2023 – Q2 2026	Supply of process chemicals
<b>Individual - Gas and Downstream</b>		
Supply of Chloralkali	2023 – Q4 2026	Supply of chloralkali chemicals
Supply of Catalyst and Adsorbent	2023 – Q3 2028 Extension option: 5 years	Supply of catalyst and adsorbent

# 07 Clean Energy Solutions



# Gentari

## A clean energy solutions company

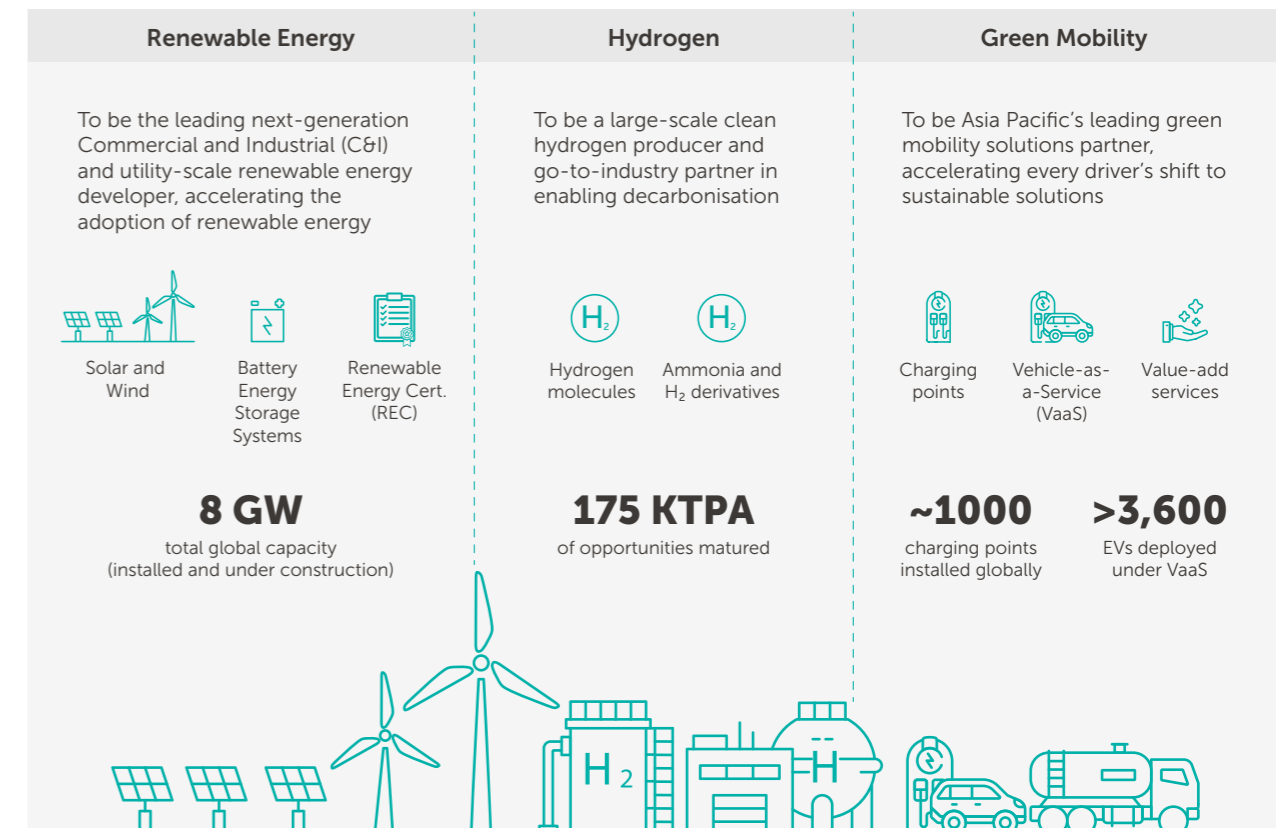
In alignment with PETRONAS' aspiration to achieve Net Zero Carbon Emissions by 2050, Gentari was established in 2022 to develop practical clean energy solutions and capture opportunities within the energy transition. As a key enabler of PETRONAS' broader sustainability goals, Gentari focuses on advancing renewable energy, hydrogen and green mobility to support the evolving energy landscape.

The name "Gentari" reflects its mission, combining "generation" and the Malay word "lestari," meaning "sustainable". Operating independently, Gentari is guided by a commitment to provide practical and impactful energy solutions. By exploring new markets and pursuing emerging opportunities, Gentari tailors its approaches to address the specific needs of its partners and customers, contributing to a lower-carbon energy future.

Recognising the pressing need for transformative action, Gentari delivers scalable clean energy solutions designed to meet today's energy demands while enabling a sustainable energy future. Guided by its mission to become Asia Pacific's most trusted clean energy partner by 2030, the company prioritises customer-driven innovation, agile execution and strategic collaboration to foster meaningful progress in energy transition efforts and clean energy adoption.

Through its initiatives in renewable energy development, advancements in hydrogen production and commitment to green mobility, Gentari actively contributes to creating a more resilient energy ecosystem. By aligning its efforts with regional and global energy priorities, Gentari strives to support industrial transformation and long-term energy reliability, affordability and security. With a focus on measurable impact, Gentari is dedicated to driving tangible results and enabling a more sustainable future for generations to come.

## Overview



Note: Datapoints updated as of December 2024.

## A. Renewable Energy

Expanding renewable energy for a clean energy future

### What Gentari Does

Gentari's Renewable Energy business is focused on advancing clean electricity solutions that meet Asia's growing energy needs with lower-carbon options. By developing and deploying large scale solar, wind and Battery Energy Storage Systems (BESS), Gentari actively supports customers across Asia Pacific in achieving their decarbonisation goals.

Gentari is focused on becoming a leading developer of Commercial and Industrial (C&I) and utility-scale renewable energy projects, providing integrated clean energy solutions.

With 8 GW of total global renewable energy capacity secured (both installed and under construction) and plans underway for further growth in solar, wind and storage, Gentari is well-positioned to contribute towards accelerating the region's clean energy adoption.

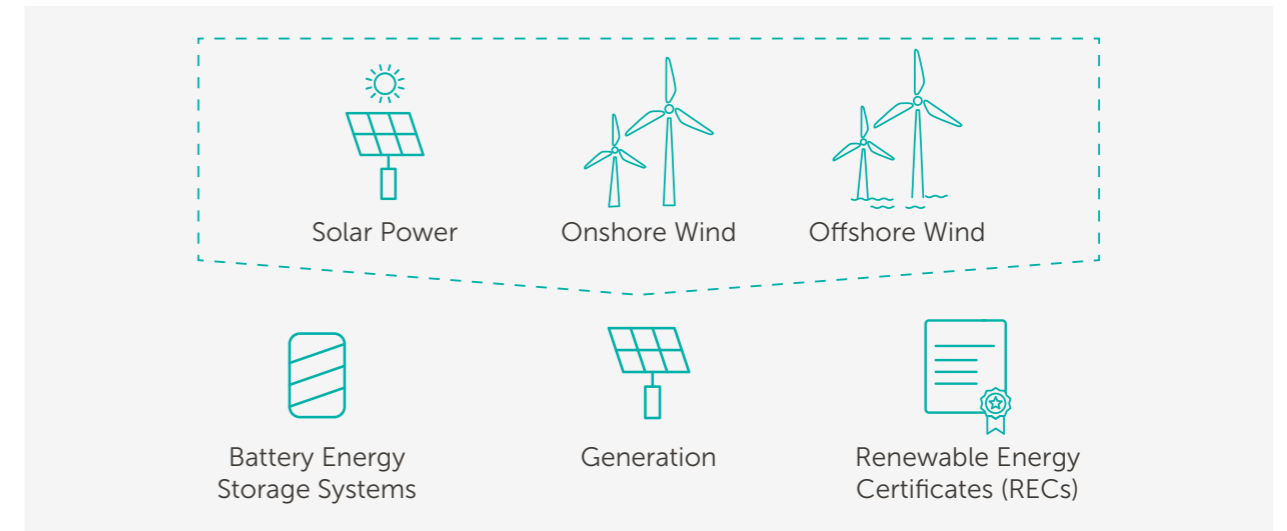
Over the next three years, Gentari expects steady growth in solar capacity, complemented by exploratory offshore wind projects, reinforcing its commitment to driving decarbonisation on both the regional and global scales.

### Progress and Achievements

- **Expanded renewable energy capacity:** As of December 2024, Gentari has secured 8 GW of installed and under construction global renewable energy capacity. The company has also entered the utility-scale space with a wind-solar hybrid power project in India and a solar Battery Energy Storage System (BESS) hybrid project in Australia. These milestones reflect the company's effort to support the increasing demand for renewable energy and contribute to the global energy transition.
- **Diverse portfolio:** Gentari's renewable energy projects span Malaysia, India and Australia, with plans to expand into additional regional markets. The portfolio includes utility-scale solar farms, C&I rooftop installations and entry into offshore wind energy through strategic collaborations such as the Hai Long Offshore Wind project in Taiwan.
- **Integrated solutions:** Gentari develops tailored renewable energy solutions for C&I customers, offering reliable and cost-effective energy solutions. These solutions aim to support customers in meeting their energy requirements while aligning with their decarbonisation objectives.

This progress demonstrates Gentari's focus on implementing impactful clean energy solutions that align with the evolving needs of its partners and stakeholders.

## Where Gentari Plays

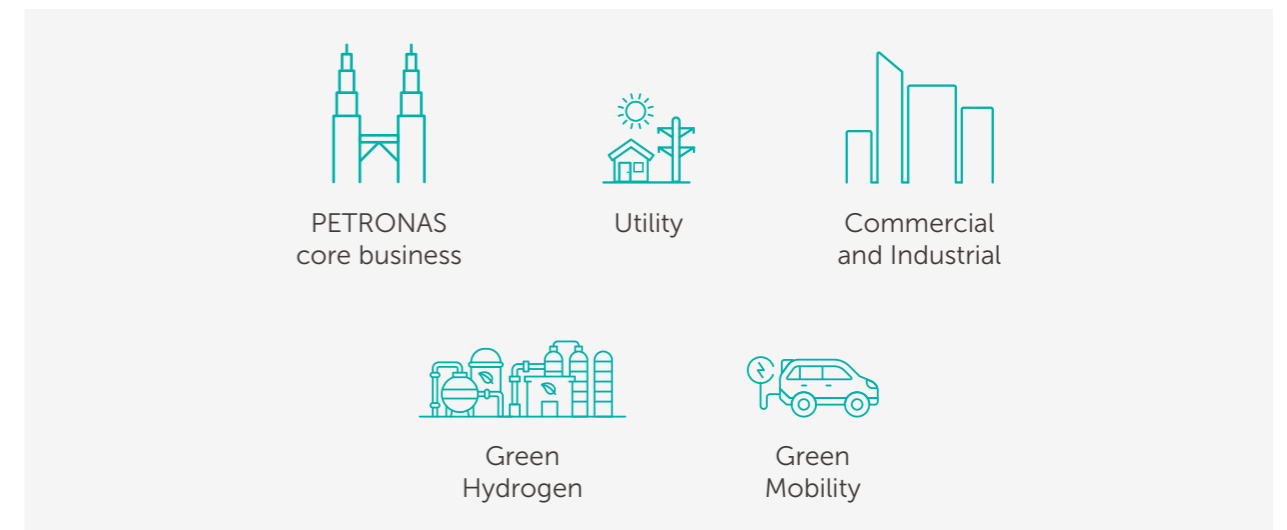


Gentari's Renewable Energy value chain involves generating clean electricity from solar, onshore wind and offshore wind sources.

Surplus energy is stored in Battery Energy Storage Systems (BESS) for reliability. Additionally, Gentari obtains Renewable Energy Certificates (RECs) from accredited bodies to certify its decarbonisation efforts.

This streamlined process – from generation to storage to certification – highlights Gentari's commitment to sustainable energy.

## Customers



## B. Hydrogen

Supporting decarbonisation and advancing innovation

### What Gentari Does

Gentari aims to become a large-scale hydrogen producer and the go-to industry partner in driving decarbonisation in hard-to-abate sectors.

Gentari explores diverse hydrogen use cases and production opportunities, collaborating closely with supply, demand and offtake customers.

Leveraging its global alliances and key strategic partnerships, Gentari positions itself as a global clean energy hydrogen player, large-scale hydrogen producer and go-to industry partner. Gentari aims to drive decarbonisation in many of the world's most complex and hardest to decarbonise sectors, including chemical, maritime and aviation.

By exploring diverse hydrogen use cases and production opportunities, Gentari collaborates closely with supply, demand and offtake customers. The company also advocates favourable policies and regulatory frameworks, fostering growth and innovation in the hydrogen economy. Under its Hydrogen pillar, Gentari has matured 175 Kilo Tonnes per Annum (KTPA) of opportunities, reflecting significant progress in large-scale hydrogen projects.

Gentari collaborates globally to expand hydrogen production and applications. With experience in managing large scale projects, market access in Asia Pacific and key demand centres, and strong industry partnerships, Gentari aims to enhance the hydrogen supply chain and support the global shift towards cleaner energy.

### Progress and Achievements

- **Matured opportunities:** Under the Hydrogen pillar, Gentari has developed 175 KTPA of clean hydrogen project as of December 2024.
- **Strategic collaborations:** Gentari explores diverse hydrogen use cases and production opportunities, collaborating closely with supply, demand and offtake customers. These partnerships leverage Gentari's renewable energy expertise and PETRONAS' global experience in ammonia and urea production.
- **Advocacy and innovation:** Gentari actively advocates for favourable policies and regulatory frameworks that promote hydrogen solutions, fostering growth and innovation in the hydrogen economy.



Proximity of strategic supply location to demand centres








Blue and green hydrogen production



In-house capacity, capability and technology

*Gentari is actively building partnerships in Malaysia and globally to explore diverse hydrogen use cases and to advance production.*

### Where Gentari Plays

Markets		
Malaysia	India	Europe
 Decarbonisation of <b>PETRONAS existing assets</b>  <b>Green ammonia</b> plant in <b>Peninsular Malaysia and Sarawak</b>	 Tamil Nadu and Karnataka <b>Green ammonia for export</b> <b>Total 1 MTPA-NH3</b>   AM Green partnership	 Planned ammonia storage and cracking  <b>Canada</b> Alberta  <b>Blue ammonia for domestic and export</b> <b>Total 1.2 MTPA-NH3</b>

## C. Green Mobility

### Accelerating the transition to sustainable transportation.

Gentari is supporting the transition towards sustainable transportation in Asia Pacific, through its comprehensive green mobility solutions. While early adoption of electric vehicles (EVs) was led by regions like the European Union, the United States and China, markets in Southeast Asia, Australia and India have seen remarkable growth in recent years, signaling a significant shift in the region.

As EV adoption accelerates across the Asia Pacific region, the increasing demand has revealed gaps in infrastructure. This evolving landscape presents opportunities for Gentari to deliver critical services and solutions that enable seamless and accessible sustainable transportation for businesses and communities alike.

Gentari offers a diverse range of solutions to drive the EV ecosystem in the Asia Pacific region.

These include an extensive network of charging points, flexible Vehicle-as-a-Service (VaaS) options for businesses and commercial users, and value-added services like the Gentari Go app.

The Gentari Go app enhances the EV experience for both drivers and businesses by simplifying access to charging services and streamlining EV fleet and charging management.

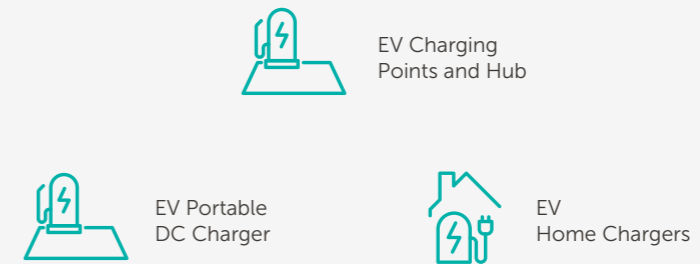
### Progress and Achievements

- **Expansion of EV charging infrastructure:** As of December 2024, Gentari has installed approximately 1,000 EV charging points globally, enhancing accessibility and convenience for EV users.
- **Vehicle-as-a-Service (VaaS):** Gentari has deployed more than 3,600 electric vehicles under its VaaS offering. This versatile range includes two-wheelers, three-wheelers, four-wheelers, buses and trucks; providing tailored solutions for businesses and commercial users.
- **Gentari Go:** Launched in 2024, Gentari Go is an integrated digital platform enhancing the EV ecosystem for both drivers and businesses. For EV users, it simplifies access to charging services. For businesses – including fleet operators, property owners, charge point operators, and car manufacturers – it streamlines EV fleet and charging management, supporting broader EV adoption in the region.

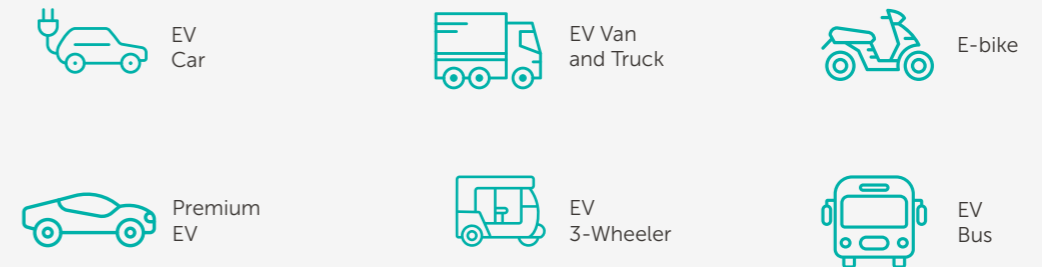
## Where Gentari Plays

Gentari aims to become Asia Pacific's preferred green mobility solutions partner, accelerating the shift to sustainable solutions.

### Charging Points Across Asia Pacific



### Vehicle-as-a-Service (VaaS)



### Digital and Value Added Services



# List of Abbreviations

Definition	Used for
<b>2D</b>	Two-dimensional
<b>3D</b>	Three-dimensional
<b>4D</b>	Four-dimensional
<b>ABM</b>	Akademi Binaan Malaysia
<b>AHTS</b>	Anchor Handling Tug Supply
<b>ALAM</b>	Akademi Laut Malaysia
<b>API</b>	American Petroleum Institute
<b>ASB</b>	Asian Supply Base
<b>ABF</b>	ASEAN Bintulu Fertilizer Sdn Bhd
<b>bbbl</b>	Barrels
<b>BCe</b>	Billion Cubic feet equivalent
<b>BESS</b>	Battery Energy Storage Systems
<b>BOG</b>	Borneo Oil and Gas Supply Base
<b>C&amp;I</b>	Commercial and Industrial
<b>CAPEX</b>	Capital Expenditures

Definition	Used for
<b>CCS</b>	Carbon Capture and Storage
<b>CCUS</b>	Carbon Capture, Utilisation and Storage
<b>CIDB</b>	Construction Industry Development Board
<b>CLCW</b>	Closed Loop Cooling Water
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>COP</b>	Conference of the Parties
<b>CRA</b>	Corrosion Resistance Alloy
<b>CSI</b>	Centralised Sustainability Intelligence
<b>CSOV</b>	Commissioning Service Operation Vessel
<b>CPP</b>	Central Processing Platforms
<b>CPTPP</b>	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
<b>DCS</b>	Distributed Control System
<b>DD</b>	Directional Drilling
<b>DPDSV</b>	Dynamic Positioning Diving Support Vessel
<b>DPST</b>	Dynamic Positioning Shuttle Tanker
<b>DLN</b>	Dry Low Nitrogen Oxides
<b>E&amp;P</b>	Exploration and Production
<b>EPCC</b>	Engineering, Procurement, Construction and Commissioning
<b>EPCIC</b>	Engineering, Procurement, Construction, Installation and Commissioning

## 08 List of Abbreviations

Definition	Used for
<b>ERD</b>	Extended Reach Drilling
<b>ERW</b>	Electric Resistance Welded
<b>ESG</b>	Environmental, Social and Governance
<b>ESP</b>	Electrical Submersible Pump
<b>EV</b>	Electric Vehicle
<b>EWL</b>	Electric Wireline Logging
<b>FA</b>	Frame Agreement
<b>FCB</b>	Fast Crew Boat
<b>FIP</b>	Facilities Improvement Plans
<b>FHs</b>	Flying Hours
<b>FPSO</b>	Floating Production Storage and Offloading
<b>FSO</b>	Floating Storage and Offloading
<b>FSU</b>	Floating Storage Unit
<b>GAS</b>	Gas Assets and Solutions
<b>G&amp;G</b>	Geological and Geophysical
<b>GDP</b>	Gross Domestic Product
<b>GFA</b>	Global Frame Agreement
<b>GHG</b>	Greenhouse Gas
<b>GLV</b>	Gas Lift Valves

Definition	Used for
<b>GPK</b>	Gas Processing Kertih
<b>GPS</b>	Gas Processing Santong
<b>GPV</b>	General Purpose Vessel
<b>GTG</b>	Gas Turbine Generator
<b>GUCD</b>	Gassing Up Cooling Down
<b>GW</b>	Gigawatt
<b>H2S</b>	Hydrogen Disulphide (Sour gas)
<b>HRD Corp</b>	Human Resource Development Corporation
<b>HP</b>	High Pressure
<b>HPHT</b>	High Pressure, High Temperature
<b>HSE</b>	Health, Safety and Environment
<b>HUC</b>	Hook-Up and Commissioning
<b>HWU</b>	Hydraulic Workover Unit
<b>HVO</b>	Hydrogenated Vegetable Oil
<b>IMF</b>	International Monetary Fund
<b>InTAF</b>	Industry Talent Framework
<b>IRM</b>	Inspection, Repair and Maintenance
<b>IWCS</b>	Integrated Well Continuity Services
<b>JC3</b>	Joint Committee for Climate Change

## 08 List of Abbreviations

Definition	Used for
<b>JUR</b>	Jack-up Rigs
<b>JV</b>	Joint Venture
<b>kBOE/D</b>	Kilo barrels of oil equivalent per day
<b>KBPD</b>	Thousand Barrels Per Day
<b>KGA</b>	Kangsar Gas Pipeline
<b>KSB</b>	Kemaman Supply Base
<b>KTPA</b>	Kilo Tonnes per Annum
<b>LBV</b>	LNG Bunker Vessel
<b>LCT</b>	Landing Craft Tank
<b>LCO<sub>2</sub> carrier</b>	Liquid CO <sub>2</sub> carrier
<b>LNG</b>	Liquefied Natural Gas
<b>LNGC</b>	LNG Carrier
<b>LMP</b>	Liquid Mud Plant
<b>LSAW</b>	Longitudinal Submerged Arc Welded
<b>LSV</b>	Logistic Support Vessel
<b>LWD</b>	Logging While Drilling
<b>M&amp;S</b>	Maintenance and Support
<b>MISC</b>	Malaysia International Shipping Corporation Berhad
<b>MCHE</b>	Main Cryogenic Heat Exchanger

Definition	Used for
<b>MCM</b>	Maintenance, Construction and Modification
<b>MTBI</b>	Mean Time Between Inspection
<b>MEDEVAC</b>	Medical Evacuation
<b>MEG</b>	Monoethylene Glycol
<b>MI</b>	Major Inspection
<b>MIDF</b>	Malaysian Industrial Development Finance
<b>MLNG</b>	Malaysia LNG Sdn Bhd
<b>MMRP</b>	Malaysia Master Reefing Plan
<b>MMboe/d</b>	Million barrels of oil equivalent per day
<b>MMscfd</b>	Million standard cubic feet per day
<b>MOAB</b>	Mobile Offshore Application Barge
<b>MOGSC</b>	Malaysian Oil, Gas and Energy Services Council
<b>MOPU</b>	Mobile Offshore Production Units
<b>MoU</b>	Memorandum of Understanding
<b>MPM</b>	Malaysia Petroleum Management
<b>MPRC</b>	Malaysia Petroleum Resources Corporation
<b>MTJDA</b>	Malaysia-Thailand Joint Development Area
<b>MSA</b>	Master Service Agreement
<b>MT/hr</b>	Metric Tonne Per Hour



## 08 List of Abbreviations

Definition	Used for
<b>Mtoe</b>	Million tonnes of oil equivalent
<b>MTPA</b>	Million Tonnes Per Annum
<b>MW</b>	Megawatt
<b>MWD</b>	Measurement While Drilling
<b>NDT</b>	Non-Destructive Testing
<b>NETR</b>	National Energy Transition Roadmap
<b>NH<sub>3</sub></b>	Ammonia
<b>NZCE</b>	Net Zero Carbon Emissions
<b>O&amp;M</b>	Operations and Maintenance
<b>OBS</b>	Ocean-Bottom Seismometer
<b>OCTG</b>	Oil Country Tubular Goods
<b>OE</b>	Operational Excellence
<b>OEM</b>	Original Equipment Manufacturer
<b>OEE</b>	Overall Equipment Effectiveness
<b>OGSE</b>	Oil and Gas Services and Equipment
<b>OPEC</b>	Organisation of the Petroleum Exporting Countries
<b>OPEX</b>	Operating Expenditures
<b>OPU</b>	Operating Plant Unit
<b>P&amp;A</b>	Plug and Abandonment

Definition	Used for
<b>PACs</b>	Petroleum Arrangement Contractors
<b>PBT</b>	Profit Before Tax
<b>PCF(K)SB</b>	PETRONAS Chemicals Fertiliser Kedah Sdn Bhd
<b>PCF(S)SB</b>	PETRONAS Chemicals Fertiliser Sabah Sdn Bhd
<b>PCG</b>	PETRONAS Chemicals Group
<b>PDG</b>	Permanent Downhole Gauge
<b>PDR</b>	Product Delivery Reliability
<b>PETRONAS</b>	Petroleum Nasional Berhad
<b>PFLNG</b>	PETRONAS Floating Liquefied Natural Gas
<b>PGB</b>	PETRONAS Gas Berhad
<b>PIR</b>	PETRONAS Integrated Report
<b>PIC</b>	Pengerang Integrated Complex
<b>PM</b>	Peninsular Malaysia
<b>PLC</b>	PETRONAS LNG Complex
<b>PMT</b>	Project Management Team
<b>PSSP</b>	PETRONAS Supplier Support Programme
<b>PSV</b>	Platform Supply Vessels
<b>R&amp;D</b>	Research and Development
<b>RE</b>	Renewable Energy

## 08 List of Abbreviations

Definition	Used for
<b>RGTP</b>	Regasification Terminal in Pengerang, Johor
<b>RGTSU</b>	Regasification Terminal in Sungai Udang, Melaka
<b>RECs</b>	Renewable Energy Certificates
<b>ROV</b>	Remotely Operated Vehicle
<b>SAF</b>	Sustainable Aviation Fuel
<b>SAT</b>	Saturation Diving system
<b>SB</b>	Sabah
<b>SCSSSV</b>	Surface Controlled Sub-surface Safety Valve System
<b>SCWP</b>	Sea Cooling Water Pump
<b>SEA</b>	South East Asia
<b>SK</b>	Sarawak
<b>SPAR</b>	Single Point Anchor Reservoir
<b>SR</b>	Self Regulation
<b>SSI</b>	Special Scheme Inspection
<b>SSV</b>	Straight Supply Vessels
<b>SURF</b>	Subsea Umbilical, Riser and Flowline
<b>T&amp;I</b>	Transportation and Installation
<b>TASD</b>	Turnaround and Shutdown
<b>TBSB</b>	Tok Bali Supply Base

Definition	Used for
<b>TCP</b>	Tubular Conveyed Perforation
<b>TEG</b>	Triethylene Glycol
<b>TLP</b>	Tension-leg platform
<b>TPES</b>	Total Primary Energy Supply
<b>TVET</b>	Technical and Vocational Education and Training
<b>UG</b>	Utilities Gebeng
<b>UK</b>	Utilities Kertih
<b>UNGCMYB</b>	UN Global Compact Network Malaysia & Brunei
<b>UOB</b>	United Overseas Bank Limited
<b>US</b>	United States
<b>UV</b>	Utility Vessel
<b>UWILD</b>	Underwater Inspection In Lieu of Drydocking
<b>VaaS</b>	Vehicle-as-a-Service
<b>VDP</b>	Vendor Development Programme
<b>VFP</b>	Vendor Financing Programme
<b>VLCC</b>	Very Large Crude Carrier
<b>VLEC</b>	Very Large Ethane Carrier
<b>VISTA</b>	Vocational Institution Sponsorship and Training Assistance
<b>WHP</b>	Wellhead Platform

# Glossary

Definition	Used for
<b>Barrel</b>	A standard unit of measurement for oil and production. One barrel contains 159 litres of oil.
<b>Barrels of Oil Equivalent (boe)</b>	A unit of measurement to quantify amount of crude oil, condensates and natural gas. Natural gas volumes are converted to barrels on the basis of energy content.
<b>Brent Price</b>	The benchmark crude oil price in Europe, as traded on the International Petroleum Exchange in London. Brent Crude refers to a particular grade of crude oil, which is slightly heavier than WTI crude.
<b>Brownfield</b>	Field that has been previously developed and has reached its peak oil/gas production level.
<b>BloombergNEF</b>	A strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy.
<b>Catalyst</b>	One that precipitates a process or event, especially without being involved in or changed by the consequences.
<b>Clean Energy</b>	Energy gained from sources that do not release air pollutants, while green energy is energy derived from natural sources.
<b>COP28</b>	28 <sup>th</sup> United Nations Climate Change conference, Conference of the Parties to the Convention (COP) has convened member countries every year to determine ambition and responsibilities and identify and assess climate measures. The 21 <sup>st</sup> session of the COP (COP21) led to the Paris Agreement, which mobilised global collective action to limit the global temperature increase to 1.5°C above pre-industrial levels by 2100, and to act to adapt to the already existing effects of climate change.
<b>Decarbonisation</b>	The term used for removal or reduction of carbon dioxide (CO <sub>2</sub> ) output into the atmosphere.

Definition	Used for
<b>Deepwater</b>	Projects in water depths exceeding 450ft. The unique methods are required to produce the oil and gas from ocean bed at such depths.
<b>Development</b>	Activities following discovery that are necessary to begin production and transportation of crude oil and natural gas.
<b>Downstream</b>	All segments of the value chain that add value to the crude oil and natural gas produced, for example refining, gas processing, gas liquefaction, gas distribution, petrochemical manufacturing, marketing of petroleum and petrochemical products, storage and transportation.
<b>Energy Transition</b>	The energy transition is the ongoing process of replacing fossil fuels with lower-carbon energy sources.
<b>Exploration</b>	The search for crude oil and/or natural gas by geological and topographical studies, geophysical and seismic surveys and drilling of wells.
<b>Feedstock</b>	Raw material used in manufacturing a product, e.g. crude oil is a feedstock in the refining process to produce gasoline.
<b>Field</b>	A geographical area overlying a hydrocarbon reservoir.
<b>Fortune Global 500®</b>	The Fortune Global 500 is an annual ranking of the top 500 corporations worldwide based on their reported annual revenue. It is compiled and published by Fortune magazine.
<b>Greenfield</b>	Field that has proven oil/gas reserve but has never been developed.
<b>Hydrocarbon</b>	A compound of hydrogen and carbon, such as any of those which are the chief components of petroleum and natural gas.

Definition	Used for
<b>Hydrogen</b>	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.
<b>Infill Drilling</b>	Drilling of new wells in an existing field within the original well patterns to accelerate production.
<b>Integrated - Downstream</b>	Single joint tender among PETRONAS Downstream and Gas OPU for similar scope of services and materials (with multiple contract holders).
<b>Integrated - Upstream</b>	Single joint tender among PACs in Malaysia and/or among PETRONAS Upstream OPU for similar scope of services and materials (with multiple contract holders).
<b>Linepipes</b>	A high strength carbon steel pipe used for transporting crude oil, petroleum products, natural gas and water.
<b>Liquefied Natural Gas (LNG)</b>	Natural gas that is liquefied under extremely cold temperatures of about 260 degrees Fahrenheit to facilitate storage or transportation in specially designed vessels.
<b>National Energy Policy 2022-2040</b>	The National Energy Policy was formulated to achieve the following objectives: ensuring adequate, secure, quality and cost-effective supply of energy; promoting efficient utilisation of energy; and ensuring factors pertaining to environment protection are taken into consideration in the production and utilisation of energy.
<b>National Energy Transition Roadmap</b>	NETR is crucial for Malaysia's Energy Transition, enabling the country to transition from a traditional fossil fuel-based economy to a high-value green economy on large scale.
<b>Net Zero Carbon Emissions</b>	Achieved by balancing carbon dioxide (CO <sub>2</sub> ) emissions by removal (for example, through carbon capture and sequestration) or simply eliminating CO <sub>2</sub> emissions altogether (for example, decarbonisation of energy systems through solar and wind energy).
<b>New Energy</b>	Sources of energy that are renewable and environmentally friendly, such as solar energy, wind energy and biofuels.

Definition	Used for
<b>Petrochemicals</b>	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.
<b>Refining</b>	A purification process for natural resources which includes hydrocarbons, using distillation, cooling and/or compression.
<b>Regasification</b>	Process of converting LNG temperature back to natural gas at atmospheric temperature.
<b>Renewable Energy</b>	Energy that is generated from natural processes that are continuously replenished.
<b>Resources</b>	The total estimated quantities of petroleum at a specific date to be contained in or that have been produced from known accumulations of hydrocarbon.
<b>Subsurface</b>	Relating to being located beneath a surface and especially underground.
<b>Sustainable Aviation Fuel</b>	A biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint.
<b>United Nations Sustainable Development Goals</b>	17 interlinked goals adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Also known as Global Goals.
<b>Upstream</b>	The segment value chain pertaining to finding, developing and producing crude oil and natural gas. These include oil and gas exploration, development and production operations; also known as Exploration and Production (E&P).
<b>Wellhead</b>	A component at the surface of an oil or gas well that provides the structural and pressure-containing interface for the drilling and production equipment.

Unit	Definition	Used for
bbl	Barrels	Volume
hr	Hour	Time
kb/d	Kilo barrels per day	Production Rate
km	Kilometre	Distance
MMboe/d	Million barrels of oil equivalent per day	Production Rate
MMscf/d	Million metric standard cubic feet per day	Production Rate
MT	Metric tonne	Weight
MTPA	Million metric tonnes per annum	Capacity
MW	Megawatt	Power
USD	United States Dollar	Currency



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# ENERGY ASIA

## Delivering Asia's Energy Transition

16 – 18 June 2025

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