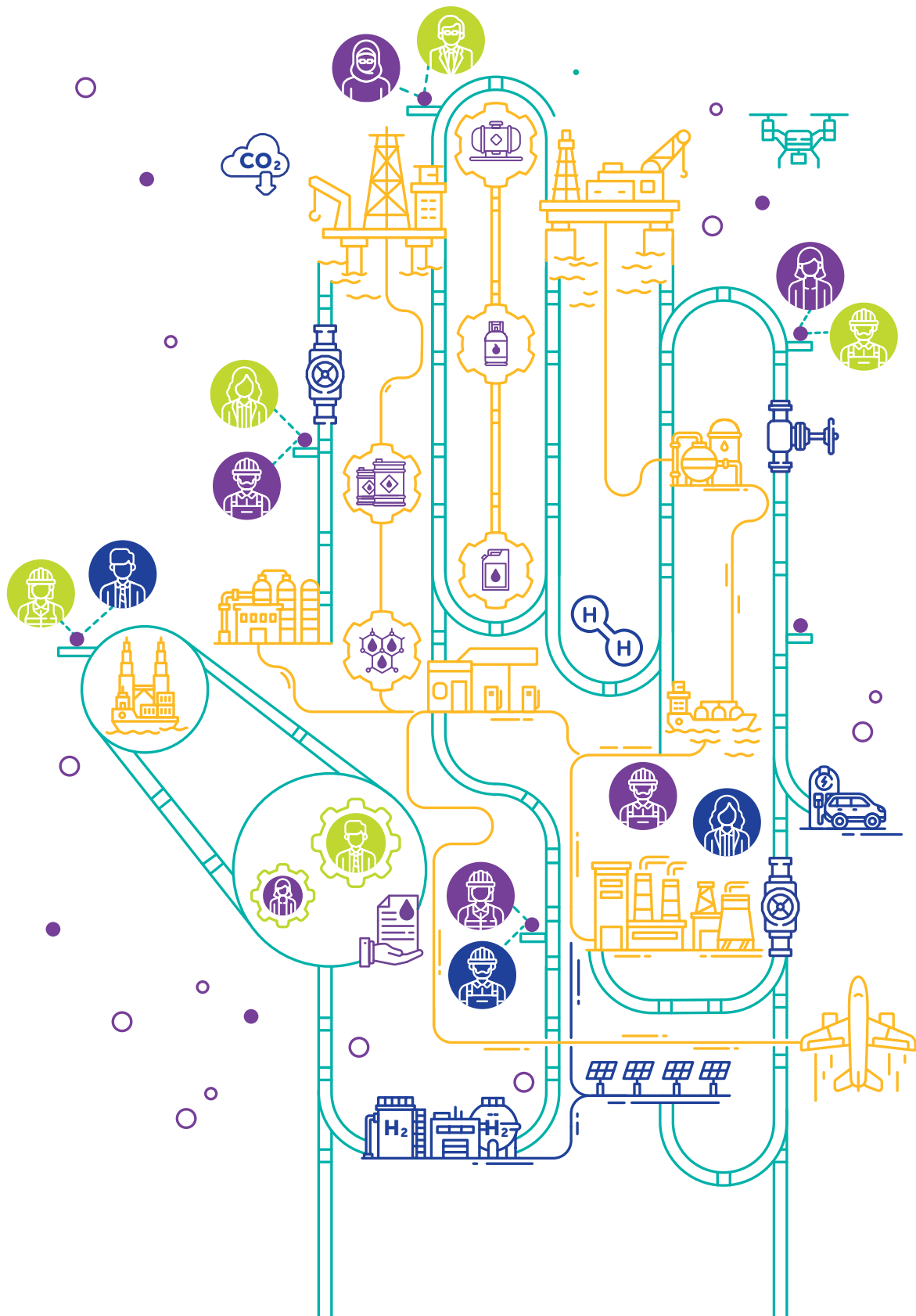




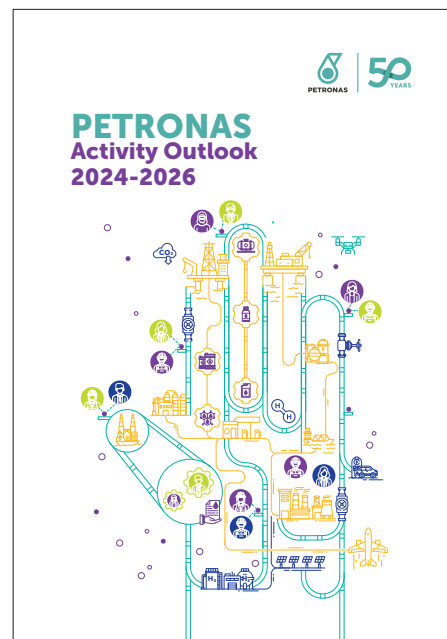
PETRONAS

Activity Outlook

2024-2026



The Cogs of Co-Creation



This cover design illustrates the seamless collaboration with our stakeholders as we navigate from one point to another, in achieving success in the energy industry. Everyone plays a pivotal role, contributing to the larger scheme of progress. Inspired by the Rube Goldberg method, this design demonstrates that co-creation is ever-present throughout our journey.

Cautionary Statement

This report was developed based on currently available information from internal and external sources. PETRONAS believes the expectations of its Management as reflected by such forward-looking statements are reasonable, based on information currently available to it.

PETRONAS makes no representation on the accuracy or completeness of any information provided in this report and expressly disclaims any liability whatsoever arising from, or in reliance upon, the whole or any part of its contents.

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.

This image is for illustrative purposes only and does not accurately represent a real technical workflow. It is a visual aid intended for conceptual understanding and does not reflect specific technical details or procedures.

Released in December 2023.

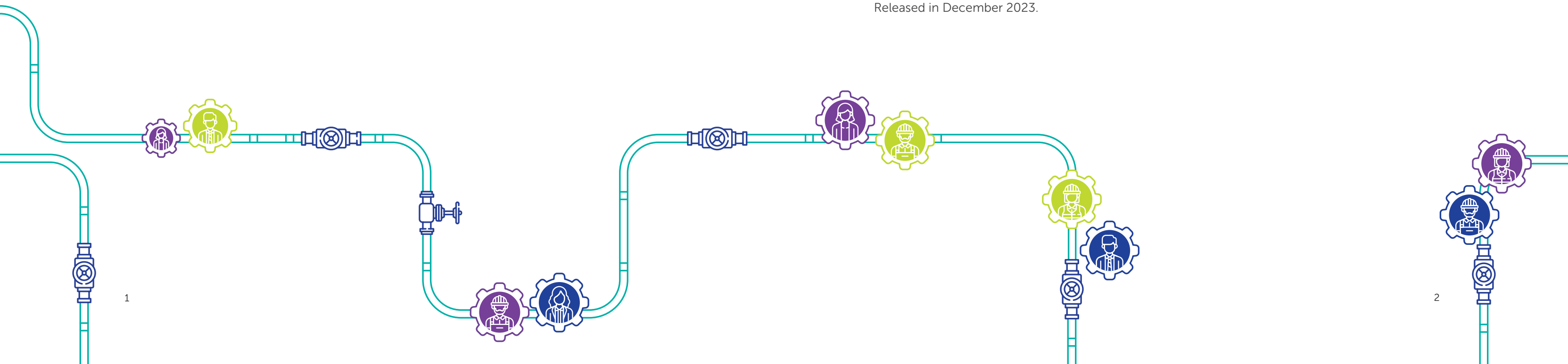


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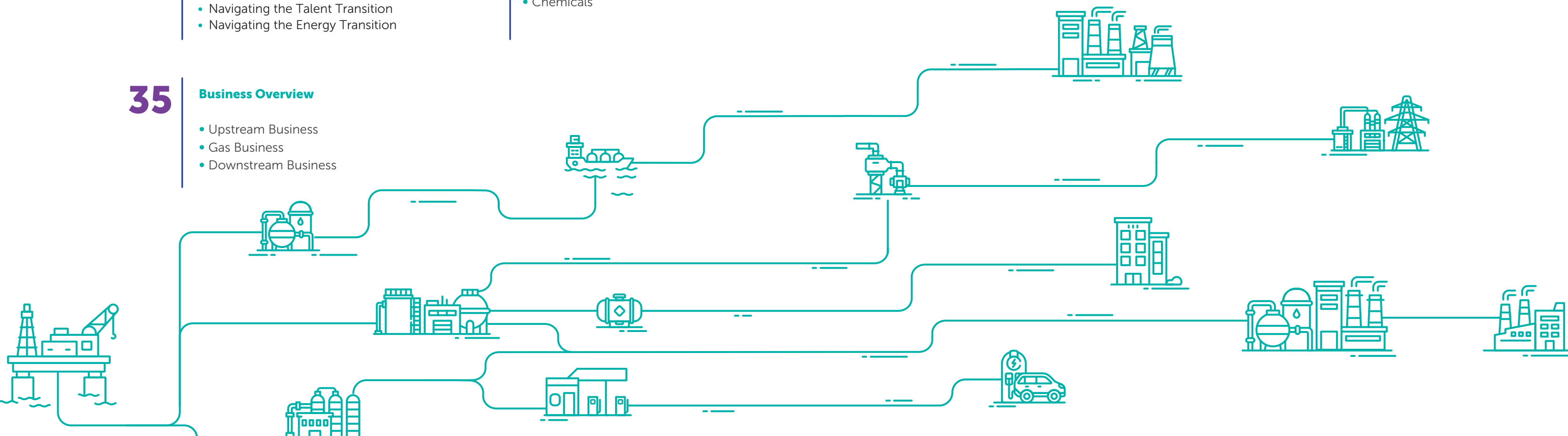
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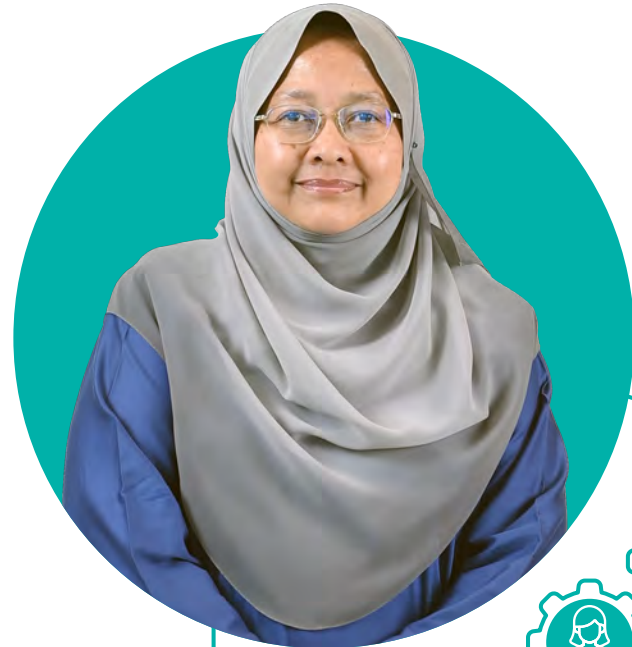
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Find Out More



Purposeful Co-Creation with Distinct Competency

Foreword by Vice President,
Group Procurement, PETRONAS



Dear Esteemed Partners,

We are pleased to present you the 2024–2026 edition of the PETRONAS Activity Outlook.

The energy sector must rapidly transform amidst the shifting energy landscape and demand for cleaner energy solutions while balancing the energy trilemma of security, affordability and sustainability; taking into account the combined impact of geopolitical conflict, rising costs of living and the climate crisis that adds up to the already uncertain economic environment.



In August this year, the government announced the National Energy Transition Roadmap (NETR), which lays the groundwork for Malaysia to forge ahead in this transformative journey. PETRONAS continues to play a key role in the Oil and Gas, Services and Equipment (OGSE) industry, supporting the government’s efforts to bolster the country’s economic growth. We aim to champion the energy transition by prioritising energy security and providing cleaner energy solutions, while maximising the value of the country’s hydrocarbon resources.

The industry should be gearing towards adapting to the energy transition, such as shifting towards lower-carbon endeavours, pursuing net zero emissions, and exploring renewable energy sources. Through cross-industry experiences, insights and knowledge, we believe co-creation can upskill our capabilities and skills, which will chart new frontiers for the OGSE industry.

The government has also ratified the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) at the end of 2022. According to the ‘Cost-Benefit Analysis on the Potential Impacts of CPTPP on the Malaysian Economy and Key Economic Sectors’ published by the Ministry of Investment, Trade and Industry (MITI) in March 2022, the trade openness from CPTPP will increase GDP by USD56.5 billion between 2021 and 2030 and Malaysia will continue to enjoy a trade surplus equivalent to 8.5 per cent of GDP in 2030. PETRONAS shall take the necessary steps to comply with CPTPP in our procurement activities, within the specific flexibilities accorded to Malaysia.



We would also like to emphasise the importance of all parties **to uphold the highest level of corporate governance and maintain zero tolerance on bribery and corruption.**

At the same time, PETRONAS will strive to ensure that safety is paramount and takes precedence as we navigate through the challenges and drive progress.

On behalf of PETRONAS, we extend our appreciation for the continued partnership from all parties. We hope the PETRONAS Activity Outlook 2024–2026 will provide valuable input to the industry in planning its activities.

Freida Amat
Vice President, Group Procurement

when insight meets innovation

Industry Overview



Energy: Security in Focus

Geopolitical conflicts in Europe and the Middle East have put the oil and gas market on edge, amid concerns that supply may be disrupted. Higher energy prices as a result of these conflicts could slow economic growth at a time when interest rates are at higher levels due to central banks' efforts to tame inflation.

High interest rates are keeping costs high, yet the need for energy security has made it crucial for players to invest today, to ensure supply continues to flow to consumers to meet their energy needs. Across the globe, major oil and gas companies have taken Final Investment Decisions (FIDs) on projects put on hold during the COVID-19 pandemic as the near-term outlook for demand improves.

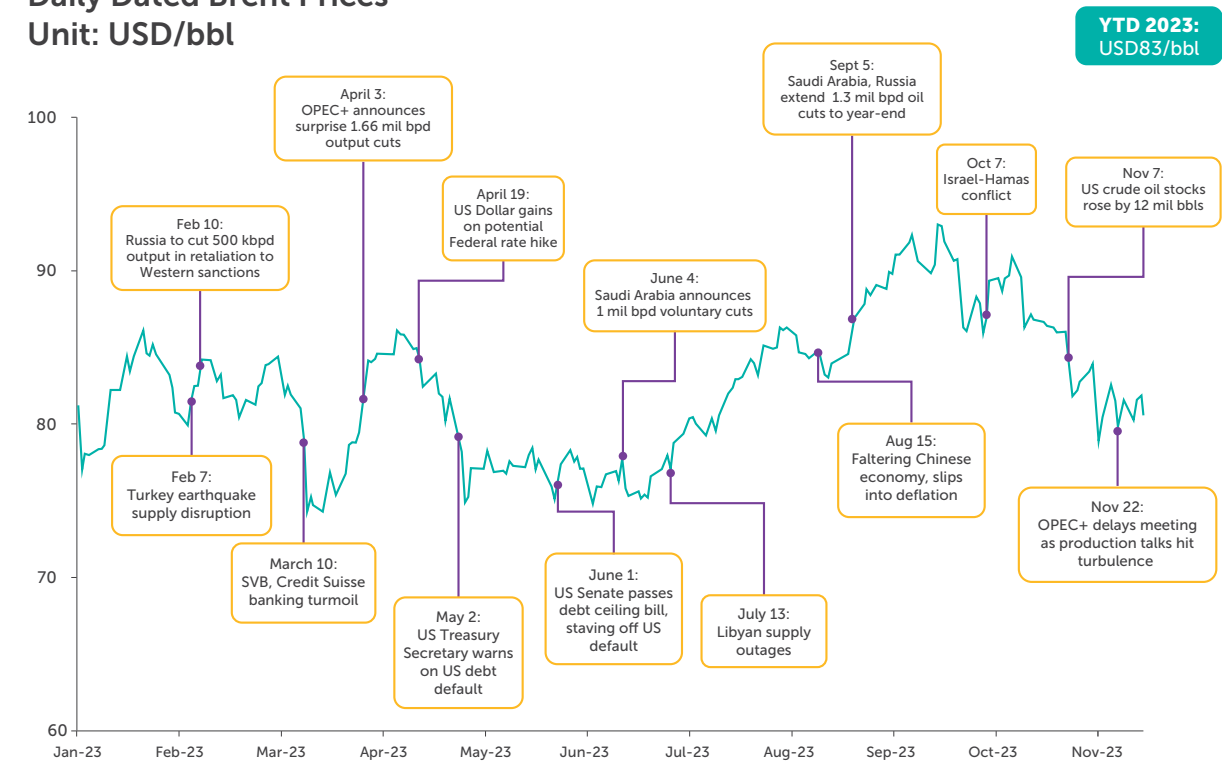
Grappling with rising costs, players are tapping into technology to put a cap on prices of services from the oil and gas services sector. Investing in technology is key to safety and efficiency improvements. Sustainable operations, where every player in the oil and gas sector embraces and adopts measures to reduce emissions and cut waste, are paramount to showcase the industry's decisive move to remain relevant as energy transition accelerates.

With peak oil demand fast approaching, the industry will eventually be relying on barrels that are produced at the lowest cost and lowest emission possible. As partners in the exploration and production of these barrels, we will be ahead of the game through fast technology deployment that keep costs down, upskilling of talent in a faster-paced world and possessing an agile mindset to fight climate change.

Natural gas is the key fuel, especially for emerging markets, to meet their goals of reducing emissions. For PETRONAS, gas makes up more than half of our oil and gas portfolio. We have the fuel that is pivotal in the energy transition, and our partners will play a crucial role in helping Malaysia and other nations gain energy security through natural gas. As oil loses traction in the transport sector, the transformation of its use will come from the downstream sector, where it has also made leaps and bounds in its pursuit towards sustainability. This has also increased demand for packaging and lighter materials, which will require the petrochemicals industry to continue innovating.



Daily Dated Brent Prices
Unit: USD/bbl

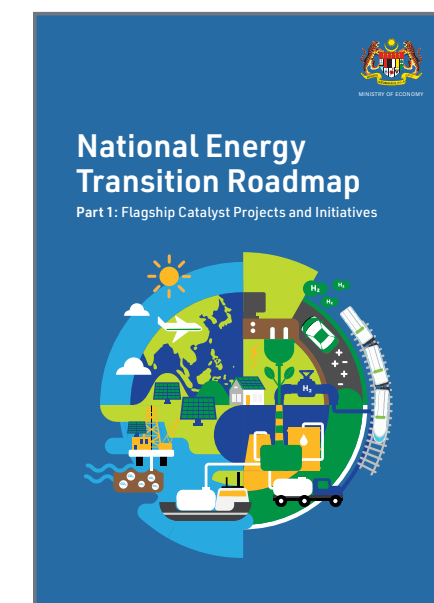


Source: Argus, PETRONAS internal analysis

The National Energy Transition Roadmap (NETR) in Accelerating the Nation's Green and Sustainable Growth Agenda

The National Energy Transition Roadmap (NETR) was developed by the Malaysian Government to expedite energy transition initiatives. It plays a vital role in guiding Malaysia's transition from a traditional fossil fuel-based economy to a high-value green economy. The NETR requires a whole-nation approach, encompassing Federal and State Governments, the industry, the general public and the international community.

Ten flagship catalyst projects under the NETR will address the six energy transition levers; green mobility, bioenergy, hydrogen, energy efficiency (EE), renewable energy (RE) and carbon capture utilisation and storage (CCUS). Malaysia's commitment is further strengthened by the NETR, which lays out the framework for national energy mix, greenhouse gas emission reduction and energy transition programmes.

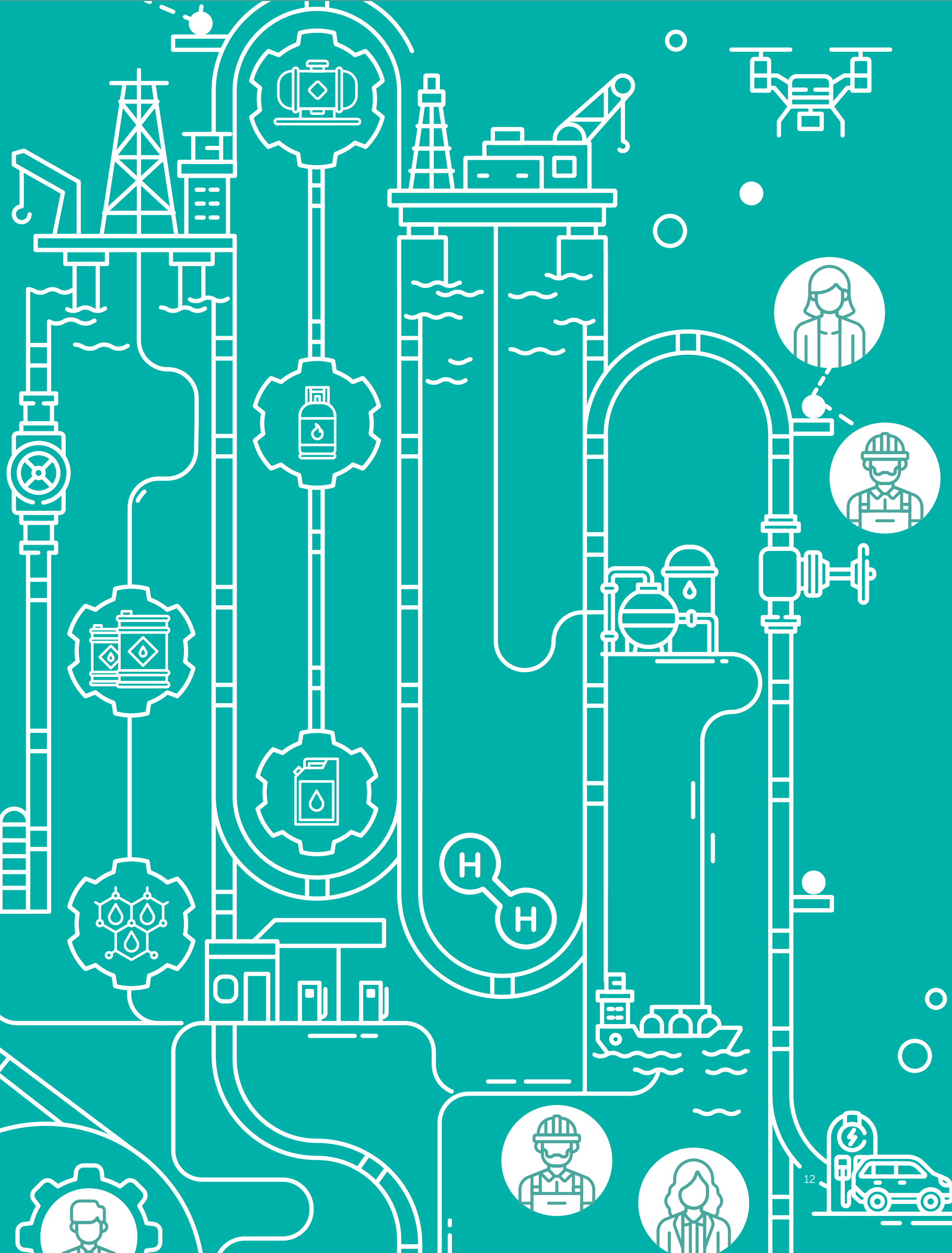
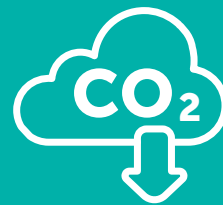


For more details on the National Energy Transition Roadmap, please scan the QR code.



when capability meets collaboration

In the Spotlight



Forging Ahead

Collaborating to Win with Energy Transition

The upstream industry in Malaysia remains vibrant and continues to attract investors, as evidenced by the substantial capital and operating expenditure channeled by investors, also known as the Petroleum Arrangement Contractors (PACs). Their investments have been brought in for activities in production operations, assets and field development projects, exploration drilling and seismic acquisitions.

Furthermore, in the wake of a healthy rebound following the COVID-19 pandemic, Malaysia Bid Rounds have witnessed enthusiastic responses. Close to 80 per cent of Malaysia's acreages are now fully awarded in the form of production sharing contracts to PACs, setting the pathway towards long-term investment and growth in hydrocarbon production.

PETRONAS, through Malaysia Petroleum Management (MPM) as the upstream oil and gas industry shaper, regulator and investment enabler, continues to transform the industry to becoming lower-cost and lower-carbon amidst the energy transition. The long-term focus is to pursue and achieve sustainable value-driven production growth in keeping with our Net Zero Carbon Emissions by 2050 pathway, monetise oil and gas resources, strengthen core capabilities and continually build upon each of these competencies. Malaysia's production currently stands at about 500 thousand barrels per day (kb/d) of liquids and 7,000 million standard cubic feet per day (MMscf/d) of gas. This achievement is underpinned by a substantial investment of over RM700 billion spanning the period since PETRONAS' inception in 1974.



A Promising Outlook

PETRONAS' future is anchored on a long-term target to sustain and grow Malaysia's oil and gas production of two million barrels of oil equivalent per day (MMboe/d) by 2025 and beyond. This will be supported by various oil and gas projects in the pipeline such as Kasawari, Jerun, Rosmari-Marjoram and Lang Lebah in Sarawak, Gumusut-Kakap Redev and Belud Clusters in Sabah, and Bekok Oil Redev, Tabu Redev and Seligi Redev in Peninsular Malaysia, amongst others.

With numerous ongoing and upcoming projects in the pipeline, a large amount of job opportunities is expected for OGSE providers. These opportunities span across various upstream activities, within the different phases of Life of Field (LoF), including exploration, development, production and decommissioning.

Exploration activities include extensive seismic, non-seismic and geological studies that must be carried out to enhance the prospectivity of acreages as well as meticulous planning of exploration drilling. For the next three years, more than 25 wells are forecasted to be drilled each year with a focus on shallow water wells in Peninsular Malaysia and Sarawak, and deepwater wells in Sabah to sustain and spur exploration growth in the country. Service providers are expected to contribute to the success of the exploration activities by applying the latest technology and expertise in this area.

The development phase, which encompasses advanced subsurface studies and efficient execution and delivery of development projects to drive resource maturation and monetisation, is another pivotal facet of upstream operations. Within the next three years, more than 45 upstream projects are expected to be executed; four Central Processing Platforms (CPPs) are projected to be fabricated; three onshore facilities are expected to be constructed and approximately 1,130 km of pipelines are expected to be fabricated and installed. In this area, PETRONAS and the PACs expect OGSE and industry players to provide the essential products and services required to drive the success of these development projects to be on time, on budget, on scope and on value (OTOBOSOV).



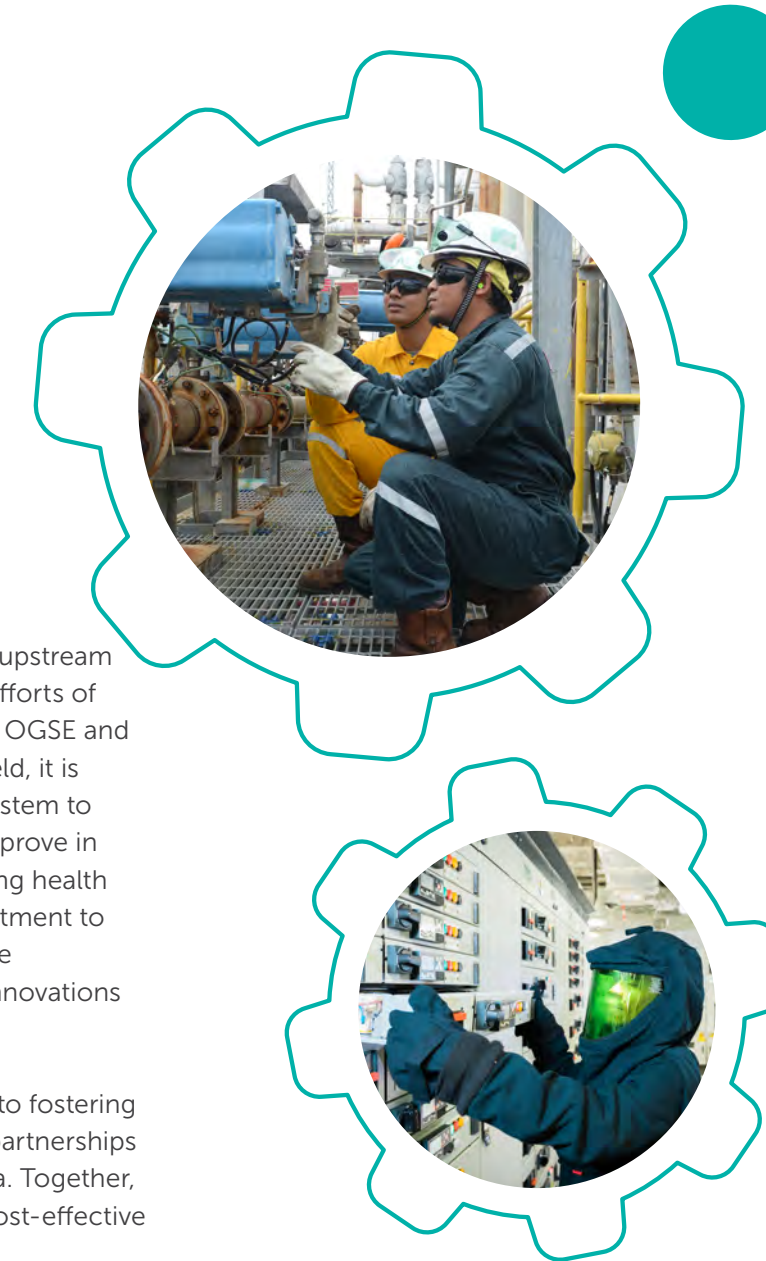


PETRONAS plays a pivotal role in overseeing petroleum operations in Malaysia, primarily to maximise production efficiency and sustainability of oil and gas supply. To sustain production volume and operability of the producing assets, an average of about 300 Facilities Improvement Plans (FIPs) have been planned to be carried out each year for the next three years. These include rejuvenation projects, gas turbine and gas generator change-out activities and other major maintenance activities, which will be carried out to eliminate bottlenecks and maximise hub capacity. FIPs also play a crucial role in curbing flaring activities at new onshore facilities, thereby contributing to decarbonisation efforts. The strength of OGSE industry across various disciplines such as logistics, maintenance and supplies ensure production operations continue without disruption, efficiently and safely.

Another significant aspect in Upstream Malaysia operations is the decommissioning activities for matured assets. In line with driving decommissioning execution to restore the area to a safe and environmentally stable condition, disused assets are assessed for potential reuse or repurpose. For the next three years, decommissioning plans include the plugging and abandonment of about 130 wells and the abandonment of about 50 facilities.

A strong and balanced ecosystem is vital for the sustained growth of Upstream Malaysia. Key to this equation is the optimal performance of service providers to ensure the successful delivery of projects. It is imperative that OGSE players continue to operate and align to industry benchmarks to ensure efficiency, safety and reliability in its operations. This is significant as it will cultivate a capable and competitive pool of service providers who not only meet but exceed these benchmarks, contributing to the continued success of Malaysia's upstream industry.

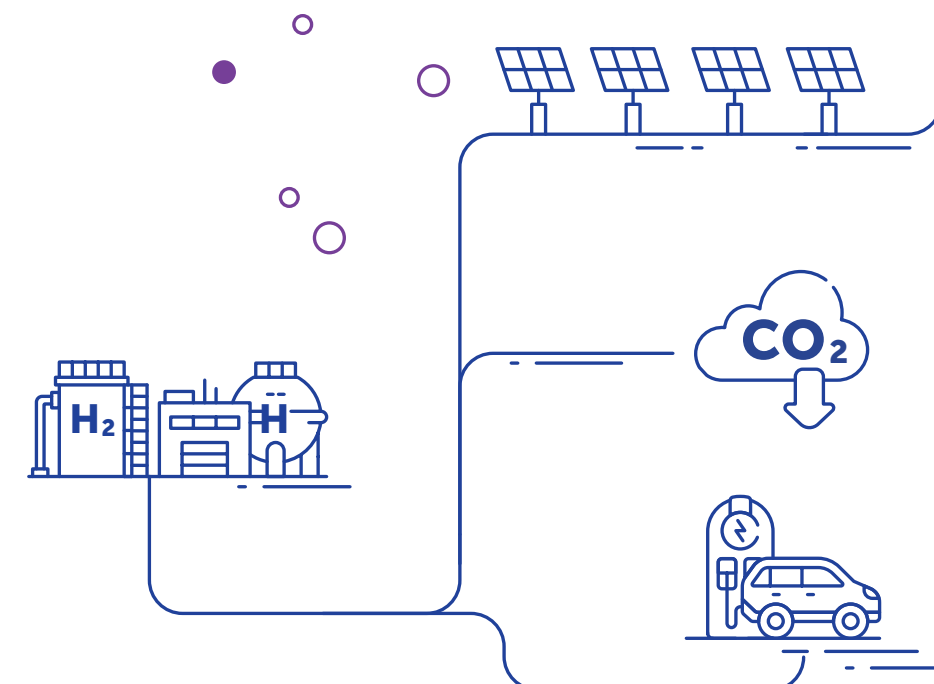
In addition, service providers must prioritise and invest in health, safety and environmental protocols to not only safeguard the workforce but also minimise adverse environmental impact. In tandem, they must demonstrate the ability to adapt to the ever-changing oil and gas landscape. Staying abreast with technological advancements and consistently enhancing processes are imperative to sustaining production at a competitive price.



A Sustainable Future

The continued growth of Malaysia's upstream sector will hinge on the combined efforts of various industry stakeholders; PACs, OGSE and business partners. To excel in this field, it is imperative for all facets of the ecosystem to work together and collaborate to improve in several key areas, including prioritising health and safety, and boosting our commitment to initiatives that will allow us to achieve sustainability, adopt technological innovations and enhance workforce skills.

PETRONAS via MPM is always open to fostering more extensive collaborations and partnerships with all players of Upstream Malaysia. Together, we can achieve a secure, resilient, cost-effective and lower-carbon future.

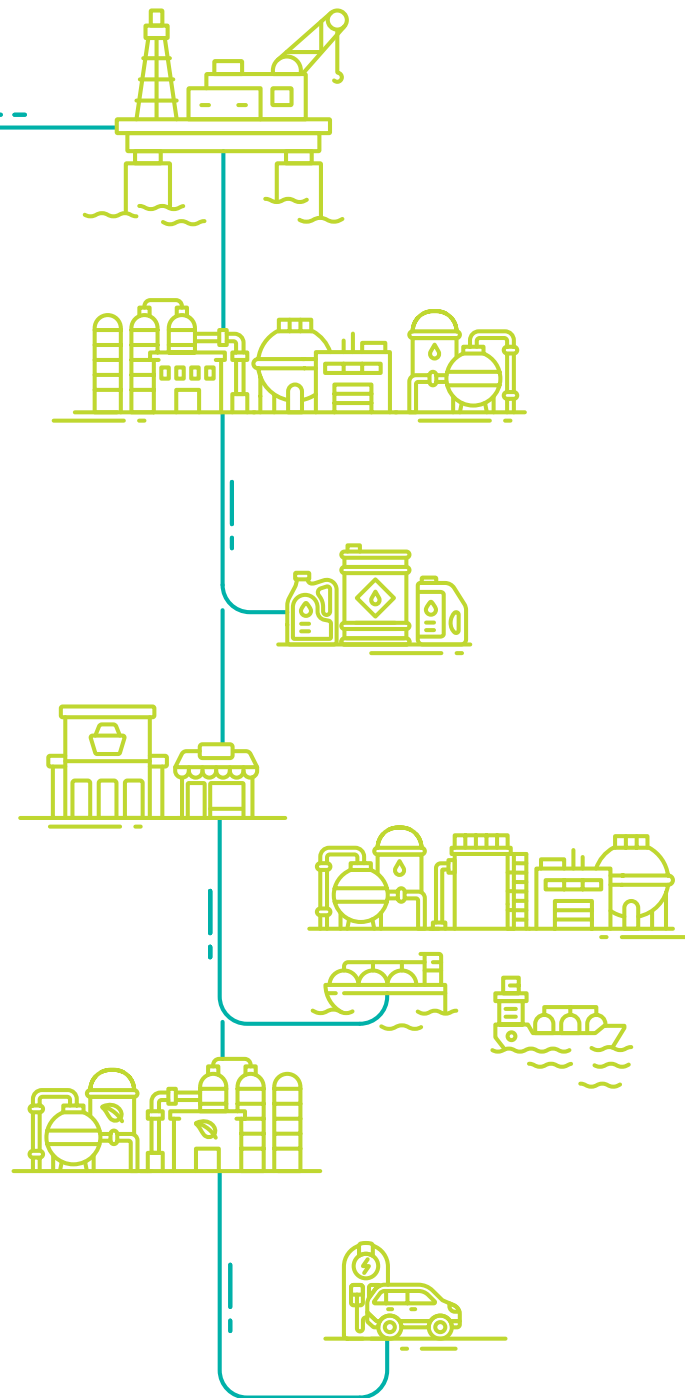


Downstream and New Business Opportunities

PETRONAS' Downstream business focuses on enhancing the value of our energy resources, transforming them into high quality, value-added products that are distributed to over 100 countries worldwide. Our operations include refining, marketing and trading crude oil and petroleum products, along with manufacturing petrochemical and specialty chemicals.

With a network of over 1,000 PETRONAS stations in Malaysia, we offer high-quality fluids, lubricants and innovative non-fuel offerings like Setel and Kedai Mesra in 800 locations. Additionally, you can also find over 40 Café Mesra outlets operating beyond PETRONAS stations, providing premium coffee and pastries for customers on-the-go.

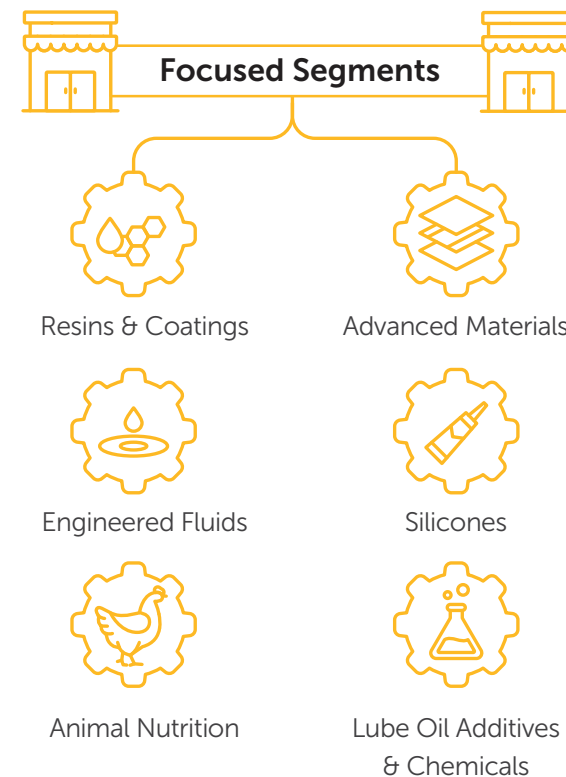
Expanding the Downstream business into cleaner energy initiatives, we are venturing into biofuels, circular economy, Liquefied Natural Gas (LNG) bunkering and next-gen fluids with PETRONAS Iona Range and the installation of Electric Vehicle (EV) charging facilities at PETRONAS stations. This aligns with our Net Zero Carbon Emissions 2050 (NZCE 2050) Pathway and the country's goal of achieving net zero emissions by 2050.



Petrochemicals

PETRONAS Chemicals Group Berhad (PCG) is guided by its Two-Pronged Strategy that drives its business growth, while enhancing its role in sustainability to support NZCE 2050. The first prong focuses on sustaining strength in basic petrochemicals, while the second prong encapsulates stepping-out opportunities through selectively diversifying into derivatives, specialty chemicals and solutions.

Under its second prong, PCG's specialty chemicals segment offers a wide range of focused segments that include: Resins and Coatings, Engineered Fluids, Animal Nutrition, Advanced Materials, Silicones and Lube Oil Additives and Chemicals to the market, with a commitment to ongoing growth.



Did You Know?

A collaboration to expand these market segments will only enhance resilience within PCG. Let's join hands and explore collaborative opportunities across these segments to cultivate growth.

PCG is also driving the circular economy transition through the construction of one of Asia's largest advanced chemical recycling plant.

With a capacity of 33,000 tonnes per annum, this plant converts end-of-life plastics into pyrolysis oil that can be used as chemical feedstock for the production of sustainable plastics. This effort drives innovation across the plastics value chain and creates opportunities for all parties - from waste collectors to manufacturers - to jointly contribute to the circular plastics economy.

Biofuel

PETRONAS is committed to fuel innovation and sustainability by venturing into biofuel production through a greenfield biorefinery and co-processing at existing facilities. With used cooking oil (UCO) as the main feedstock, PETRONAS will have the capability to produce Sustainable Aviation Fuel (SAF) and Hydrogenated Vegetable Oil (HVO) or renewable diesel.

PETRONAS is actively purchasing UCO from the public and plans to expand our collection network across the nation. The initiative is aligned with the green framework set by the International Civil Aviation Organisation (ICAO), namely Carbon Offsetting and Reduction Scheme (CORSIA) to reduce the impact of carbon footprint and meet the carbon neutral growth target for the international aviation sector.

PETRONAS Iona



Advanced Fluid for EV

PETRONAS, through PETRONAS Lubricants International, continues to innovate next-generation e-fluid solutions with our PETRONAS Iona range, making us one of the pioneers in the industry to introduce a dedicated range of automotive fluid solutions for electric vehicles (EVs) and other thermal management applications across diverse sectors.

As partners to premium original equipment manufacturers (OEMs), PETRONAS is committed to co-engineering the best advanced fluids through our Fluid Technology Solutions™, delivering custom-made solutions for our customers to help us use energy more sustainably and efficiently.



Expansion of EV Charging Network

Through strategic collaborations with relevant industry players, PETRONAS Dagangan Berhad (PDB) aspires to expand its charging infrastructure for electric vehicles at PETRONAS stations, signaling our commitment to accelerate the adoption of electric mobility. PDB has also introduced battery swap stations for electric two-wheelers and is actively seeking for collaborations with suitable players to support the growth of green mobility.

Did You Know?

Expanding Beyond Fuel

PDB has expanded into non-fuel portfolios to adapt to the ever-changing business landscape.

Auto Expert

PDB is expanding its AutoExpert network to boost SMEs and local economic growth.



Setel

PDB expands its Setel ecosystem through digital innovation and new features for a seamless customer experience.



Café Mesra

Café Mesra expands beyond PETRONAS stations with standalone kiosks and new café formats.



Pengerang Integrated Complex (PIC)

The Pengerang Integrated Complex (PIC) is a petrochemical park that plays an essential role in meeting rising energy and downstream derivatives demand, while supporting the energy transition towards net zero carbon emissions. Its multi-train refinery, processes imported crude oil into top-quality fuels and supplies feedstock for the adjacent steam cracker complex, producing premium products used in high-end consumer goods.



Built for Energy Efficiency

PIC is designed with groundbreaking facilities that ensure supply reliability for seamless processes and business continuity. Strategically located near major shipping routes, it stands as one of the leading petrochemical hubs in the region. The highly integrated complex where innovation and technology work hand-in-hand, creates value chain synergy that optimises cost.

Sustainability is embedded across PIC's growth aspiration and we welcome partners that promote circular economy and carbon footprint reduction. Explore a wide range of business opportunities at PIC and we look forward to partnering with you for a better future.

Associated Facilities and Utilities

Supporting PIC's operations to ensure its self-sufficiency and reliability.



Centralised Utilities



Raw Water Supply Facility



Deepwater Terminal



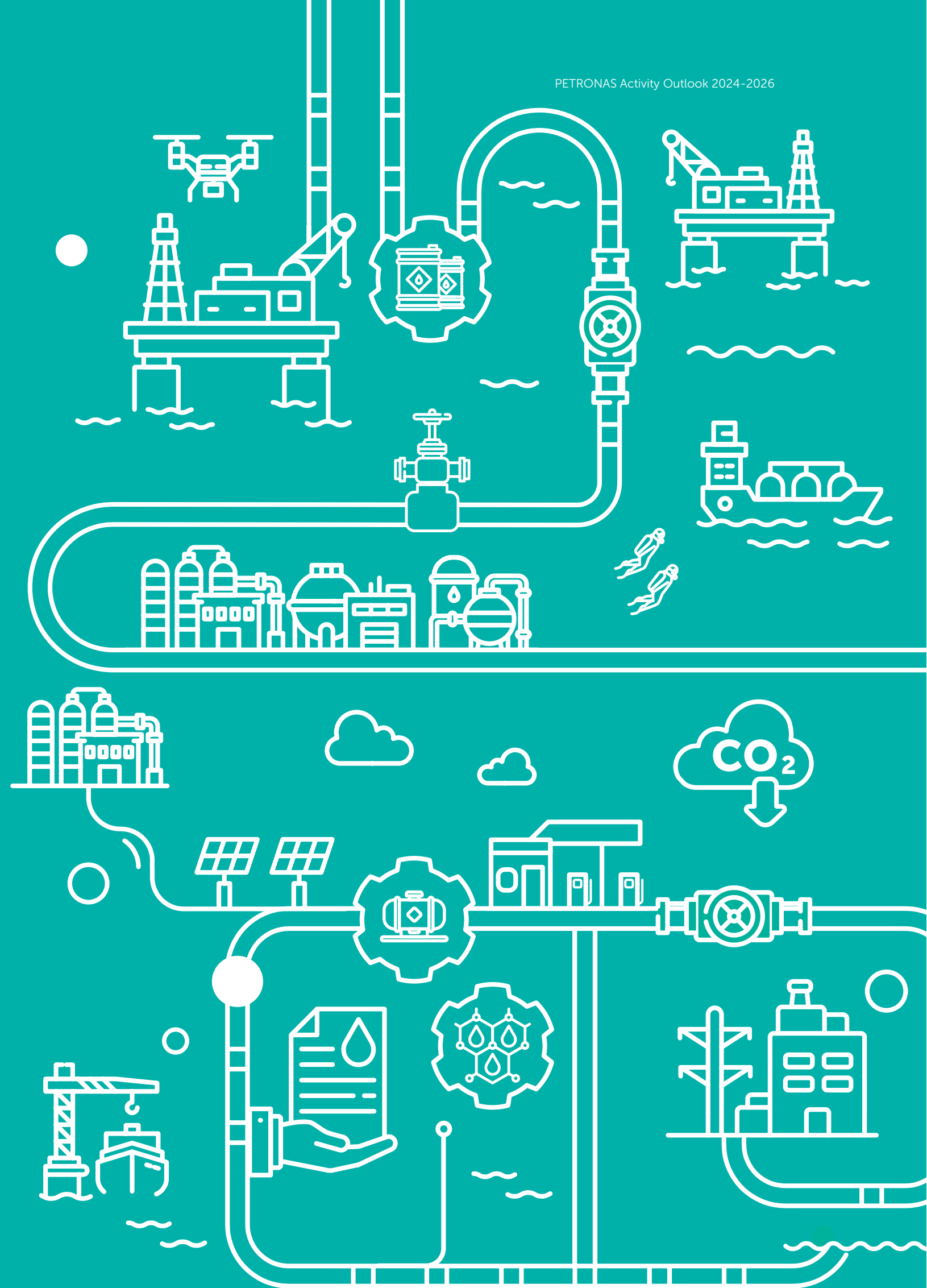
Liquefied Natural Gas Terminal



Co-Generation Power Plant



Air Separation Unit

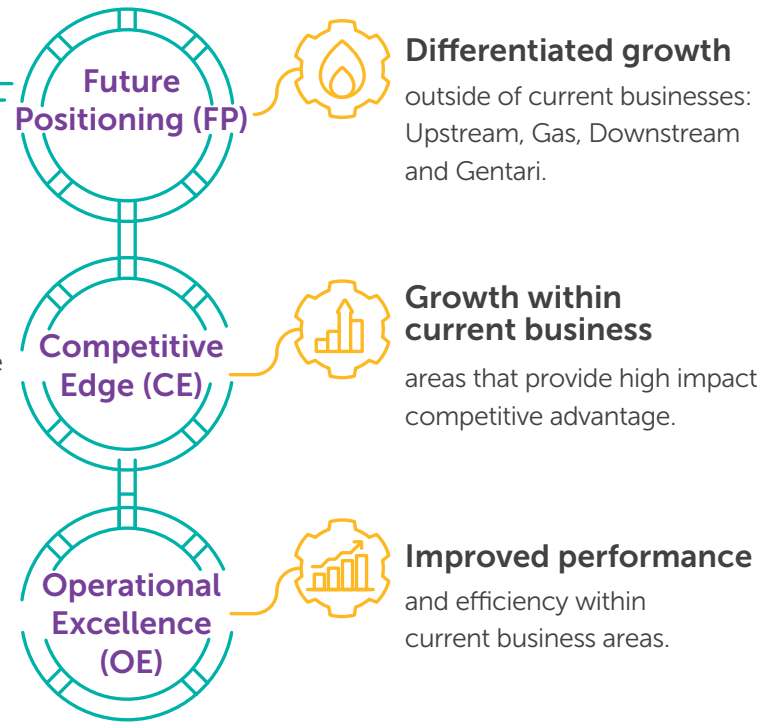


Innovation Gateway @ PETRONAS: Driving Technological Evolution

At PETRONAS, we see technology as a strategic differentiator to help us stay ahead. Innovation Gateway @ PETRONAS (iG@P) is PETRONAS' pioneering initiative, leveraging technology to drive competitive advantage and innovation. It acts as a crucial bridge, connecting operational challenges to cutting-edge solutions.

Strategic Focus Areas

PETRONAS' technology agenda focuses on three key areas: Future Positioning (FP), Competitive Edge (CE) and Operational Excellence (OE). In the realm of FP and CE, the emphasis is on pursuing technological advancement through innovative and fast-paced research and development (R&D) efforts. Conversely, OE places its focus on tapping into the knowledge of established and mature solution partners through the Innovation Gateway @ PETRONAS (iG@P).



iG@P: An Overview

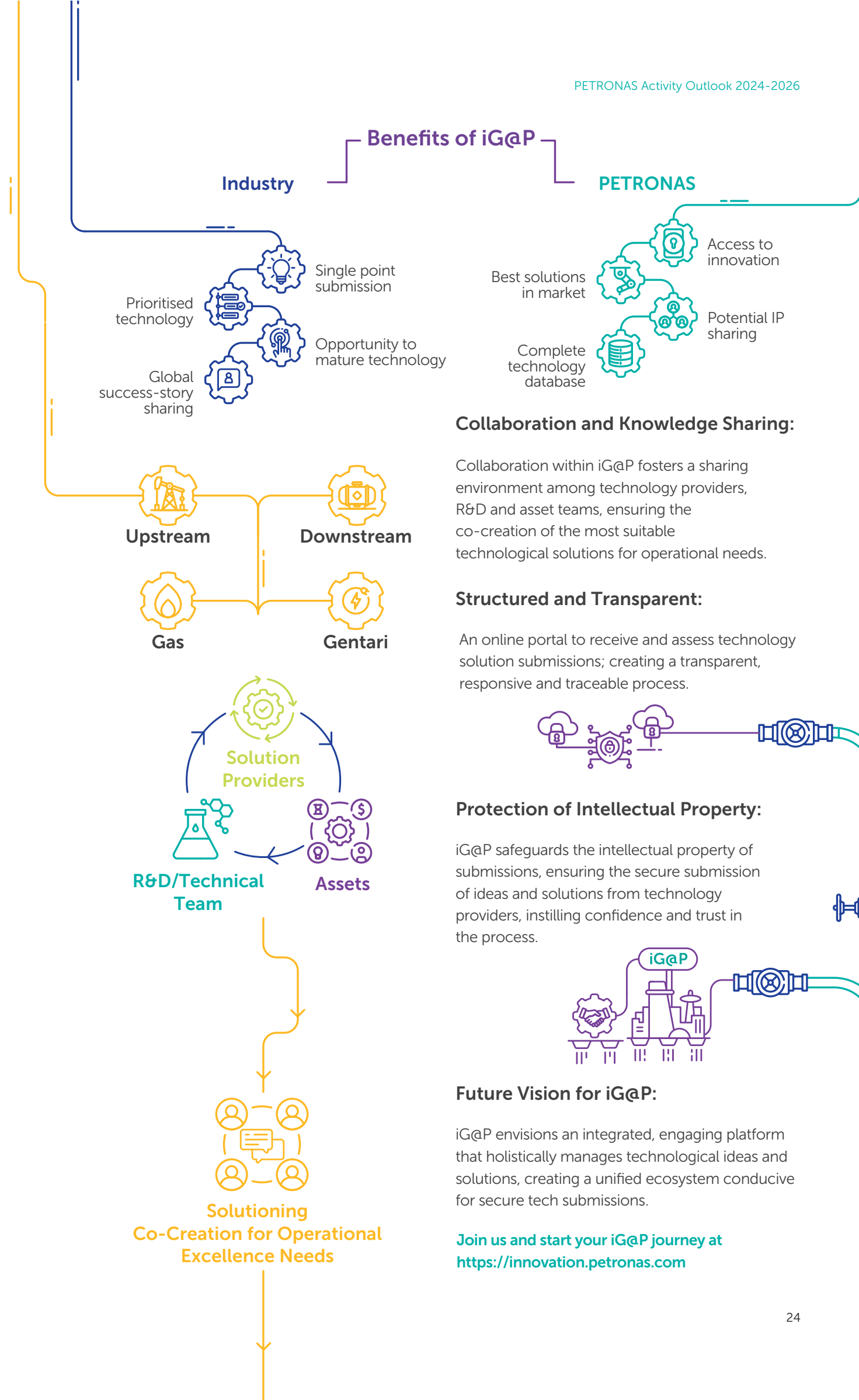
iG@P is a dynamic open innovation portal and online crowdsourcing platform that provides stakeholders with off-the-shelf, easy-to-access and diverse technology solutions. It facilitates the swift co-creation, deployment and partnership of technological advancements for operational excellence at PETRONAS.

Technology Submission and Evaluation Process:

iG@P provides an online platform for technology providers to submit solutions. These submissions undergo rigorous evaluation by Subject Matter Experts for suitability within PETRONAS' operations.

Enhancing Operational Excellence:

iG@P is aimed at enhancing operational excellence, encompassing aspects such as asset integrity, data management, energy efficiency and more. It caters to diverse needs across the Upstream, Gas, Downstream and Gentari businesses.



The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)

Free Trade Agreement (FTA)

The FTA is an agreement between two or more countries that promotes seamless cross-border trade. It aims to foster:

- Market access of foreign goods and services.
- A transparent and impartial investment environment, regardless of nationality.
- Review mechanisms – generally, all FTAs contain a review mechanism which may lead to a 'levelling up' of commitments from the base-level.

The FTA comprises multiple "Chapters" that outline key provisions by subject area (varies based on the FTA). The standard chapters with direct implications to PETRONAS include:

- State-Owned Enterprise (SOE)
- Trade in Sustainable Development
- Investment
- Trade in Services
- Trade in Goods
- Rules of Origin

The Trans-Pacific Partnership Agreement (TPP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).

- The TPP is a trade agreement between 12 Pacific Rim nations: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States and Vietnam signed on 4 February 2016 in Auckland, New Zealand.

- In January 2017, President Trump decided to withdraw the US from the TPP, thus, the agreement as it stands cannot enter into force without the United States.

- In November 2017, Ministers of the 11 TPP countries reached an agreement on the core elements, the text of the agreement and way forward to implement the TPPA, which was renamed as the CPTPP.

- The CPTPP was signed by all 11 participating countries - Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam on 8 March 2018 in Santiago, Chile. Signing the agreement indicates all 11 countries accepted the outcome of the negotiations and will start their domestic process to enable their ratification of the CPTPP in order to bring the agreement into force.

Ratification of Malaysia

- The Ministry of Investment, Trade and Industry (MITI) announced on 5 October 2022 that Malaysia has successfully ratified CPTPP on 30 September 2022. The CPTPP entered into force (EIF) effective 29 November 2022 (60 days after ratification). Malaysia will now practise open trade as per CPTPP's obligations with the 11 countries.



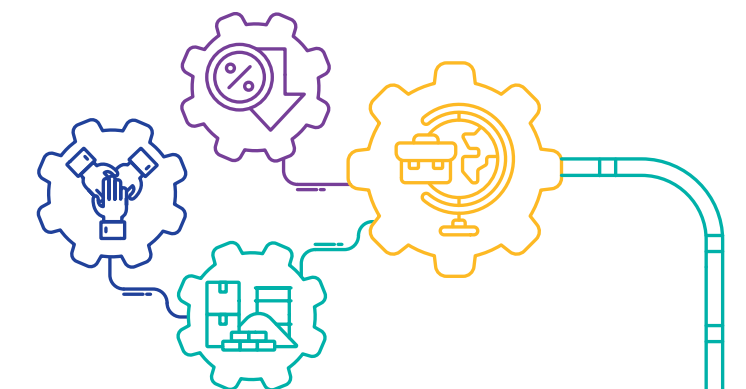
Net Benefit to Malaysia's key economic sectors

There are gain opportunities under the CPTPP including:

- Market access to Canada, Peru, Mexico, and the United Kingdom which Malaysia does not have an FTA with.
- Lower costs and ease of exporting due to customs cooperation, harmonisation and transparency.
- Wider sourcing channels for raw materials at competitive prices.
- Local capability development through cooperation and capacity-building activities with other CPTPP countries.

Ratification of Participating Countries

- All of the 11 participating countries have completed the ratification process, and the agreement has entered into force in all of the participating countries.
- On 16 July 2023, the United Kingdom became the first non-original signatory and European country to sign the CPTPP agreement, with entry into force by Q3 2024.



Source: Cost Benefit Analysis on the Potential Impacts of the CPTPP on the Malaysian Economy and Key Economic Sectors, MITI.

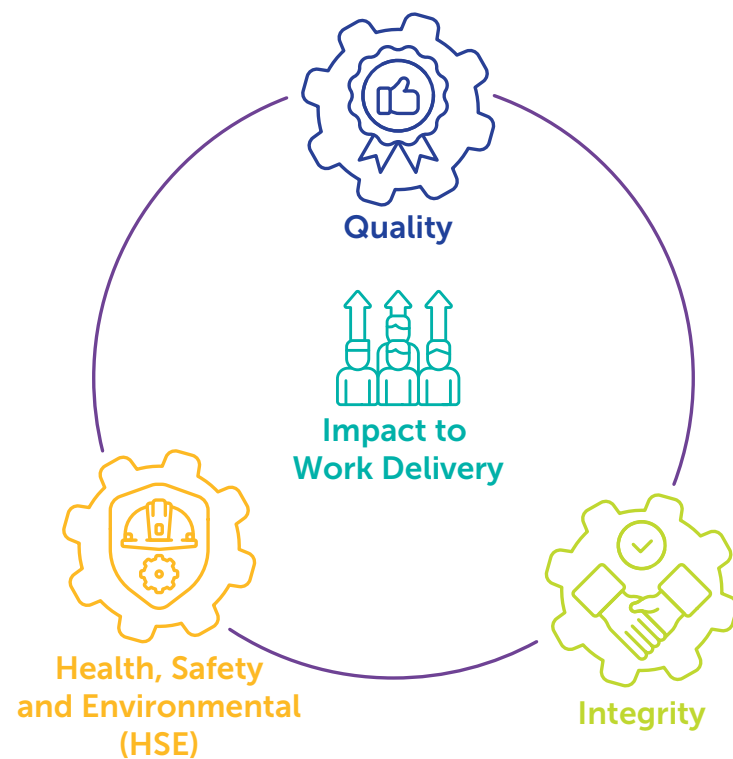
Navigating the Talent Transition: Challenges and Opportunities in the OGSE Industry

The changing landscape presents both challenges and opportunities for the OGSE industry, including the journey towards energy transition with new business models, digital technology integration and lower-carbon alternatives. As environmental and sustainability issues gain prominence, the need for qualified talents is becoming increasingly urgent, while competing with gig economies and other industries. Talents with both broad and specialised expertise are required to have new skill sets and capabilities to perform in the current landscape, as failure to do so may hinder productivity. This will further affect the industry's competitiveness.

In order to remain competitive in this volatile environment, the OGSE industry must prioritise attracting and retaining the right talent with the right capabilities.



The Oil and Gas Talent Landscape Grapples with a Growing Capability Gap and Capacity Shortage



In Malaysia's dynamic oil and gas industry, the successful hiring and retaining of relevant top talents is paramount to sustain growth and competitiveness. However, an internal survey conducted by PETRONAS revealed widespread challenges in hiring and retaining skilled professionals, citing competency gaps and competing job offers in the industry.

A mismatch of workforce skills may impact operational efficiency, productivity and jeopardise safety. This could lead to poor asset integrity, compromised health, safety and environmental compliance and hinder the OGSE industry's competitive edge.

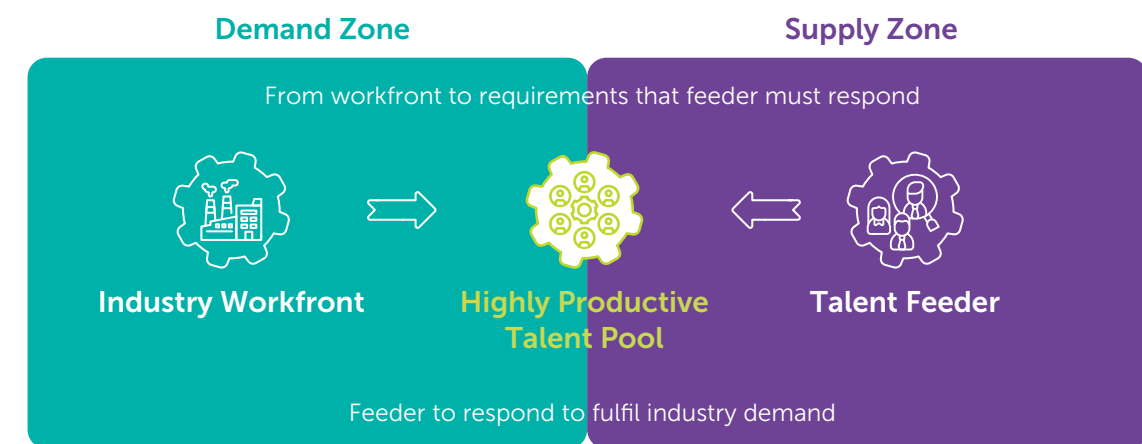
Talent Integrity Remains Essential in the Oil and Gas Industry

It is imperative that the industry have talents who adhere to the highest integrity standards that are crucial for generating and sustaining corporate value. Talents must have the necessary competencies and knowledge to uphold asset integrity and process safety especially in high-risk environments such as offshore operations or processing plants to avert unfavourable situations or accidents. This involves the management of people, systems, processes and technologies to ensure high productivity of assets that operate safely with zero risks to employees, the public and the environment. Having the right talent that does not compromise on integrity is a major step towards achieving success in today's business environment.

Tomorrow's Talent: Are We Ready for the Future?

One of the key items highlighted during the Energy Asia 2023 conference was that despite commitments, advancing technology and adequate funding, there is a considerable talent gap in the energy industry. This poses a significant challenge to transition towards net zero energy systems effectively and efficiently. Filling this gap requires the creation of about 30 million new jobs worldwide, including 200,000 in Malaysia alone¹ to ensure the sustainability of the nation's oil, gas and energy industry.

Attaining a future-ready talent pipeline requires rewiring the talent strategy ecosystem, including sourcing, retaining and elevating talent value propositions via upskilling and reskilling. Having a comprehensive line of sight on talent demand and supply within the industry ecosystem will ensure an industry-ready workforce. Facilitating the integration of the industry's existing fragmented initiatives will contribute towards a robust talent outlook.



Brief talent supply and demand within ecosystem re-imagined framework for illustration purposes only

The industry must have visibility to the dynamics of talent demand (what skills and roles are needed by the industry) and talent supply (the available pool of talents with needed skills and qualifications). This will enable the industry to analyse and respond timely to the current and future needs for specific skills and the availability of talents.

Fulfilling industry demand is important as it ensures sustainability and ability to contribute positively to the nation's oil, gas and energy industry.

Source:

¹ Experts: New talent needed for transition to renewable energy | The Star

To ensure a consistent supply of talent, the industry must collectively work together to entice the masses as early as during school level towards the interest of science, technology, engineering and mathematics (STEM). This can be done through collaboration with schools and universities to allow students to be exposed to industry demands, as well as the range of jobs available to them. Using real-world examples and experiences, the curriculum can be tailored for students to carry out industry-based experiments, make observations, ask questions, test ideas, think creatively and use their intuition, which will one day lead to solutions for the industry.

Did You Know?

We Shape Tomorrow's Bright Talents

PETRONAS has been nurturing talents through robust education and training initiatives, devoting resources to Malaysia's human capital development to meet the country's requirements and the energy industry's demand.

PETRONAS Powering Knowledge Initiatives:

1. Discover PETRONAS @Schools (DPS)
2. Education Sponsorship
3. Vocational Institutions Sponsorship and Training Assistance (VISTA)

*List is non-exhaustive

Did You Know?

Embracing a collaborative strategy towards a forward-thinking and strategic move can yield benefits not only for an individual organisation but also for the broader oil, gas and energy industry. It's time for industry players to co-create a talent pool in addressing talent challenges.

Get on board! Join the industry collaboration today as we work together to enhance the visibility of talent demand and supply and drive top-notch workforce productivity by scanning the QR code below before 30 June 2024.



The industry is also urged to promote and support Technical and Vocational Education and Training (TVET) graduates to fulfil the demand for talents. Collaboration between all stakeholders is crucial to ensure the right certification and training modules are made available for the right qualification. Additionally, during his keynote speech at the Oil and Gas Asia 2023 (OGA) conference, Datuk Bacho Pilong, PETRONAS' Senior Vice President, Project Delivery and Technology (PD&T) also urged industry players to tap into TVET institutions to align both talent and industry needs.

Visibility over the demand-supply of talent is still not enough. Visibility alone will only enable action towards capacity, but not capability. The industry must address the capability to drive long-term competitiveness which requires a conscious and concerted effort from everyone involved.

From the training perspective, the industry is urged to increase awareness of incentives provided by the Human Resource Development Corporation (HRD Corp) on levies for specific soft-skills trainings and local professional development programmes. Referring to the same survey analysis conducted by PETRONAS this year, 80 per cent of the respondents were aware of the levies. However, only 52 per cent were registered with the government agency. Notably, small and medium-sized enterprises (SMEs) indicated lower utilisation of HRD Corp benefits, compared to others. 18 per cent of SMEs are still unaware of the initiatives HRD Corp provides. Inputs from the industries, HRD Corp and relevant government agencies are vital to assess retraining programmes of industry skill sets, especially those which are expected to decline.

Nurturing OGSE Talent: A Collective Responsibility

Addressing the talent demand-supply gap is crucial for long-term sustainability of the oil and gas industry as a driver to the country's economic growth. It requires a concerted effort by everyone in the industry to step up to enhance productivity and competency. Investing in the industry's talent development through enhancing capability, capacity and productivity norms as well as collaborating with policymakers, training providers and educators will ensure the OGSE industry becomes more globally competitive, attracting foreign investors while forging a path towards sustainability.

Every small effort is a significant step forward, not only for the industry's success but also to advance the broader goals of responsible business practices, while ensuring a sustainable and resilient OGSE ecosystem to drive the industry forward amid the energy transition. The time to act is now. Failure to do so will undoubtedly hinder growth of the energy industry.



Did You Know?

PETRONAS has collaborated with HRD Corp and the Malaysian Oil, Gas and Energy Services Council (MOGSC) to address talent development needs within respective industries through the development of the second edition of the Industrial Skills Framework.

This initiative helps to channel levy and training grants timely to the right talent through competent training providers and aims to increase the number of Malaysian skilled workforce timely as required by the industry.

The second edition of the Industrial Skills Framework covers core and in-demand skill sets in the OGSE sector and critical focus areas have been identified and enhanced. A new addition as well as certification schemes have also been incorporated. With the proposed enhancements, there are several skill sets such as:

1. Welding Inspection
2. Hydro-Jetting
3. Insulation
4. Blasting and Painting

*List is non-exhaustive

For more details on the Industrial Skills Framework, please scan the QR code.



Navigating Energy Transition

The world is transitioning to a low-carbon future, making decarbonisation a strategic imperative for Malaysia's OGSE sector. The industry must ensure it is prepared for this transition so that it may not only participate, but also be able to compete on a global scale. By doing this, the sector can remain an important driver of Malaysia's economic growth and contribute to national sustainable development priorities. However, this will require the OGSE sector to adapt, innovate and collaborate so that it can grow sustainably.

In 2023, the International Renewable Energy Agency forecasted ASEAN's Gross Domestic Product (GDP) growth to be 3.4 per cent higher per year from 2021 to 2050 if the world can curb man-made emissions and achieve the goals of the Paris Agreement. Cumulatively, this would add around USD 13.1 trillion to the region's economies. Curbing emissions can partly be achieved by developing and deploying new technologies and value chains which present exciting business opportunities for partnerships, collaboration and co-creation. In 2022, global investments in clean energy reached USD 1.1 trillion, matching the amount spent on fossil fuel production. By the end of 2023, clean energy investments are expected to reach USD 1.7 trillion, surpassing those in fossil fuels¹. PETRONAS itself has pledged to spend up to 20 per cent of its total capital expenditure (2022-2026) to intensify its decarbonisation efforts and pursuits in cleaner energy solutions.

To further facilitate the needed energy transition, other regions are responding with policy and regulatory measures such as the European Union (EU)'s Carbon Border Adjustment Mechanism (CBAM) and the United States' Inflation Reduction Act (IRA) that are shaping the future global energy system. These measures, along with others that may follow from other regions, present both risks and opportunities for Malaysia's OGSE sector, which employs one in four workers². PETRONAS is responding to this call for accelerated change and is committed to leading the transition as it looks to produce energy in a more responsible manner, contributing to the socio-economic growth of Malaysia.

In response to the energy transition and increasing customer demand for cleaner energy sources, PETRONAS will need to manage the emissions throughout its entire value chain. This includes introducing bold and proactive actions to ensure sustainable practices within the Malaysian OGSE sector. PETRONAS will continue to work with its suppliers to help build their capabilities to effectively serve and create opportunities in the energy transition.



Malaysia's Net Zero Aspiration

The Malaysian Government sees significant opportunities in the energy transition, as a whole-of-nation approach that is result-oriented and ensures employment creation, economic growth and sustainable development.

The government conducted a mid-term review of the 12th Malaysia Plan (2021-2025) to assess the progress made as part of broader development efforts. It also outlines actions for the final two years to reduce emissions by 45 per cent against GDP by 2030 and achieve net zero greenhouse gas (GHG) emissions by 2050, based on the Nationally Determined Contribution (NDC). These actions include:

- Implementation of a national carbon policy and a carbon pricing mechanism.
- Development of a regulatory framework for carbon capture, utilisation and storage.
- Creation of a long-term low emissions development strategy (LT-LEDS)
- Publication of a national OGSE sustainability roadmap to promote sustainability practices and develop simplified reporting standards.

The above will supplement the government's NETR, the New Industrial Master Plan and the National Energy Policy 2022-2040. All these plans provide clear signposts, near, medium and long-term for the Malaysian OGSE sector's journey towards sustainability. In doing so, the sector can be at the forefront of change, enabling it to remain globally competitive as world economies transition to low-carbon energy systems.



PETRONAS' Pathway to Net Zero

As Malaysia's oil and gas resources custodian, PETRONAS will support efforts to decarbonise economic development and deliver reliable energy that enables progressive growth.

It is committed to reduce emissions from its operations and diversify into new energy transition businesses that are cleaner, less carbon intensive and aligned with changing consumer and market preferences. These commitments are prescribed in the PETRONAS NZCE 2050 Pathway which stipulates emissions reduction from operations and growth ambitions for cleaner energy solutions, both of which present opportunities for investors and suppliers.

Emissions reduction will be achieved through four main levers:

- Zero Routine Flaring and Venting
- Energy Efficiency
- Electrification
- Carbon Capture and Storage (CCS)

In support of its NZCE 2050 Pathway, PETRONAS is working towards capping operational emissions in Malaysia at 49.5 million tonnes of carbon dioxide equivalent by 2024.

The target covers Scope 1 (direct emissions directly from its own operations) and Scope 2 (indirect emissions from energy purchased for its operations). PETRONAS has set a target to reduce 25 per cent of absolute carbon emissions groupwide by 2030, including Scope 1 and Scope 2 emissions.

In addition, PETRONAS has set a target to achieve a 50 per cent reduction in methane emissions from its groupwide natural gas value chain by 2025. This supports Malaysia's ambition to reduce methane emissions by 30 per cent by 2030, in line with the Global Methane Pledge. The groupwide target for 2030 is 70 per cent and 50 per cent for Malaysia's natural gas value chain respectively.

Source

¹ National Energy Transition Roadmap

² World Energy Investment 2023 – Analysis - IEA

Energy Value Chain

To achieve its NCZE 2050 Pathway quickly and widely, PETRONAS needs to reduce emissions significantly and rapidly across the value chain. New low-carbon energy value chains will need to be created and existing ones redesigned.

Moving forward, PETRONAS will continue to improve its Scope 3 (indirect emissions across the value chain) reporting efforts to identify opportunities for impactful climate action across its value chain. PETRONAS' Scope 3 emissions represent the majority of its GHG emissions, therefore close collaboration will be required with both of its industrial customers and vendors, as well as small and medium enterprises (SMEs) to minimise the risks and maximise the benefits from emissions reduction efforts.

However, according to the PETRONAS OGSE Survey 3.0 2023, its vendors and suppliers are not well prepared for decarbonisation efforts, as only 25 percent of respondents have adopted environmental, social and governance (ESG) initiatives, while 82 per cent are unaware or barely aware of ESG incentives, programmes or support mechanisms that they can access. Accessing resources such as Bursa Malaysia's Sustainability Reporting Guide and Toolkits and the Human Resource Development Corporation's ESG training courses is vital in building the capacity of Malaysian OGSE SMEs and will improve transparency across the energy value chain.

The energy transition goes beyond investment in decarbonisation technology. The associated large-scale investments are also a unique opportunity to reverse nature loss and strengthen social progress.

Nature and Biodiversity

PETRONAS' position on nature and biodiversity aims to take a proactive approach to support the well-being of natural ecosystems through five key action areas:

1. Establishing voluntary exclusion zones.
2. Managing nature and biodiversity risk.
3. Promoting nature and biodiversity through partnerships and collaborations.
4. Supporting public policy that aims to protect nature and biodiversity.
5. Promoting high-quality nature-based climate solutions.



Workforce

The energy transition is rapidly changing the energy landscape – continuous adaptation and transformation will be necessary, especially for the workforce. Upskilling and reskilling the workforce will be vital for the Malaysian OGSE sector to reap the benefits from the broader global trend towards a low-carbon economy which is expected to create millions of new jobs in ASEAN¹. Interdisciplinary and multidisciplinary skills that are necessary for driving decarbonisation and growth in new energy chains will be in high demand as innovative thinking and approaches will be vital in addressing the scale of the challenges that lie ahead.

In conclusion, the energy transition presents both challenges and opportunities for Malaysia's OGSE sector, which must adapt, innovate and collaborate to grow sustainably and remain globally competitive. PETRONAS remains committed to working collaboratively with its suppliers to build their awareness, capacity and skills to ensure that they too, can benefit from the opportunities that the energy transition can provide.



All this support the Malaysian and other host governments' commitments to biological conservation, as outlined in the Kunming-Montreal Global Biodiversity Framework (CBD COP15).

Our efforts are integral in supporting nature-based carbon offsets which are part of our aspiration to achieve NZCE by 2050. To this aim, in 2023 PETRONAS signed a Memorandum of Understanding with the Malaysia Forest Fund to explore, develop and invest in high-quality nature-based solutions projects in Malaysia.

Just Transition and Human Rights

A just transition incorporates the social dimensions of climate action, taking into account that the expected prosperity brought on by the transition will be enjoyed by all. During 2023, PETRONAS convened a series of roundtables to foster conversation and engagement on what the energy transition could mean for the Malaysian energy sector, including workers, suppliers and communities. Some key takeaways include uplifting overall awareness on sustainability, providing clarity on expectations, having targeted solutions and actively engaging stakeholders to identify and respond to their needs. Further information on this activity is available on PETRONAS Global website.

PETRONAS also remains committed to upholding human rights within its operations and throughout its value chain. This includes strengthened due diligence on human rights management using surveys, assessments and monitoring of adherence to PETRONAS' human rights policies and guidelines as well as ensuring that there is an effective grievance mechanism in place as part of its Whistleblowing Policy.

Source

¹ Renewable Energy Statistics 2023

when potential meets performance

Business Overview



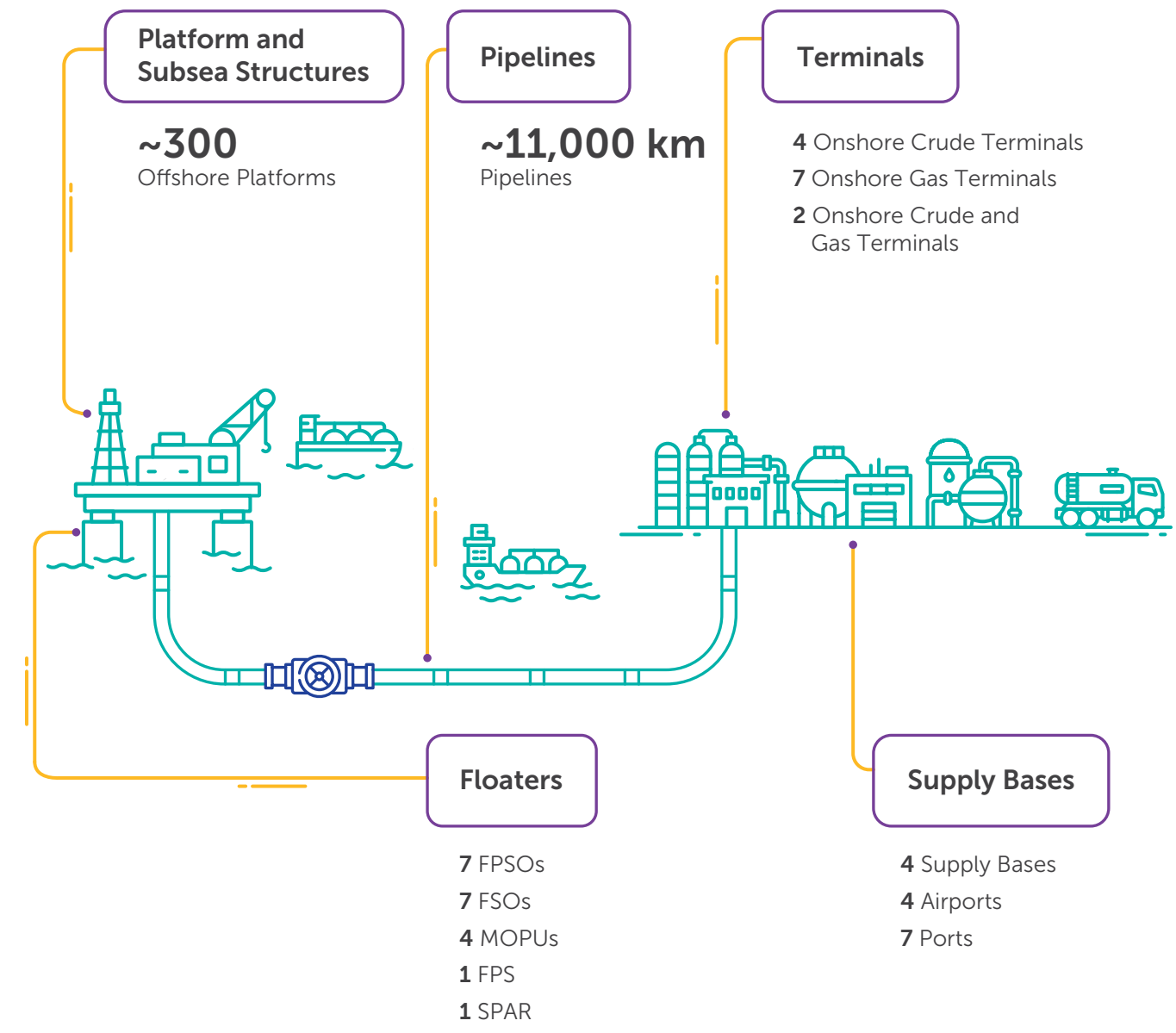
Upstream Business



Samarang Platform, off the coast of Sabah

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

The illustration below provides a general overview of Upstream Malaysia's facilities dimension, operated by around 30 Petroleum Arrangement Contractors (PACs).



Gas Business



PETRONAS Floating LNG DUA

The Gas Business portfolio showcases our position as a one-stop centre for lower-carbon energy solutions, equipped with end-to-end 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 Business.

Midstream Plants

LNG Assets

- 4 LNG Plants**
29.3 million metric tonnes per annum (mtpa)
- 2 Floating LNGs**
2.7 mtpa

Marketing and Trading



LNG Marketing and Trading

Customers



LNG Buyers

Gas and Power

- 5 Gas Processing Plants**
1,750 MMscfd
- 2 Regasification Terminals**
990 MMscfd
- 4 Gas Pipelines**
2,623 km
- 1 Power Plant**
285 MW



PETRONAS Energy and Gas Trading



Power, Non-Power and Exports

Utilities Plant:

- Power**
256 MW
- Steam**
1,080 MT/hr

Downstream Business

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



1. Refining

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

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



2. Chemicals

19 manufacturing sites around the world with a total combined production capacity of over 15.4 million tonnes per annum.

Sales offices in 22 countries.

The largest methanol producer in Asia-Pacific and fourth largest in the world. Second largest ammonia and urea producer in Southeast Asia.



3. Marketing and Trading

Marketing

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

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

Trading

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

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



4. Lubricants

A leading global lubricant player with product availability in over 100 countries.

Owns and operates eight blending facilities and five research centers worldwide, this guarantees excellence in production and a commitment to ongoing innovation.

Actively engages with customers and partners to address diverse market demands with five regional offices spanning all continents.

From industrial lubricants to a wide range of vehicle solutions including electric vehicle fluids, the company tailors its offerings to meet specific needs.

when purpose meets vision

Activity Outlook



Methodology

Scope of Coverage

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

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

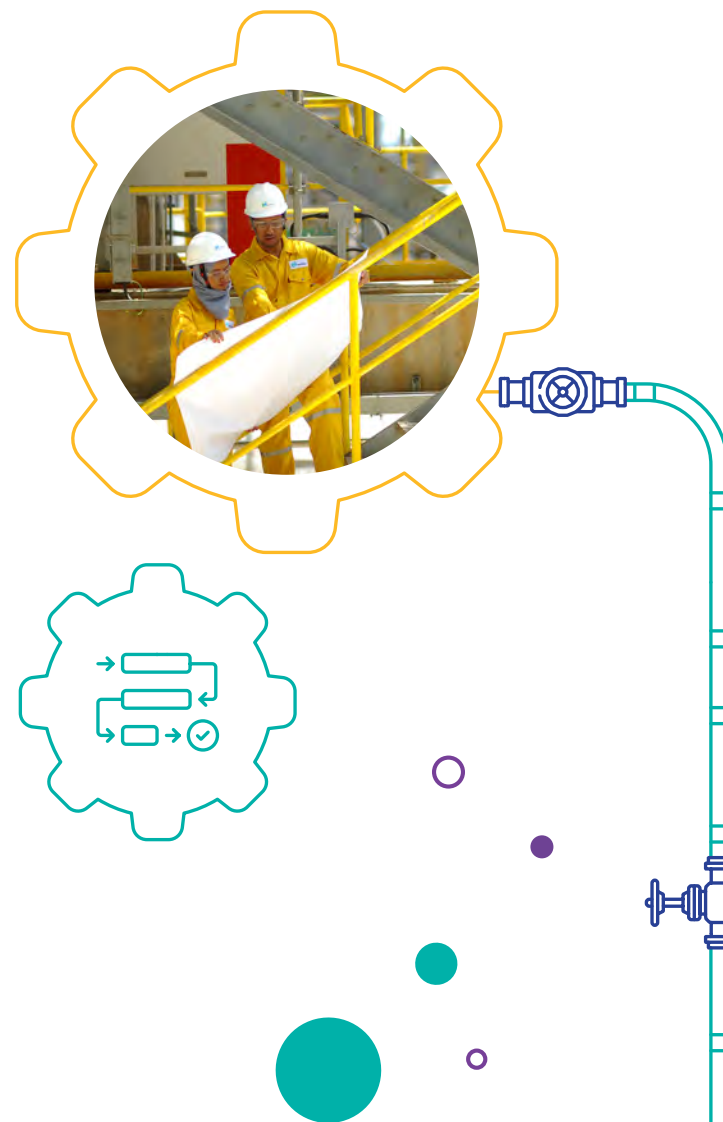
For Downstream and Gas-related information, this report covers the activity outlook for the PETRONAS Group of Companies in Malaysia only.

Time Horizon

The report provides information on activities within a three-year period, from 2024 to 2026. In the effort to provide more accurate information to the industry, where applicable, the approach taken is to provide information based on actual or planned contract award date. Using Offshore Fabrication as an example, the reported date is based on the actual or planned award date of Engineering, Procurement, Construction, Installation and Commissioning (EPCIC) package instead of the first steel-cut date. Another example is plant turnaround that begins in December 2024 and ends in January 2025 is only accounted for once, i.e., in 2024.

General Narrative on the Overall Activity Outlook

Steady outlook is expected for the next three years covering drilling rigs, fixed structures, installation and projects. An increase in activity is expected for Plant Turnaround to cater for requirement in Pengerang.



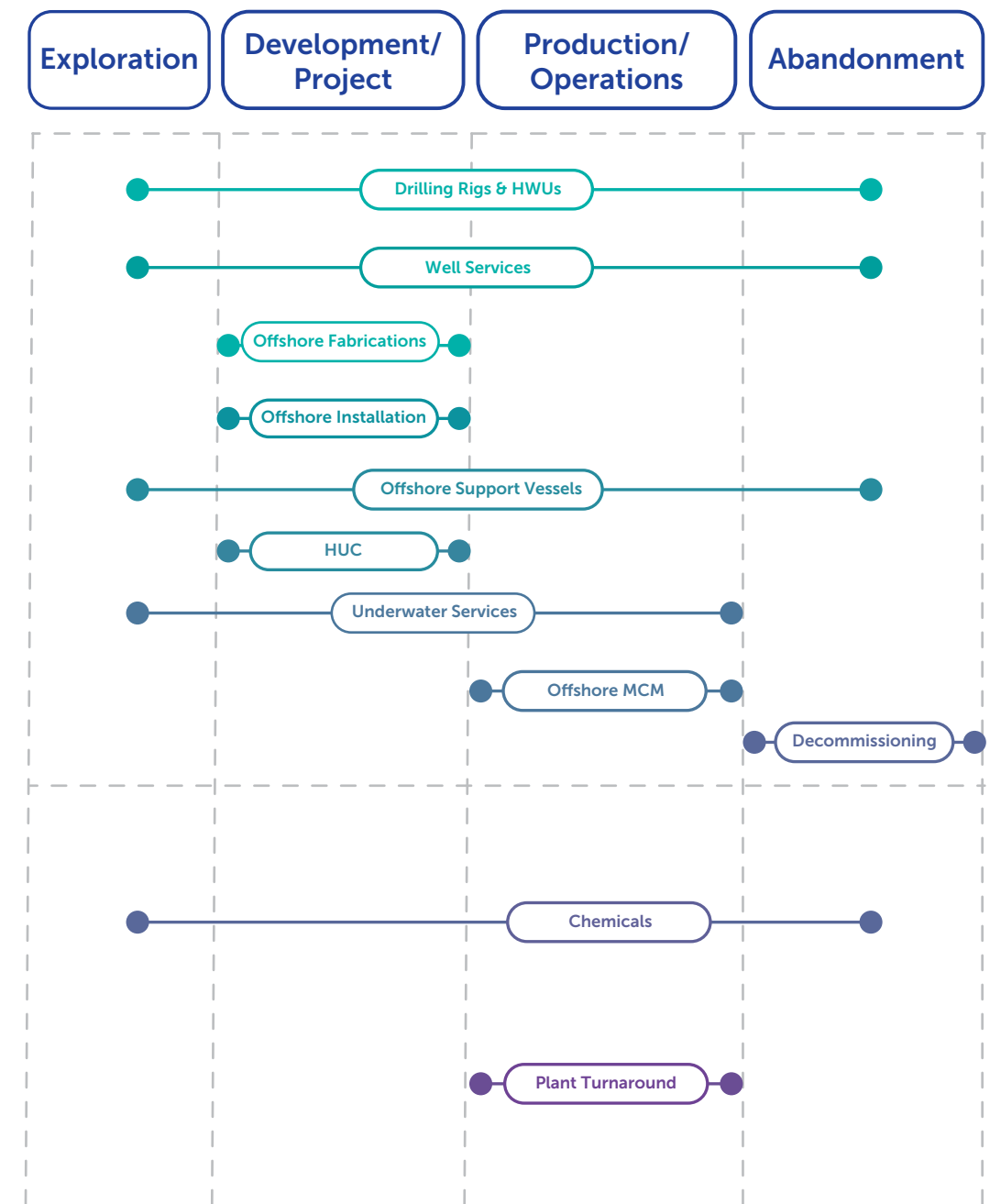
Quick Reference for 2024



Upstream business is a fully integrated business that encompasses Exploration, Development, Production and Abandonment, covering a broad portfolio of resources and play types.



Downstream business enhances the value of petroleum resources through the refining, marketing and trading of crude oil and petroleum products, as well as manufacturing and marketing of petrochemicals, specialty chemicals and derivatives.



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.

A - Subsurface

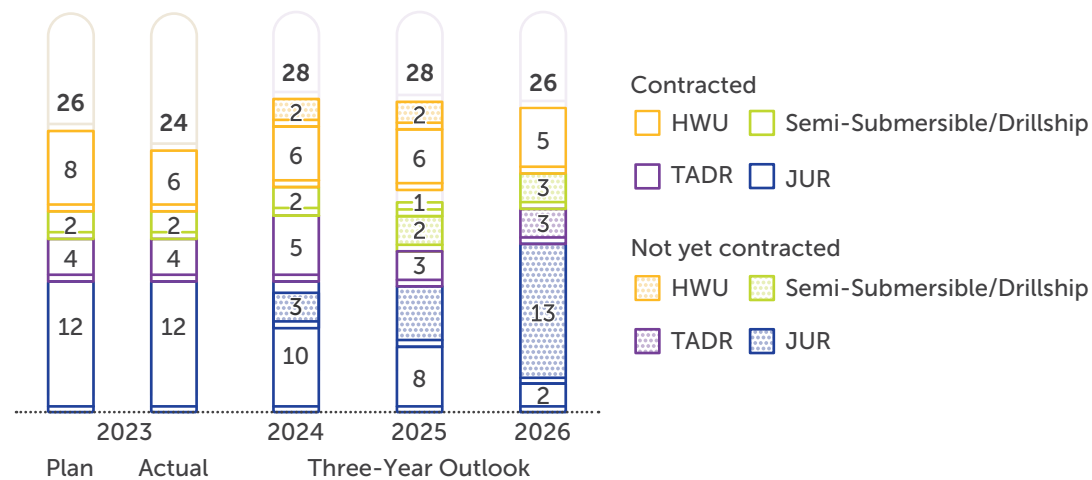
Drilling Rigs and Hydraulic Workover Units

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

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

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

Number of Rigs



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

- Utilisation for all drilling rigs for 2023 was as planned, except for HWU where lower utilisation was contributed by optimisation in performing planned workover and P&A activities.
- The outlook for 2024 to 2026 is based on full year utilisation. Actual numbers may vary based on campaign duration and/or optimisation, project deferment, cancellation, etc.

A - Subsurface

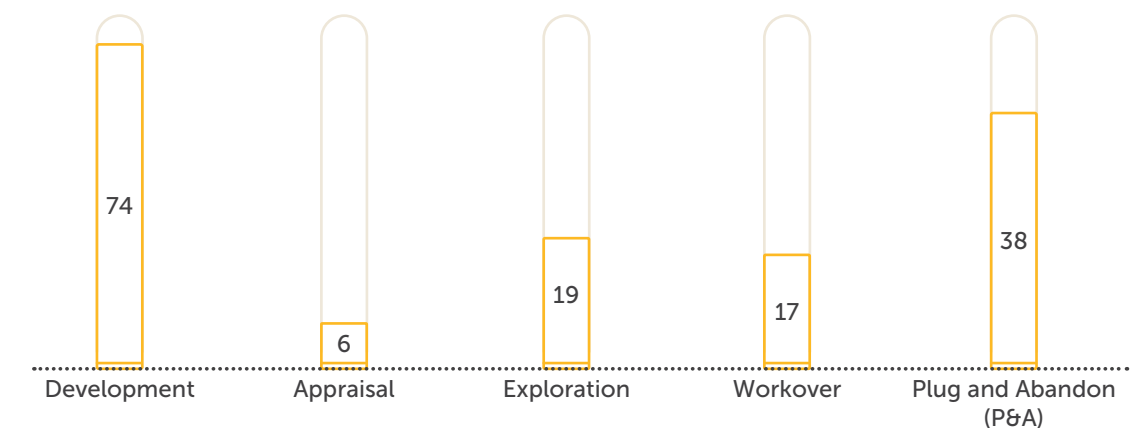
Well Services

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

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

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

Number of Wells in 2024



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

- In 2024, a total of 99 wells are planned to be drilled under the development, appraisal and exploration drilling programme.
- Significant increase is expected for P&A activities in 2024 to honour the commitment made by the regulator.

B - Engineering, Construction and Projects

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

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

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

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



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

Legend for Project Activities:



Legend for Facility Type:

| | | | | |
|--------------------|---|--|---|---|
| Fixed structure | L | WHP Lightweight – total tonnage ≤ 1,000 tonnes | H | WHP Heavy Weight – total tonnage > 7,500 tonnes |
| | M | WHP Medium Weight – total tonnage ≤ 7,500 tonnes | C | CPP Heavy Weight – total tonnage > 7,500 tonnes |
| Floating structure | F | Floaters – Floating Production Storage and Offloading (FPSO) / Floating Storage and Offloading (FSO) / Mobile Operating Production Unit (MOPU) | | |
| Subsea structure | S | Subsea – Subsea Production System and Subsea Umbilical, Riser Flowline (SURF) | | |

B - Engineering, Construction and Projects

Offshore Fabrication

Offshore fabrication outlook is provided for fixed and floating structures, with actual or planned contract award date as the indicator of commencement of fabrication activity.

Fixed Structures: Wellhead Platform/Central Processing Platform

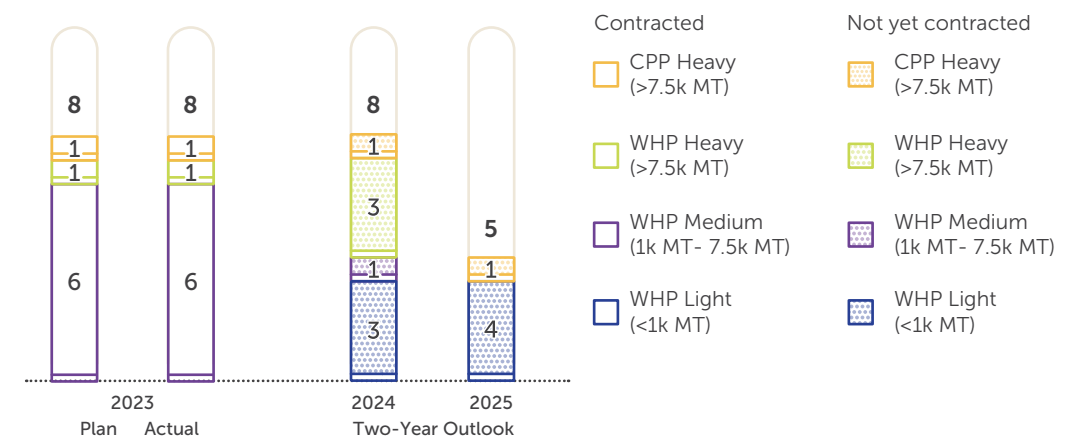
Wellhead Platform (WHP) Application:

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) Application:

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.

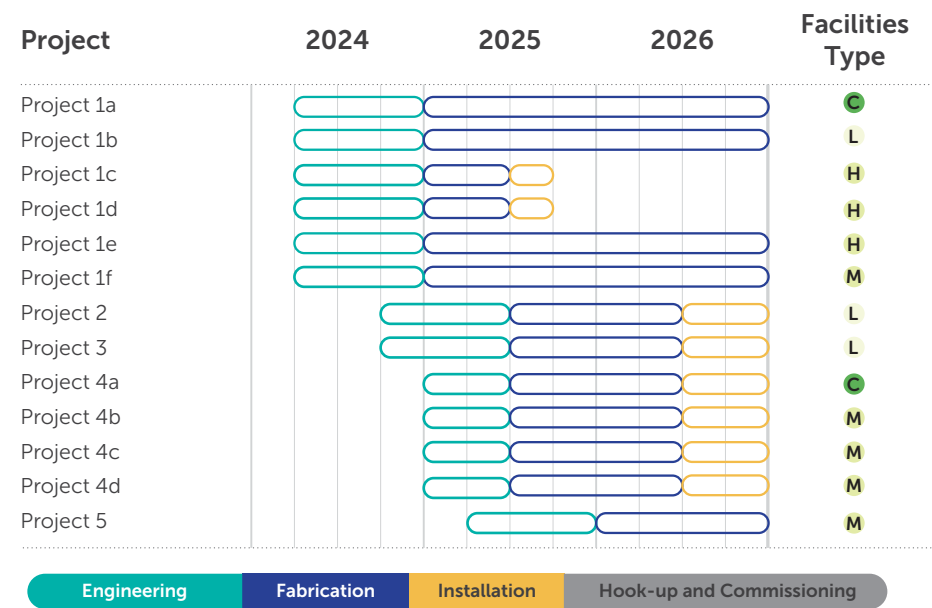
Number of Fixed Structures Fabrication



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



B - Engineering, Construction and Projects



- All requirements for the next two years have not been contracted yet.



There are five offshore fabrication yards in Malaysia contracted under the Fabrication Frame Agreement (FA) with a combined annual capacity of 280,000 MT. These yards are located in Klang, Lumut, Pasir Gudang and two in Kuching.

Floating Structures: Floaters

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

Application:

Used as relocatable production facilities, generally to 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 and Operations and Maintenance (O&M).

FPSO Floating Production, Storage and Offloading

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



FSO Floating Storage and Offloading

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



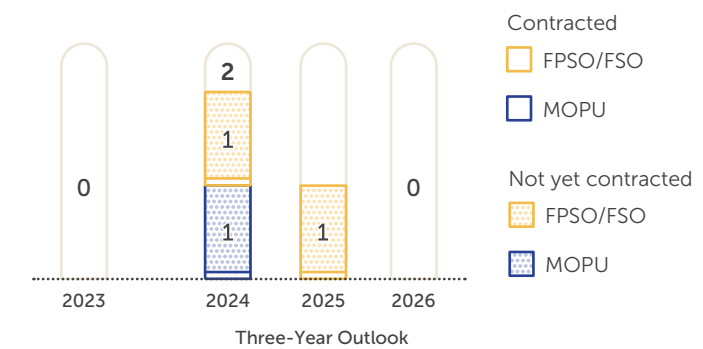
MOPU Mobile Offshore Production Unit

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

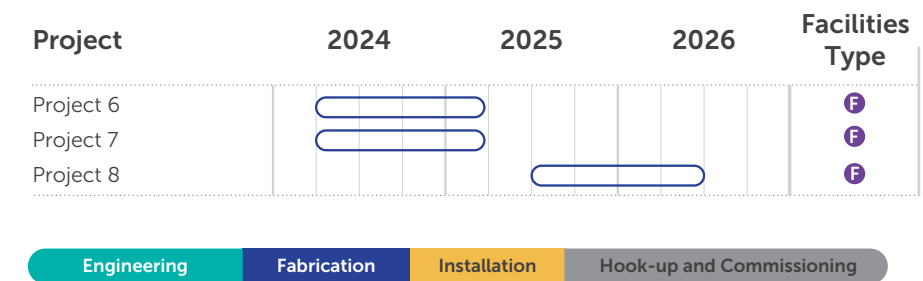


B - Engineering, Construction and Projects

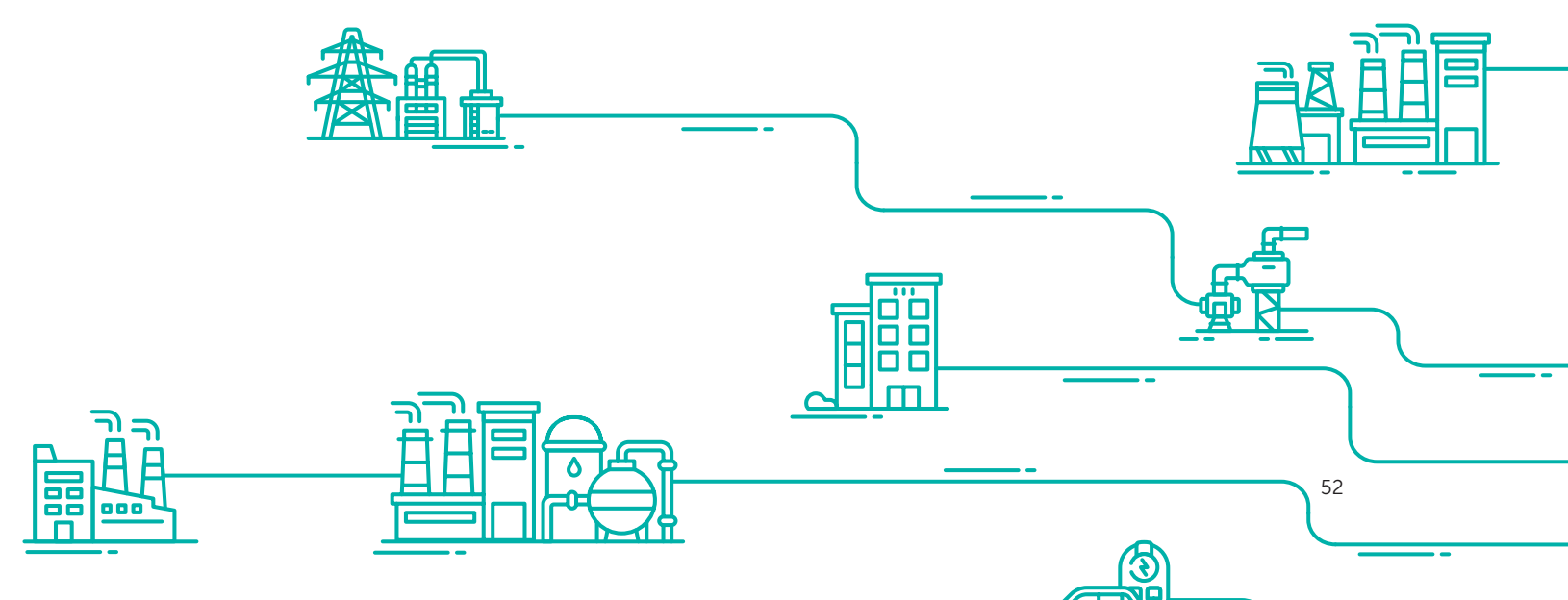
Number of Floating Structures Fabrication



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



- All requirements for the next two years have not been contracted.
- ESG and robust economics are the key industry priorities of various stakeholders in maintaining the license to operate in pursuing new floater projects.
- Technology advancements for lower-carbon solutions are continuously being harnessed within the floaters fraternity in supporting NZCE 2050 aspirations.
- Operators are constantly looking for new ways to contract capable players and improve the bankability of their contracts to meet the growing demand for local floaters and keep up with market trends.
- The local floaters market offers great opportunities for new entrants to expand their services and offerings in medium-sized projects, which are less competitive than the mega projects elsewhere.



B - Engineering, Construction and Projects

Subsea Structures

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

Application:

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

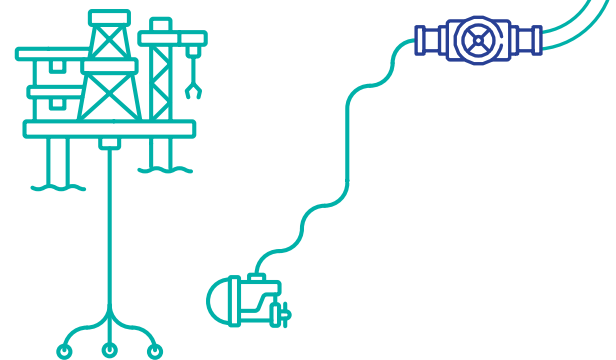
Associated Services:

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

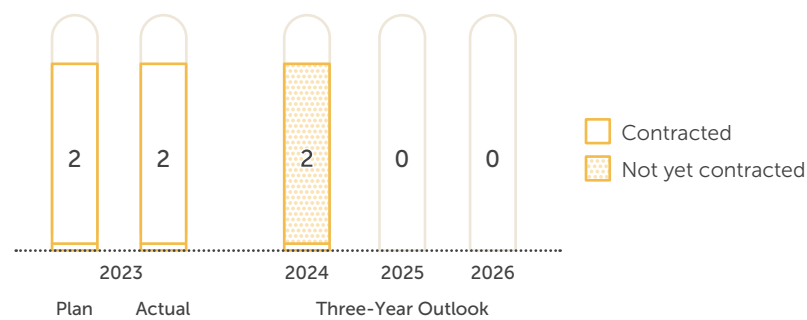
SURF

Subsea Umbilical, Riser and Flowline (SURF)

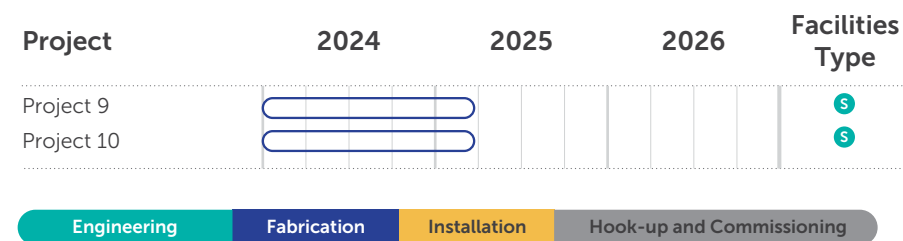
Comprises subsea completed wells, subsea Christmas trees and wellhead systems, subsea tie-in to flow line system, jumpers, umbilical and riser system and subsea equipment to operate the well.



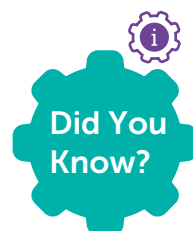
Number of Floating Structures Fabrication



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



- All requirements for 2024 have not been contracted.



Malaysia serves as the manufacturing hub for three out of five prominent global subsea equipment suppliers.

B - Engineering, Construction and Projects

Offshore Installation

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

Structural Installation – Heavy Lift

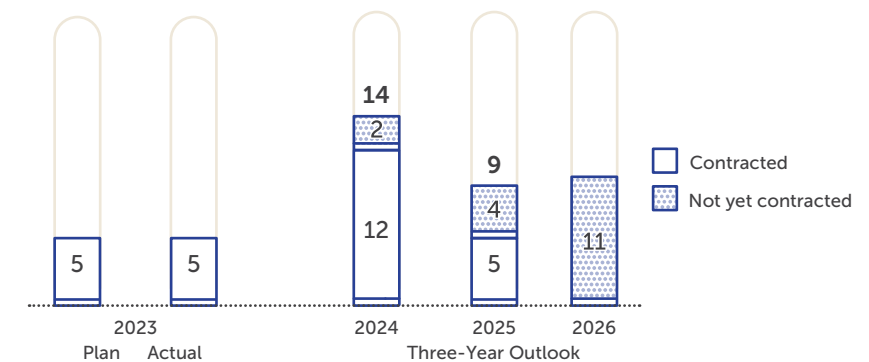
Application:

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

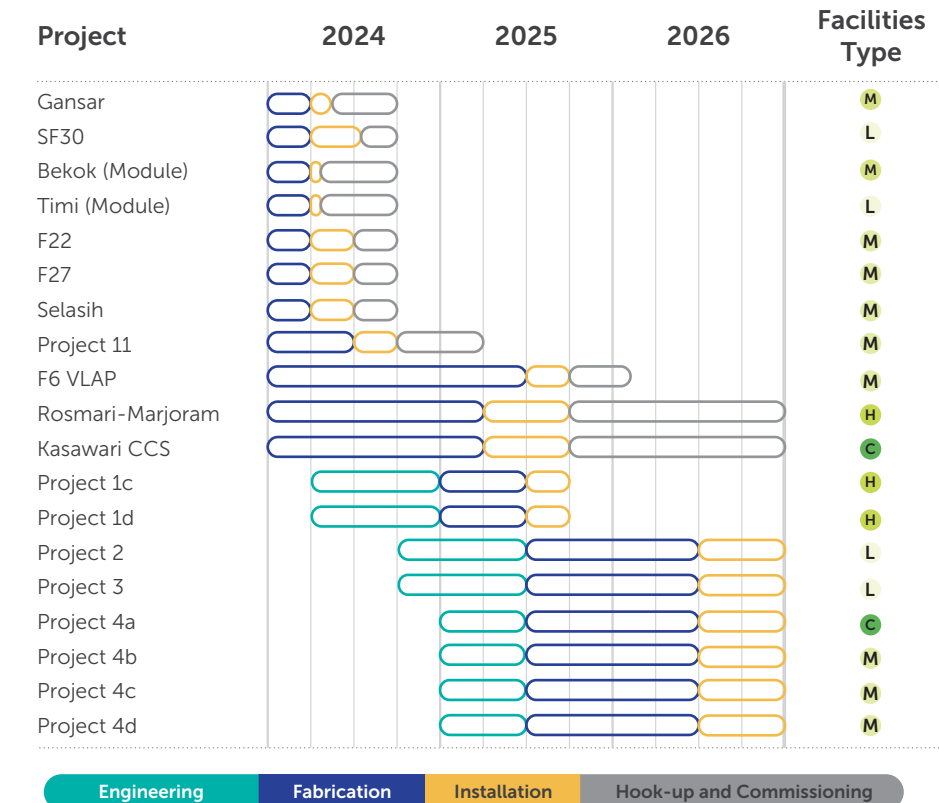
Associated Services:

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

Number of Lifts Using Heavy Lifts Barges



Outlook may be read together with the outlook for offshore fabrication based on respective project phases



- Outlook number is measured in terms of number of lifts, counted separately for each jacket and topside, and excludes heavy lift barges utilisation for facilities decommissioning.
- Positive demand in the oil and gas and wind sector is expected to drive heavy lift utilisation growth in 2023-2030, posing challenges in security of supply.

B - Engineering, Construction and Projects

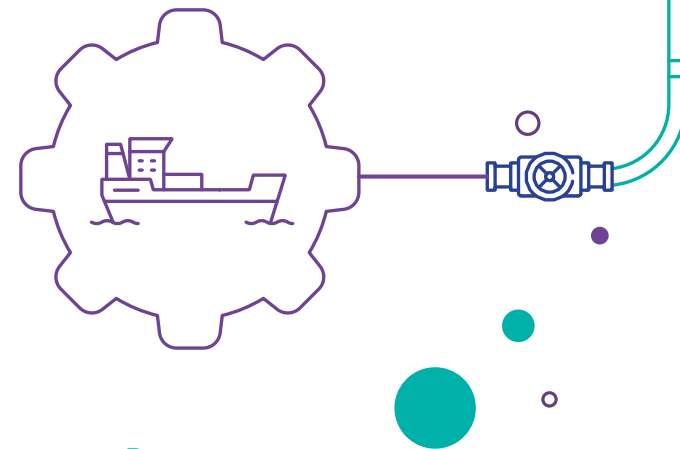
Structural Installation – Floatover

Application:

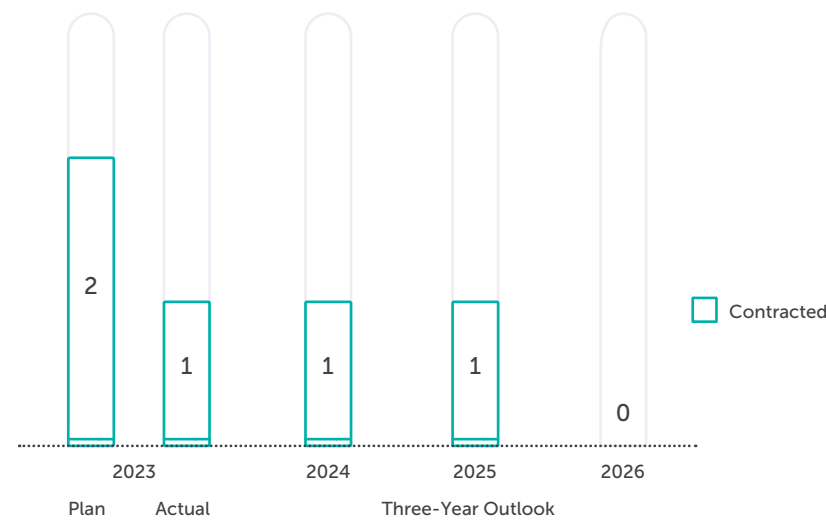
Used for installation of heavier or integrated topsides (for CPPs).

Associated Services:

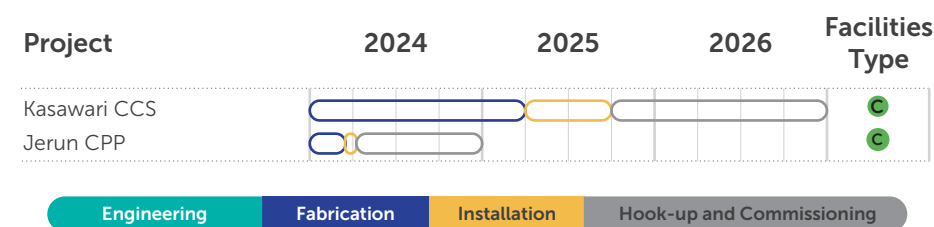
Supporting vessels, diving and ROVs, welding and NDTs.



Number of Structural Installations Using Floatover Barges



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



- For 2023, one CPP was deferred to 2024 due to rationalisation of execution plan.
- All requirements for the next two years have been contracted.

B - Engineering, Construction and Projects

Pipeline Installation – Pipelay

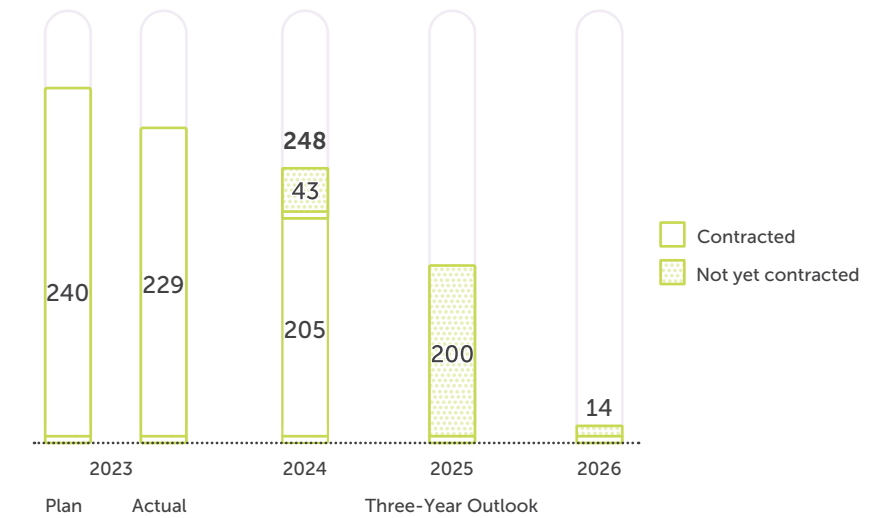
Application:

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

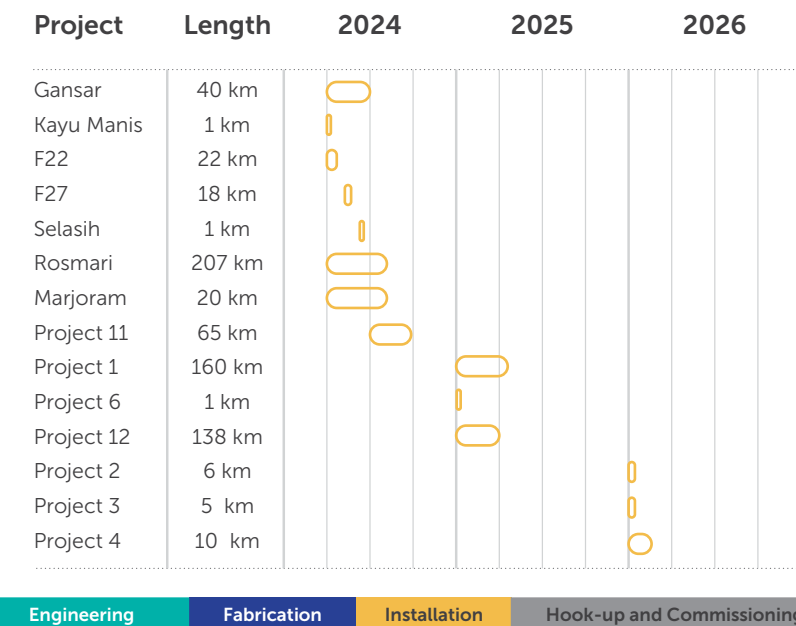
Associated Services:

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

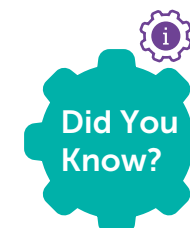
Number of Installation Days



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



- This outlook excludes requirements for pipeline replacement.



There are currently five heavy-lift installation vessels and two pipelay installation vessels operating under the Malaysian flag as at November 2023.

B - Engineering, Construction and Projects

Hook-up and Commissioning

Hook-Up and Commissioning (HUC) ties in all components of the facilities including all function tests and start-up of facilities. Outlook is stated in man-hour units as the activities are labour intensive.

Associated Services:

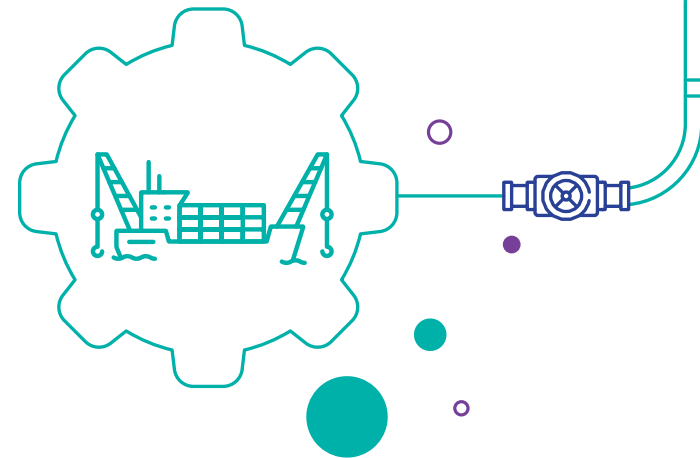
Marine spread (accommodation work barge, workboat, Fast Crew Boat), logistics services, pre-commissioning services, inspection services, etc.

Activity Phase:

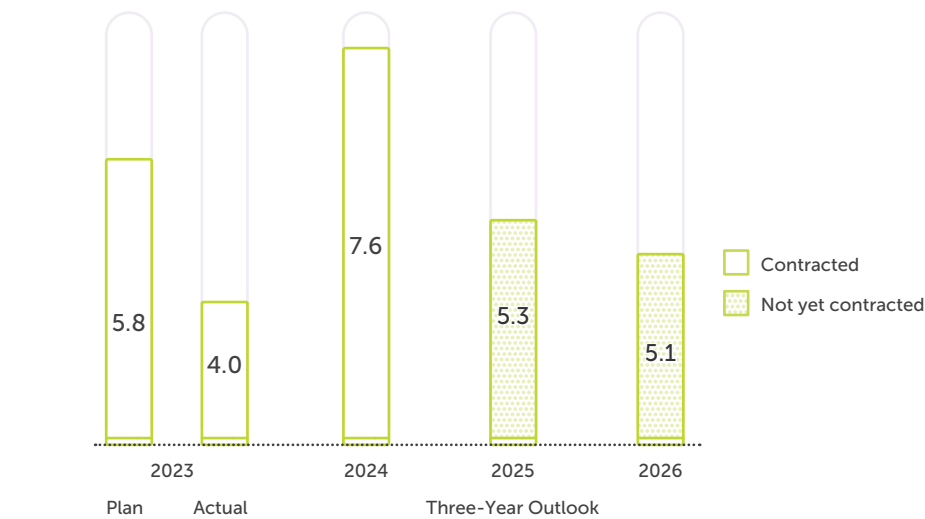
Development and Production.

Application:

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



Number of Man-Hours (Millions)



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

- All requirements for 2024 have been contracted.
- Approximately 1.8 million man-hours planned for 2023 is expected to be carried over to 2024.
- HUC activity is expected to remain steady for year 2025 and 2026.

B - Engineering, Construction and Projects

Decommissioning

Decommissioning in the oil and gas industry represents the end of the facilities productive life of facilities, the process which comprises the removal and possible remediation of assets' installation whilst avoiding environmental impact.

Activity Phase:

Abandonment.

Application:

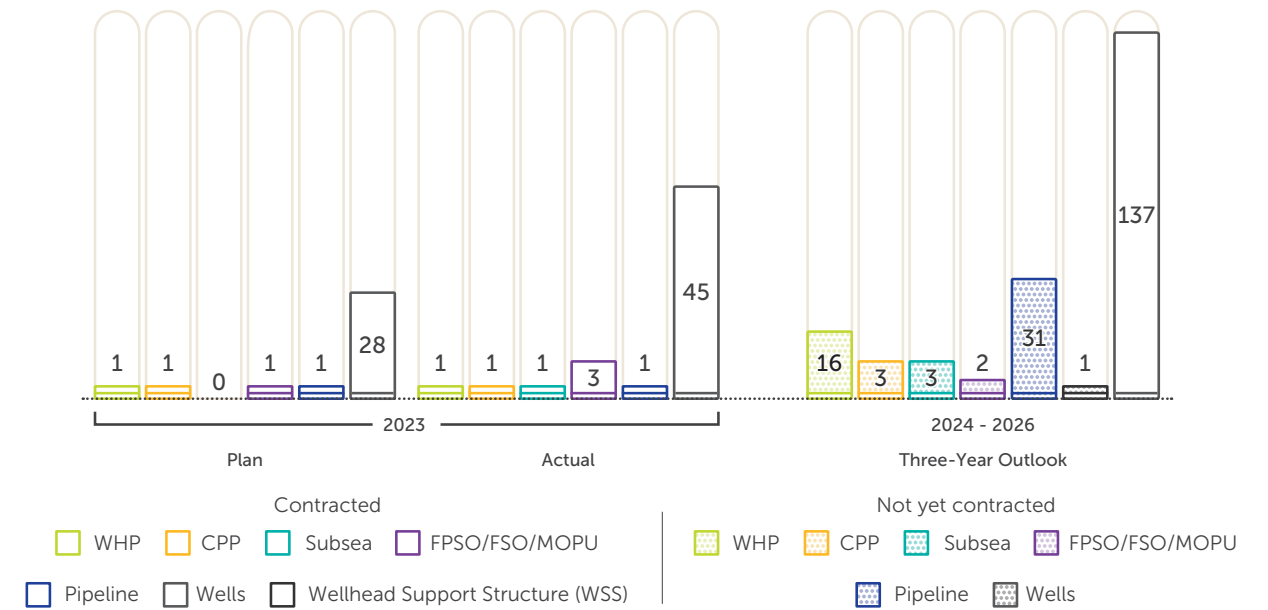
Decommissioning comprises two activities:

- Well Abandonment: preparation of the well to be closed permanently.
- Upstream Facilities Decommissioning: removal and proper remediation (e.g. disposal, reefing, reuse) of the disused facilities.

Associated Services:

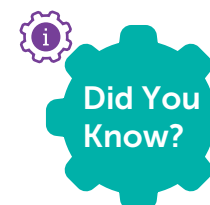
Drilling rigs and HWU, offshore support vessels, lifting vessels, third-party drilling services, engineering services, yard facility, transport, cutting services, conductor removal, pipeline flushing, etc.

Decommissioning of Facilities and Wells



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

- All 2024-2026 requirements for facilities decommissioning have not been contracted. For Wells P&A, the contracted requirement is subject to final a technical assessment based on rig availability at the time.
- PETRONAS is looking into innovative facilities decommissioning solutions focusing on technologies, re-use/re-purpose options, integrated approaches as well as identifying potential alternative removal methods to ensure cost compression, covering the above outlook with flexibility of execution plan. Thus, participation and collaboration are encouraged from all parties.



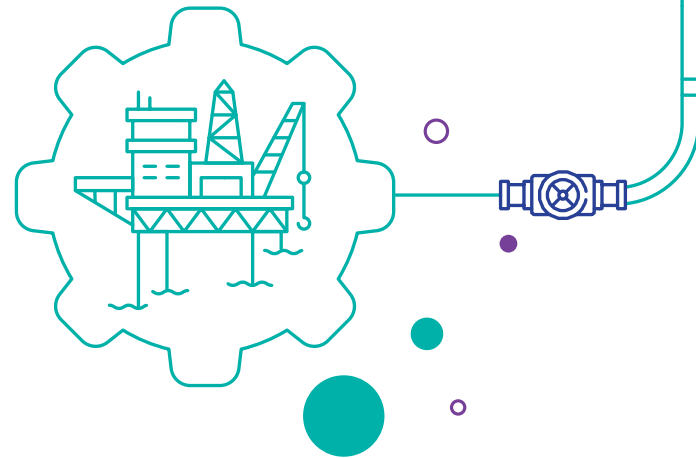
Malaysia is home to a certified decommissioning yard in Klang, specialising in the removal of hazardous and non-hazardous waste and the remediation of assets ensuring safe and environmentally responsible disposal of offshore structures.

C - General Facilities Maintenance

Offshore Maintenance, Construction and Modification

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

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

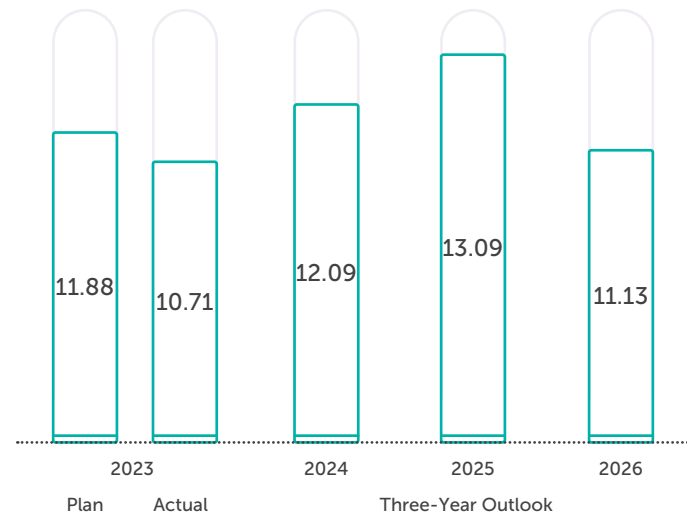


Outlook is stated in man-hour units as the activities are labour intensive.

Activity Phase: Production.

Application: MCM involves two types of activities:
 i. Scheduled Maintenance: Planned activities.
 ii. Corrective Maintenance: Unplanned activities arising from unforeseen circumstances.

Number of Man-hours (Millions)



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

- All requirements for 2024 have been contracted. Nevertheless, there are opportunities for Associated Services under the main contractors.

C - General Facilities Maintenance

Underwater Services

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

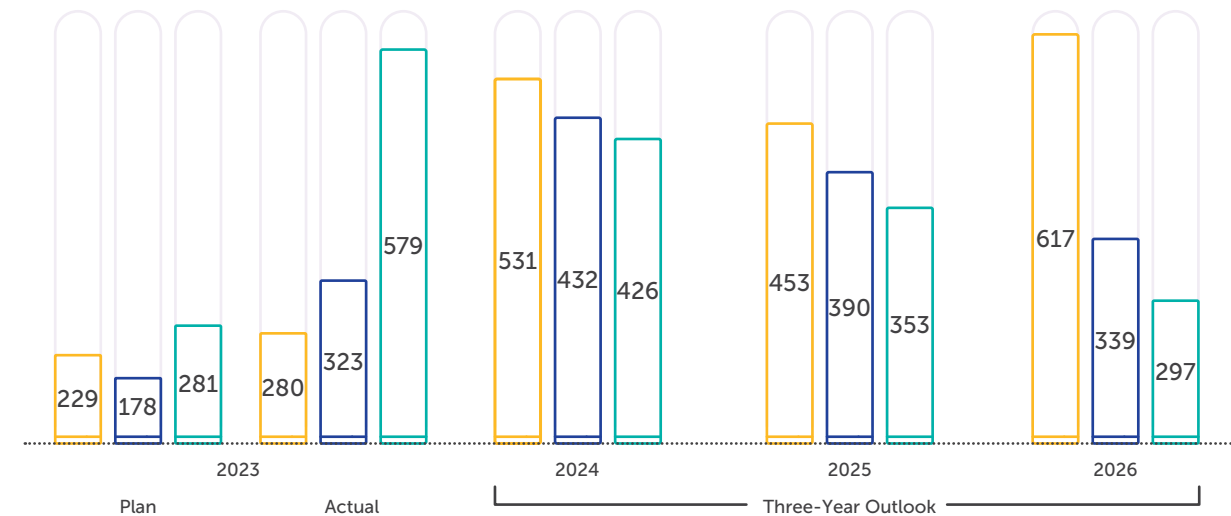
Activity Phase: Development and Production.

Application: Inspection, Repair and Maintenance (IRM) activities for continuity of services, safety and integrity of underwater structures e.g. platform jackets, pipelines, subsea intervention, etc.

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

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

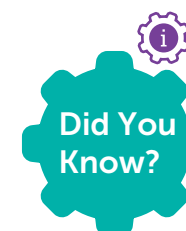
Number of Days



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

■ DPII DSV - ROV & Air Diving System
 ■ DPII DSV - Built-in Saturation Diving System
 ■ DPII DSV - ROV & Intervention

- The actual execution for 2023 has increased due to elevated activity levels. Demand is projected to remain strong in 2024 onwards.
- Approximately six to eight Diving Support Vessels (DSV) are required for the next three years.
- Outlook is based on forecasted number of days for execution of underwater activities utilising Diving Support Vessels (DSV) where the estimated volume for each vessel specification may vary depending on specific scope requirement by PACs.



There are five active Dynamic Positioning Diving Support Vessels (DPDSV) in Malaysia as at November 2023.

C - General Facilities Maintenance

Plant Turnaround

Plant Turnaround is planned periodic shutdown of a process plant or process unit to carry out work (including but not limited to) for equipment maintenance, inspection, repairs, replacement, catalyst change out, etc. of the plants to ensure integrity and to achieve a safe, reliable operation until the next planned shutdown.

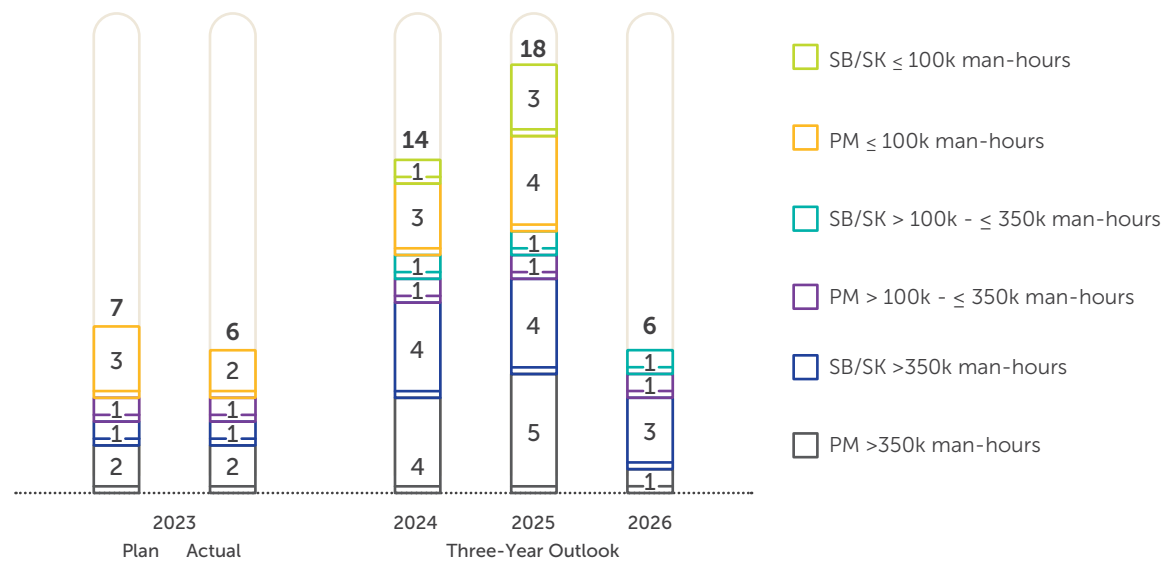
Turnaround comprises main mechanical work, which constitutes the bulk of total activities (~60 percent). Other activities are discipline-specific; e.g., electrical, instrument, inspection and rotating equipment maintenance. Turnaround is labour intensive; hence activity outlook is stated in man-hour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

Activity Phase:
Operations.

Application:
Turnaround is scheduled periodically in which the entire facility is taken off stream for an extended period to conduct maintenance and inspection activities to ensure the asset's reliability.

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

Number of Turnarounds



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

- 2023 execution was slightly lower due to schedule deferment.
- Positive outlook is expected for the next three years, especially for the years 2024 and 2025. 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 certified while shifting focus to maintenance.

D - Logistics

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

Offshore Support Vessel (OSV)

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

Associated Services: Vessel inspection services, bunkering services, port services and tank cleaning services.

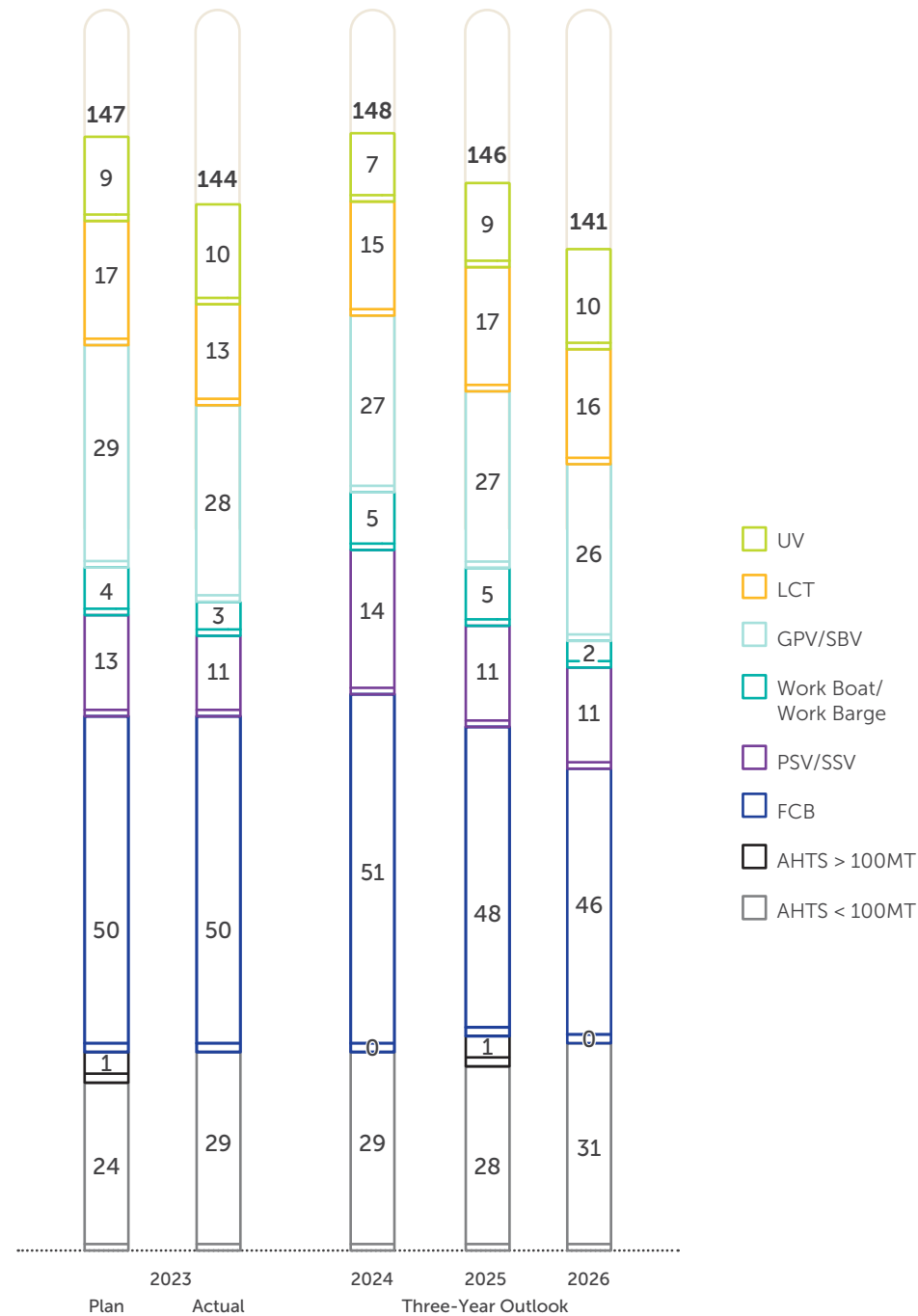
| Type of Vessel | Workboat/ Work Barge | General Purpose Vessel (GPV)/ Standby Vessel (SBV) | Utility Vessel (UV) | Landing Craft Tank (LCT) |
|----------------|--|---|---------------------|---|
| Activity Phase | <ul style="list-style-type: none"> • Development • Production • Abandonment | <ul style="list-style-type: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

Associated Services: Vessel inspection services, bunkering services, port services and tank cleaning services.

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

D - Logistics

Number of Vessels Supporting Production Operations and Production Project Related:

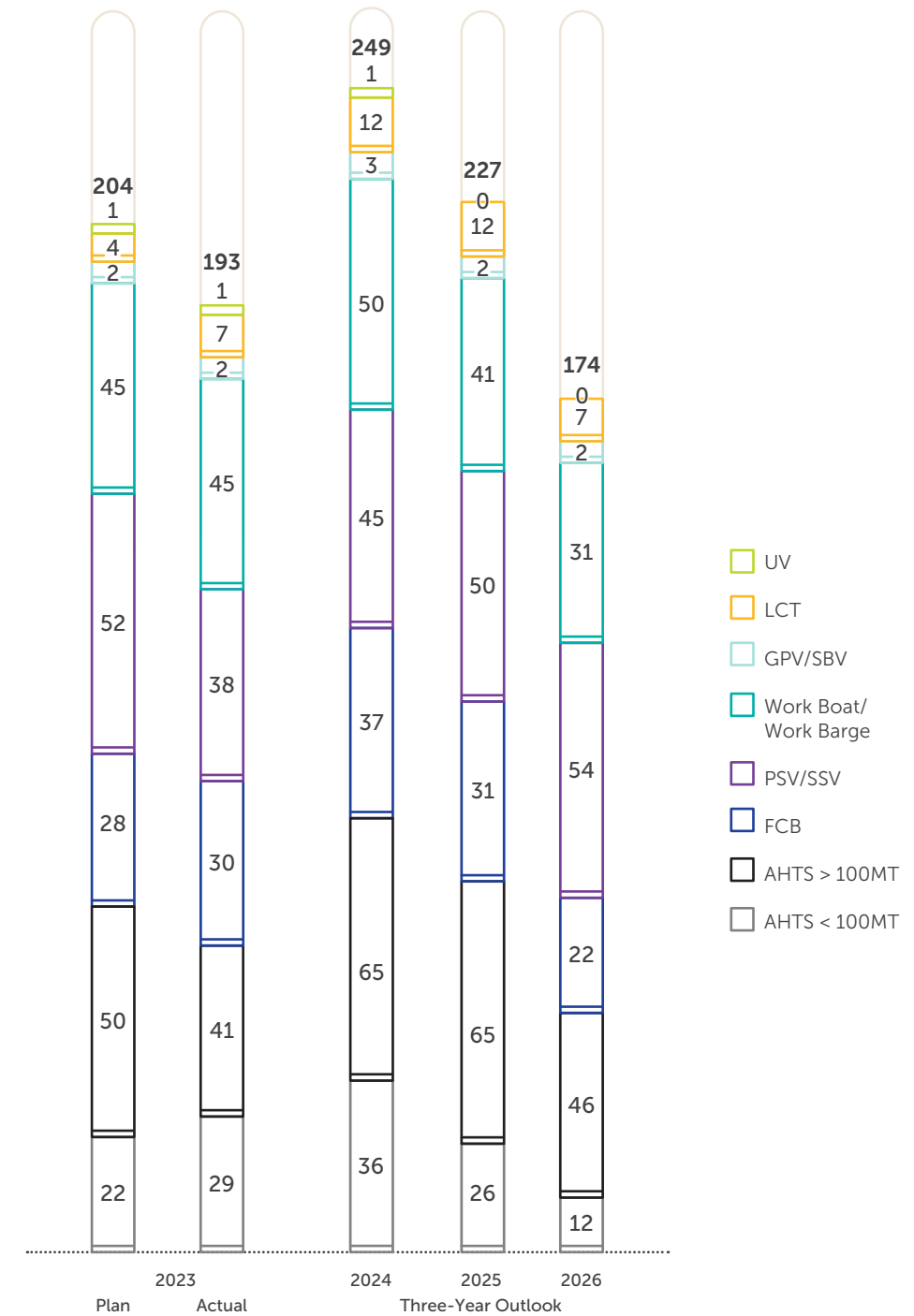


Outlook includes activities which may have been contracted out at the time of reporting

- 2023 utilisation remain as per plan, and demand is projected to remain steady in 2024.
- Outlook for the next three years depicts slightly decreasing demand for vessels supporting production operations from year-to-year due to possible revision in production operations philosophy i.e. unmanned platform.
- OSV owners embarking on fleet renewal should consider fuel efficient technologies including diesel electric with battery (hybrid) vessels to reduce total operational cost for charterers.
- Project Safina Phase Two, which aims to build new offshore support vessels replacing ageing vessels, is expected to commence its contracting exercise in Q3 2024.

D - Logistics

Number of Vessels Supporting Drilling and Projects (Wells)



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

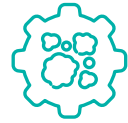
- In 2023, the actual numbers were lower due to a vessel optimisation exercise implemented across multiple projects.
- Outlook for the next three years depicts stable year-to-year demand for vessel supporting projects and drilling activities.
- Shortage of Malaysian-Flagged OSV to support Drilling and Projects is expected to continue in the near future.
- This outlook excludes the requirements of vessels for HUC, MCM and Underwater Services activities, EPCC and EPCIC which will be sourced separately.

E - Chemicals

Chemicals are consumed in both upstream and downstream businesses, mainly during maintenance and operation activities.



Commodity Chemicals



Gases



Laboratory Chemicals



Process Chemicals



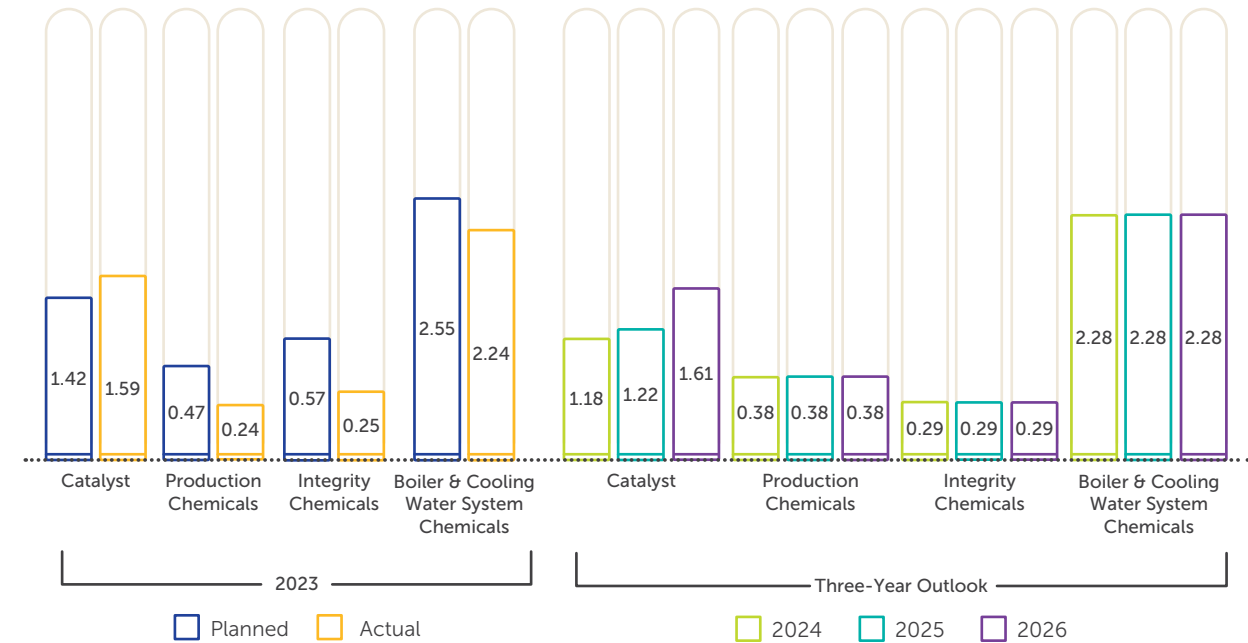
Chemical Services

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

| | Process Chemicals | Commodity Chemicals | Chemical Services |
|--------------------|---|--|---|
| Description | 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. | Provision of manpower, materials, consumables, equipment and facilities necessary for providing chemical services. |
| Examples | <ul style="list-style-type: none"> Additives Boiler & Cooling Water System chemicals Catalyst Corrosion Inhibitors and Biocides Sulfiding Agent Production chemicals | <ul style="list-style-type: none"> Amines Base oil Chloralkali Glycols Lubricants Resins Solvents | <ul style="list-style-type: none"> Catalyst and internal media change out Precious metal recovery from spent catalyst. Other chemical services |
| Outlook | <ul style="list-style-type: none"> Key elements for chemical prices are raw materials and logistics costs. Key drivers for PETRONAS chemicals demand are dependent on ageing assets, turnaround and shutdown (TASD), new projects, new plants onstream, longevity and lifespan of the chemicals, etc. Base oil, catalyst, corrosion inhibitors and biocides, glycols, oils and lubricants and production chemicals are the major contributors of chemicals spend. Chemicals consumption may not be extensive however it is essential to collaborate with others for chemicals technology advancement, not limited only to product delivery but also in products management, sustainability etc. Chemicals and/or chemical services that extend assets longevity, optimise and/or improve reliability and productivity are advantageous. More companies are managing 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 a holistic approach to ESG is not an option in the long run. | | |

E - Chemicals

Number of Chemicals' Purchase Ratio



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

Note: Chemicals' Purchase Ratio is based on the forecasted purchase in comparison to actual purchased in base year 2022.

- All requirements for 2024-2026 have been contracted.
- Boilers and Cooling Water System:** Continuous requirement for purchases and services related to boiling and cooling water system across PETRONAS Operating Units (OPUs) in ensuring asset integrity/reliability. Consumption of chemicals for water treatment is dependent on the condition of the water quality in boiler and cooling towers.
- 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 year 2024 to 2026.
- Integrity Chemicals (Corrosion Inhibitors and Biocide):** Continuous requirement in ensuring asset integrity/reliability especially of the pipeline, equipment and piping from corrosion/leak as well as additional demand for cooling water system to remove heat from process or equipment.
- Production Chemicals:** Outlook will depend on projection of crude oil production and alignment towards lower-carbon future and current geopolitical crises that affect the supply and demand.
- PETRONAS is embarking on the use of the e-Chemical Management System (eCHEMS), a PETRONAS HSE Enterprise Digital System on chemical management.

when partnership meets progress

Contracts Outlook



Contracts Outlook

The outlook comprises the following contracts:

Pan-Malaysia contracts

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

Integrated Upstream and Downstream contracts

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

Integrated Downstream contracts

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

Upstream and Downstream Individual contracts

Details of the contracts are based on data as at November 2023.

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.

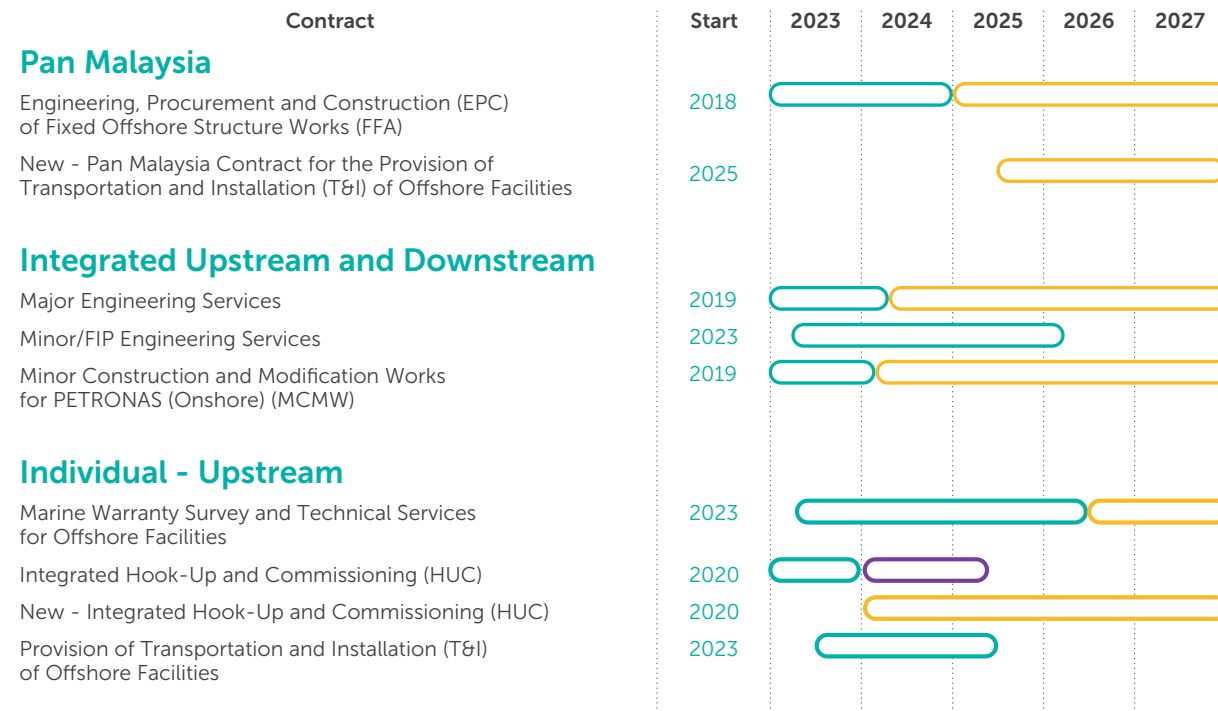


A - Subsurface

| Contract | Start | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|-------|----------------------------|------|------|------|------|
| Pan Malaysia | | | | | | |
| Completion New Technology | 2020 | [Contracted Project] | | | | |
| Tubular Handling, Conductor Installation and Slot Recovery | 2022 | [Contracted Project] | | | | |
| Well Testing and Tubing Conveyed Perforations (TCP) | 2022 | [Contracted Project] | | | | |
| Drill Bits (Rock/PDC) and Hole Enlargement Tools | 2022 | [Replacement/New Contract] | | | | |
| Mudlogging | 2017 | [Contracted Project] | | | | |
| Cementing | 2018 | [Contracted Project] | | | | |
| Drilling Fluids | 2018 | [Contracted Project] | | | | |
| Deepwater Subsea Wellhead Equipment, Tools and Services | 2019 | [Contract Extension] | | | | |
| Directional Drilling (DD)/Measurement While Drilling (MWD)/Logging While Drilling (LWD) | 2020 | [Replacement/New Contract] | | | | |
| Fishing Equipment and Services | 2020 | [Replacement/New Contract] | | | | |
| Liner Hanger | 2022 | [Contracted Project] | | | | |
| Pan Malaysia for Well Completion | 2022 | [Contracted Project] | | | | |
| Integrated Well Services (IWS) | 2020 | [Replacement/New Contract] | | | | |
| Seismic Acquisition | 2022 | [Contracted Project] | | | | |
| Individual - Upstream | | | | | | |
| Slickline | 2022 | [Replacement/New Contract] | | | | |
| Wellhead Maintenance Services | 2021 | [Replacement/New Contract] | | | | |
| Surface Controlled Subsurface Safety Valve System Rectification, Maintenance And Services | 2022 | [Contracted Project] | | | | |
| Geophysical, Geomatics, HSE and Technical Auditor Consultancy Services | 2021 | [Replacement/New Contract] | | | | |
| Drilling Tools, Well Test Tubular and Accessories Rental | 2022 | [Contracted Project] | | | | |
| Surface Sand Management | 2019 | [Contracted Project] | | | | |
| Gas Lift Valves (GLV) and Insert Strings Equipment, Accessories and Services | 2023 | [Contracted Project] | | | | |
| Sand Control | 2022 | [Contracted Project] | | | | |
| Marine Site Investigation Survey | 2023 | [Contracted Project] | | | | |
| Offshore Surveying and Positioning Services | 2023 | [Contracted Project] | | | | |
| Metal Expandable Packer (MEP) for Annular Barrier Equipment | 2023 | [Contracted Project] | | | | |
| Tender Assisted Drilling Rig | 2021 | [Contracted Project] | | | | |
| Jack up Rig (Call Out basis) | 2022 | [Contract Extension] | | | | |
| Intelligent Circulation While Drilling Tool (iCWD) | 2023 | [Contract Extension] | | | | |
| Electric Wireline | 2021 | [Replacement/New Contract] | | | | |
| Core Analysis | 2022 | [Contracted Project] | | | | |
| Coiled Tubing Unit | 2015 | [Replacement/New Contract] | | | | |
| Processing/Reprocessing | 2021 | [Contracted Project] | | | | |

- Contracted Project
- Replacement/New Contract
- Contract Extension

B - Engineering, Construction and Projects



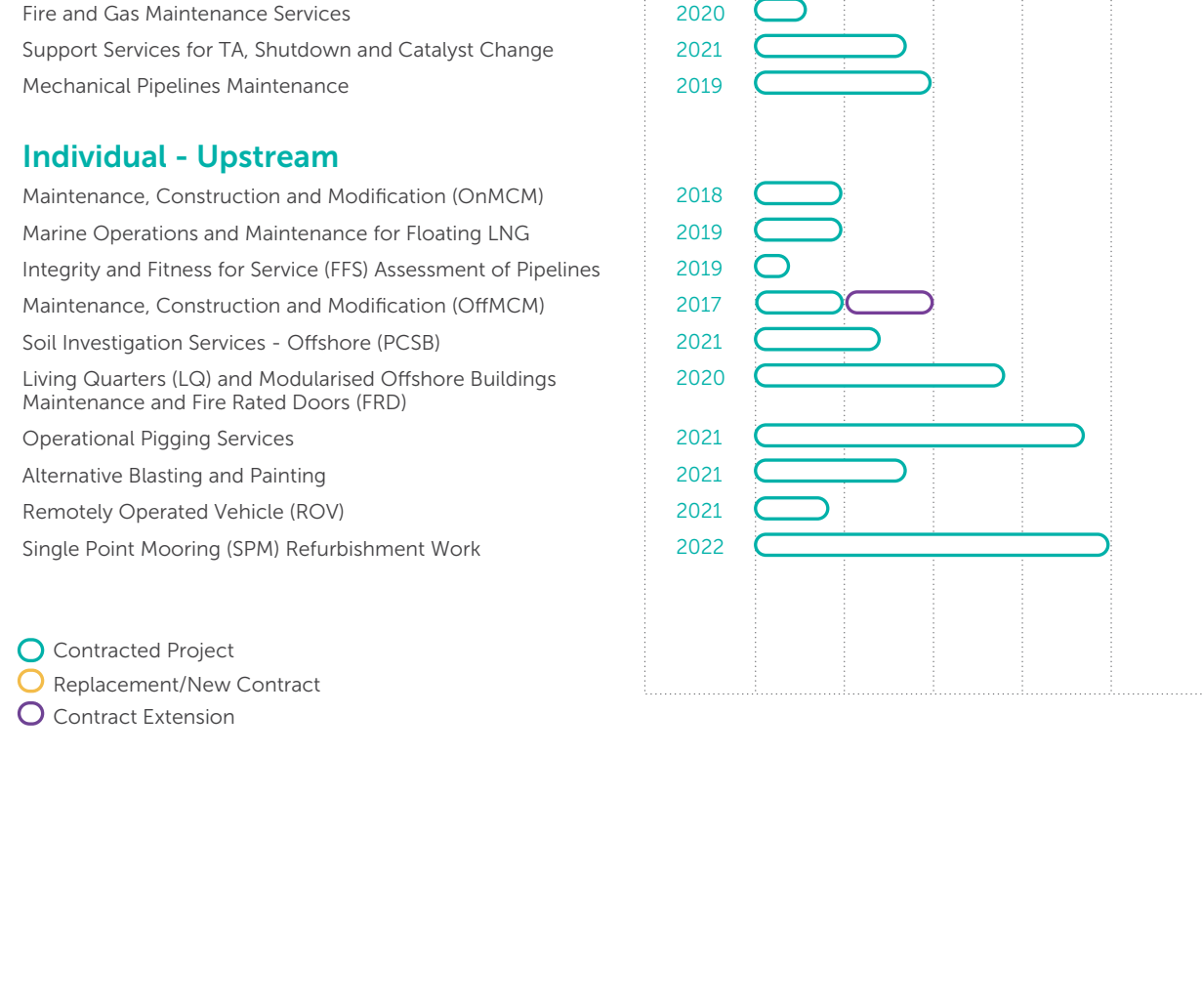
- Contracted Project
- Replacement/New Contract
- Contract Extension



C - General Facilities Maintenance



- Contracted Project
- Replacement/New Contract
- Contract Extension



D - Logistics and Warehousing

| Contract | Start | 2023 | 2024 | 2025 | 2026 |
|---|-------|--------------------|--------------------------|--------------------------|--------------------------|
| Pan Malaysia Offshore Support Vessels for PACs' Production Operations Offshore Support Vessel (OSV) Services for Drilling and Project Activities | 2018 | Contracted Project | Replacement/New Contract | Replacement/New Contract | Replacement/New Contract |
| Integrated Upstream Intra-Plant Transportation and Related Services | 2019 | Contracted Project | Replacement/New Contract | Replacement/New Contract | Replacement/New Contract |
| Individual - Upstream Vessel Tracking System (VTS) Marine Services and Marine Related Activities Offshore Support Vessel and Rig Tank Cleaning Services | 2017 | Contracted Project | Replacement/New Contract | Replacement/New Contract | Replacement/New Contract |
| | 2019 | Contracted Project | Contract Extension | Contract Extension | Contract Extension |
| | 2022 | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2021 | Contracted Project | Contracted Project | Contracted Project | Contracted Project |

- Contracted Project
- Replacement/New Contract
- Contract Extension



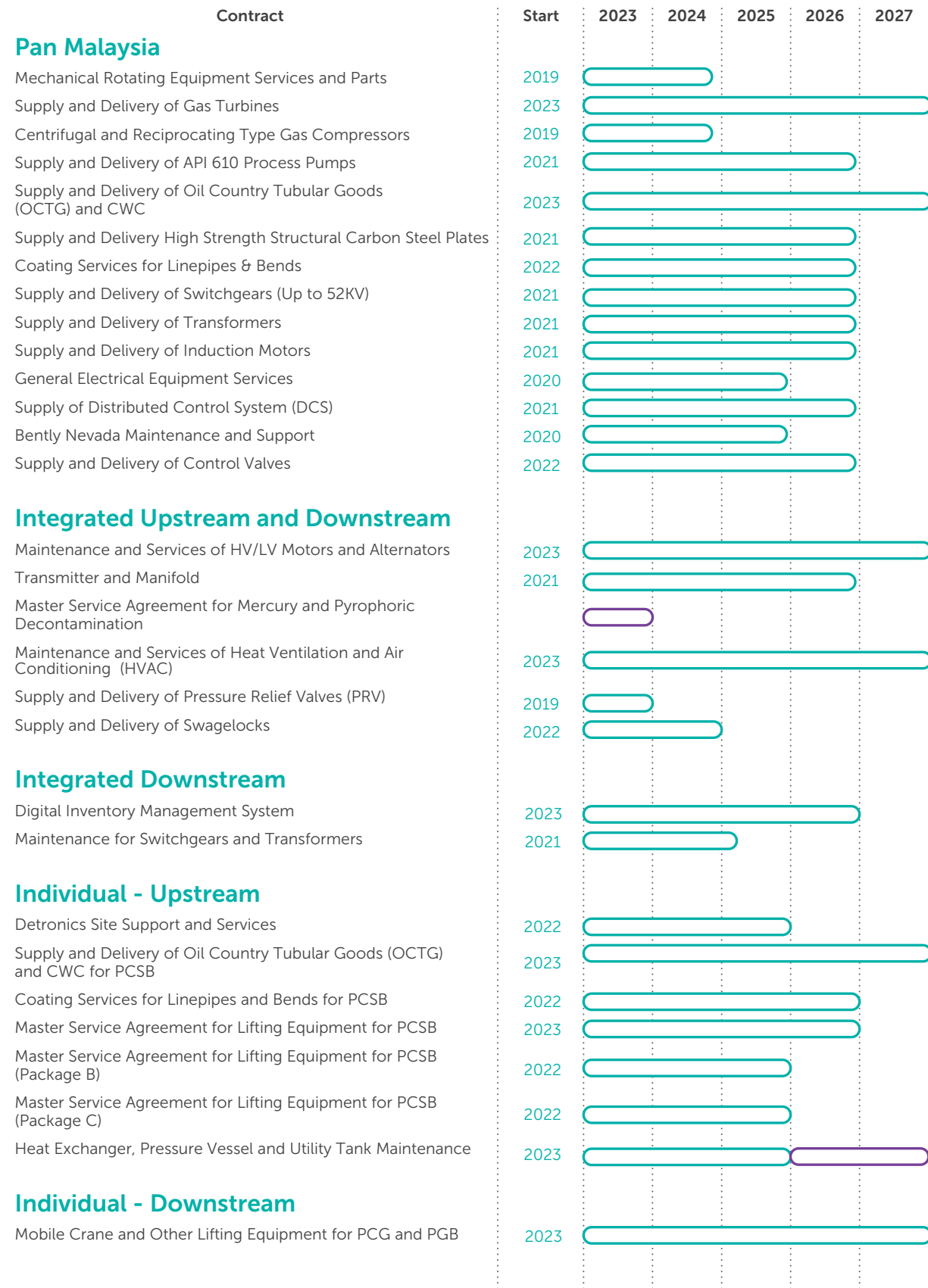
E - Chemicals

| Contract | Start | 2023 | 2024 | 2025 | 2026 | 2027 |
|--|-------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Integrated Upstream Chemical Treatment and Chemical Cleaning Services Supply of Production Chemicals Supply of Integrity Chemicals | 2023 | Contracted Project | Contracted Project | Contract Extension | Contract Extension | Contract Extension |
| Individual Upstream Supply and Delivery of Triethylene Glycol (TEG) and Monoethylene Glycol (MEG) for PACs Supply and Delivery of Base Oil for PACs | 2023 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| Individual Upstream & Downstream Supply and Delivery of PETRONAS Lubricants | 2018 | Contracted Project | Contract Extension | Contract Extension | Contract Extension | Contract Extension |
| Individual Downstream Supply of Chloroalkali Supply of Sulphuric Acid Supply of Ceramic Balls Supply and Delivery of Activated Carbon Umbrella Contract for the Provision of Precious Metal Recovery (Palladium and Platinum) Services for PETRONAS OPUs WTSP for Boiler and Cooling Water Catalyst and Adsorbent Change Out | 2017 | Contracted Project | Contract Extension | Contract Extension | Contract Extension | Contract Extension |
| | 2024 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2018 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2022 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2023 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2023 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |
| | 2017 | Contracted Project | Contract Extension | Contract Extension | Contract Extension | Contract Extension |
| | 2023 | Contracted Project | Contracted Project | Contracted Project | Contracted Project | Contracted Project |

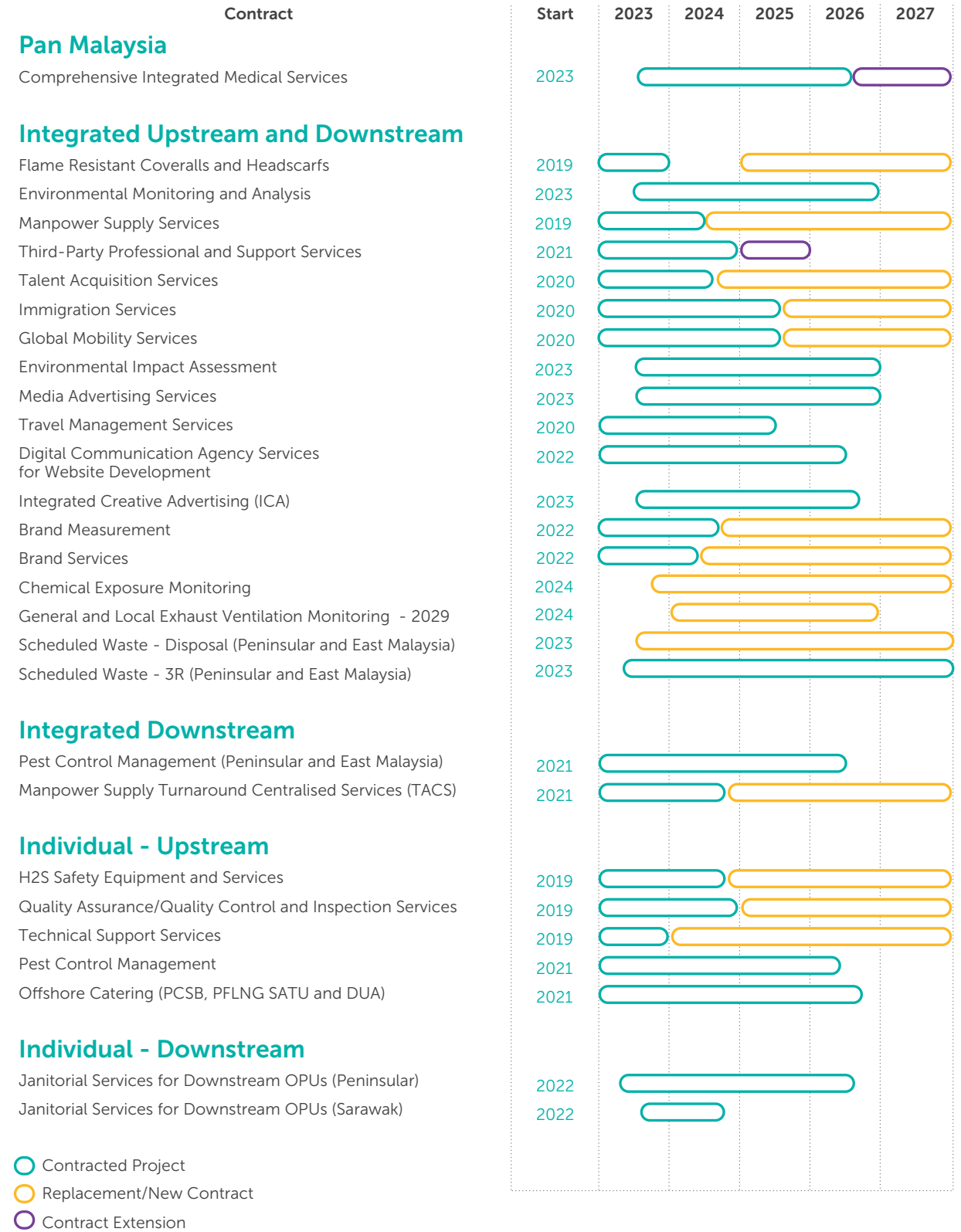
- Contracted Project
- Contract Extension



F - Equipment and Materials



G - Indirect Category



○ Contracted Project
○ Replacement/New Contract
○ Contract Extension

List of Abbreviations

Abbreviations used in the report

| Definition | Used for |
|------------|--|
| AHTS | Anchor Handling Tug Supply |
| CBAM | Carbon Border Adjustment Mechanism |
| CBD COP15 | Kunming-Montreal Global Biodiversity Framework |
| CCS | Carbon Capture and Storage |
| CCUS | Carbon Capture, Utilisation and Storage |
| CE | Competitive Edge |
| CO2 | Carbon Dioxide |
| COVID-19 | 2019 Novel Coronavirus (or 2019-nCov) |
| CPP | Central Processing Platforms |
| CPTPP | Comprehensive and Progressive Agreement for Trans-Pacific Partnership |
| DPDSV | Dynamic Positioning Diving Support Vessel |
| DPS | Discover PETRONAS @Schools |
| eCHEMS | e-Chemical Management System |
| EE | Energy Efficiency |
| EIF | Entered Into Force |
| EPCC | Engineering, Procurement, Construction and Commissioning |
| EPCIC | Engineering, Procurement, Construction, Installation and Commissioning |
| ESG | Environmental, Social and Governance |
| EU | European Union |
| EV | Electric Vehicle |
| FA | Frame Agreement |
| FEED | Front-end Engineering Design |
| FIP | Facilities Improvement Plans |

List of Abbreviations

Abbreviations used in the report

| Definition | Used for |
|------------|--|
| FP | Future Positioning |
| FPSO | Floating Production Storage and Offloading |
| FSO | Floating Storage and Offloading |
| FTA | Free Trade Agreement |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| GPV | General Purpose Vessel |
| HRD Corp | Human Resource Development Corporation |
| HRDF | Human Resources Development Fund |
| HSE | Health, Safety and Environmental |
| HUC | Hook-Up and Commissioning |
| HWU | Hydraulic Workover Unit |
| iG@P | Innovation Gateway @ PETRONAS |
| IRA | Inflation Reduction Act |
| IRM | Inspection, Maintenance and Repair |
| JUR | Jack-up Rigs |
| LCT | Landing Craft Tank |
| LNG | Liquefied Natural Gas |
| MCM | Maintenance, Construction and Modification |
| MEG | Monoethylene Glycol |
| MITI | Ministry of Investment, Trade and Industry |
| MOGSC | Malaysian Oil, Gas & Energy Services Council |
| MOPU | Mobile Offshore Production Units |

List of Abbreviations

Abbreviations used in the report

| Definition | Used for |
|------------|---|
| MPM | Malaysia Petroleum Management |
| MTJDA | Malaysia-Thailand Joint Development Area |
| NDCs | Nationally Determined Contributions |
| NDT | Non-Destructive Testing |
| NETR | National Energy Transition Roadmap |
| NZCE | Net Zero Carbon Emissions |
| O&M | Operations and Maintenance |
| OE | Operational Excellence |
| OEM | Original Equipment Manufacturer |
| OGSE | Oil and Gas, Services and Equipment |
| OPEC | Organisation of the Petroleum Exporting Countries |
| OPU | Operating Plant Unit |
| OSV | Offshore Support Vessel |
| OTOBOSOV | On Time, On Budget, On Scope, On Value |
| P&A | Plug and Abandonment |
| PACs | Petroleum Arrangement Contractors |
| PCG | PETRONAS Chemicals Group |
| PD&T | Project Delivery and Technology |
| PDB | PETRONAS Dagangan Berhad |
| PESP | PETRONAS Education Sponsorship Programme |
| PIC | Pengerang Integrated Complex |
| PLI | PETRONAS Lubricants International |
| PM | Peninsular Malaysia |

List of Abbreviations

Abbreviations used in the report

| Definition | Used for |
|------------|---|
| PSV | Platform Supply Vessel |
| RE | Renewable Energy |
| ROV | Remotely Operated Vehicle |
| SAF | Sustainable Aviation Fuel |
| SB | Sabah |
| SBV | Standby Vessel |
| SK | Sarawak |
| SME | Small and Medium-sized Enterprises |
| SOE | State-Owned Enterprise |
| SR | Self Regulation |
| SSV | Straight Supply Vessel |
| STEM | Science, Technology, Engineering and Mathematics |
| SURF | Subsea Umbilical, Riser and Flowline |
| SVB | Silicon Valley Bank |
| T&I | Transportation and Installation |
| TEG | Triethylene Glycol |
| TPP | Trans-Pacific Partnership Agreement |
| TVET | Technical and Vocational Education and Training |
| UV | Utility Vessel |
| VISTA | Vocational Institutions Sponsorship and Training Assistance |
| WHP | Wellhead Platform |

Glossary

Industry terms used in the report

| Definition | Used for |
|---------------------------------|---|
| Barrel | A standard unit of measurement for oil and production. One barrel contains 159 liters of oil. |
| Barrels of Oil Equivalent (boe) | A unit of measurement to quantify amount of crude oil, condensates and natural gas. Natural gas volumes are converted to barrels on the basis of energy content. |
| Brent Price | The benchmark crude oil price in Europe, as traded on the International Petroleum Exchange in London. Brent Crude refers to a particular grade of crude oil, which is slightly heavier than WTI crude. See WTI price. |
| Brownfield | Field that has been previously developed and has reached its peak oil/gas production level. |
| Catalyst | One that precipitates a process or event, especially without being involved in or changed by the consequences. |
| Clean Energy | Energy gained from sources that do not release air pollutants, while green energy is energy derived from natural sources. |
| Decarbonisation | The term used for removal or reduction of carbon dioxide (CO ₂) output into the atmosphere. |
| Deepwater | Projects in water depths exceeding 450ft. The Unique methods are required to produce the oil and gas from ocean bed at such depths. See Floating Production Unit. |
| Development | Activities following discovery that are necessary to begin production and transportation of crude oil and natural gas. |
| Downstream | All segments of 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. |
| Energy Transition | The energy transition is the ongoing process of replacing fossil fuels with lower-carbon energy sources. |
| Exploration | The search for crude oil and/or natural gas by geological and topographical studies, geophysical and seismic surveys and drilling of wells. |
| Feedstock | Raw material used in manufacturing a product, e.g. crude oil is a feedstock in the refining process to produce gasoline. |
| Field | A geographical area overlying a hydrocarbon reservoir. |

Glossary

Industry terms used in the report

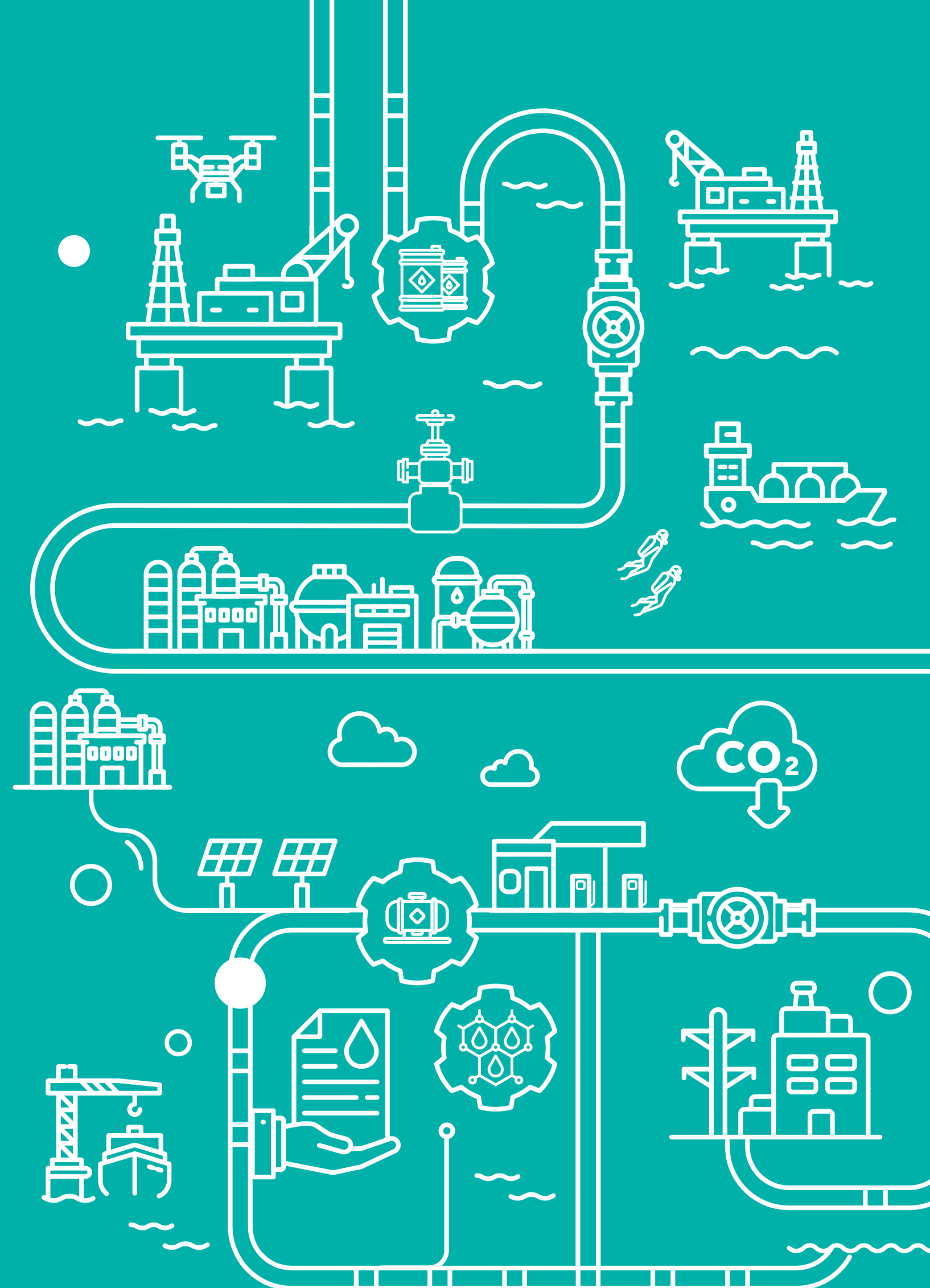
| Definition | Used for |
|------------------------------------|---|
| Greenfield | Field that has proven oil/gas reserves but has never been developed. |
| Hydrocarbon | A compound of hydrogen and carbon, such as any of those which are the chief components of petroleum and natural gas. |
| Hydrogen | Hydrogen is a clean alternative to methane, also known as natural gas. It is the most abundant chemical element, estimated to contribute 75 per cent of the mass of the universe. |
| Infill Drilling | Drilling of new wells in an existing field within the original well patterns to accelerate production. |
| Linepipes | A high strength carbon steel pipe used for transporting crude oil, petroleum products, natural gas and water. |
| Liquefied Natural Gas (LNG) | Natural gas that is liquefied under extremely cold temperatures of about 260 degrees Fahrenheit to facilitate storage or transportation in specially designed vessels. |
| National Energy Policy 2022-2040 | 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. |
| National Energy Transition Roadmap | 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 a large scale. |
| Net Zero Carbon Emissions | Achieved by balancing carbon dioxide (CO ₂) emissions by removal (for example, through carbon capture and sequestration) or simply eliminating (CO ₂) emission altogether (for example, decarbonisation of energy systems through solar and wind energy). |
| New Energy | Sources of energy that are renewable and environmentally friendly, such as solar energy, wind energy and biofuels. |
| Petrochemicals | Organic and inorganic compounds and mixtures derived from petroleum, used principally to manufacture chemicals, plastics and resins, synthetic fibres, detergents, adhesives and synthetic motor oils. |
| Refining | A purification process for natural resources which includes hydrocarbons, using distillation, cooling and/or compression. |
| Regasification | Process of converting LNG temperature back to natural gas at atmospheric temperature. |
| Renewable Energy | Energy that is generated from natural processes that are continuously replenished. |

Glossary

Industry terms used in the report

| Definition | Used for |
|--|--|
| Resources | The total estimated quantities of petroleum at a specific date to be contained in or that have been produced from known accumulations of hydrocarbon. |
| Subsurface | Relating to or being something located beneath a surface and especially underground. |
| Sustainable Aviation Fuel | A biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint. |
| United Nations Sustainable Development Goals | 17 interlinked goals adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Also known as the Global Goals. |
| Upstream | 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). |
| Wellhead | 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 |



Frequently Asked Questions (FAQs)

This section provides quick answers to common questions on this PETRONAS Activity Outlook (PAO) report.

1. Is this report a one-off exercise or a regular effort?

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

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

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

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

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



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

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

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

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

Frequently Asked Questions (FAQs)

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

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

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

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



8. Does PETRONAS' NZCE 2050 Pathway include targets on Scope 3 emissions i.e., emissions within the supply chain?

The current NZCE 2050 Pathway is focused on operational decarbonisation (Scope 1 and 2) and green growth areas. PETRONAS is taking a progressive approach in addressing Scope 3 emissions, given the challenges on measurement and reduction which will require concerted efforts with key stakeholders and industry ecosystem players. Currently, PETRONAS is focusing on Scope 3 emissions Category 11 – Use of Sold Goods & Services for Scope 3 reporting purposes.

9. How does PETRONAS intend to capture opportunities and address key challenges that the CPTPP may bring?

To optimise the benefits from the CPTPP, PETRONAS needs to be strategic in deciding categories/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 OGSE and the greater ecosystem.



Find Out More

Visit our one-stop-centre for all the latest and crucial information on how to collaborate with PETRONAS. Find out about:

Licensing and Procurement in Malaysia

Malaysia Oil and Gas Outlook

Malaysia OGSE Industry Initiatives

International Vendor Registration and Activities

Vendor Announcements

HSSE Partners One Stop Center

Connect to collaborate (Licensing & Procurement Matters)



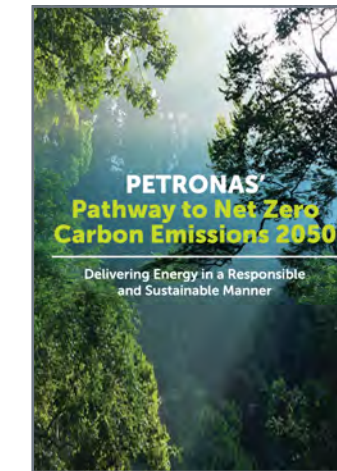
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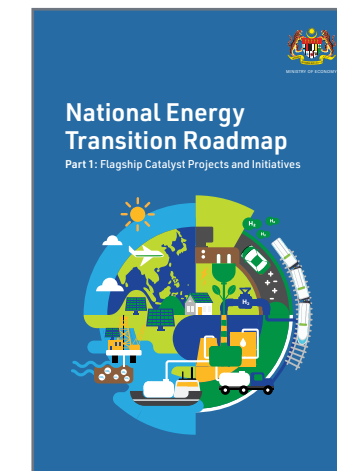
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For more details on the Pathway to NZCE 2050, please scan the QR code.



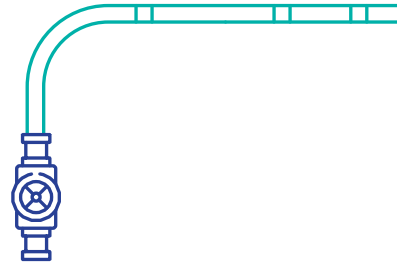
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For more details on the NETR, please scan the QR code.



Find Out More



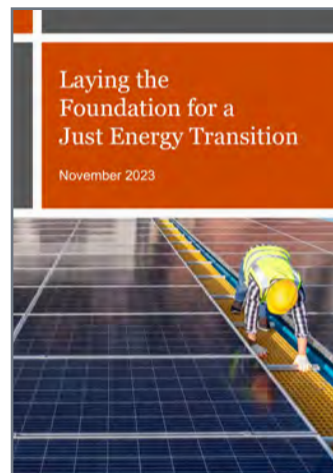
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Contact Us

We want to hear from you. Share your feedback/enquiries with our team at ask.isc@petronas.com

Thank you for showing your interest in the PETRONAS Activity Outlook 2024-2026.



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