

## Business Review

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# Upstream



**Adif Zulkifli**  
Executive Vice President and  
Chief Executive Officer,  
Upstream

"The year 2021 saw the industry stabilise and start to recover from the shocks of 2020, albeit in a shroud of uncertainty as the world continued to grapple with multiple waves of COVID-19. Valuable lessons were learnt about our vulnerability as a business, driving us to step up our efforts to ensure that we continue to be resilient in providing the world with the energy security it needs. This resilience begins with ensuring the health, safety and security of our employees and those they work with; we are proud to maintain our solid HSE record, true to our goal that "everyone goes home safely", every time.

Recognising that we have a large part to play supporting PETRONAS' net zero carbon emissions by 2050 (NZCE 2050) aspiration, while balancing the obligation to deliver energy to the world, the Upstream business has stepped up its efforts in lowering our carbon footprint, with several projects underway to achieve zero continuous flaring and venting, an increased level of digitalisation towards energy-efficient operations, and a marked level of collaboration with leading industry players to advance carbon capture and storage (CCS) technologies and solutions.

We believe that Upstream will continue to be PETRONAS' main cash generator that will provide crucial support for the Group's sustainability aspirations. As the custodian of Malaysia's hydrocarbon resources, we continue to increase Malaysia's resource base through efforts such as the Malaysia Bid Round (MBR), bringing in responsible investors who share the same pragmatic approach in providing the world with affordable energy via a safe, resilient, low cost and lower carbon exploration and production."

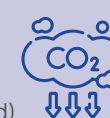


Made **10**  
exploration  
discoveries

Achieved first hydrocarbon for  
**21 projects**

Achieved Final Investment  
Decision (FID) for  
**22 projects**

GHG emissions reduction  
**3.83** million  
tCO<sub>2</sub>e  
(8 projects completed)



Total daily production  
average (boe) per day  
**2,275**  
thousand



Total Contingent  
Resources (2C)  
**15.34**  
Bboe



Total Petroleum  
Reserves (2P)  
**9.11**  
Bboe

3-year average Overall  
(2P + 2C) Resources  
Life Index (ORLI)  
**39.7** years

Reserves Life  
Index (RLI)  
**9.8** years

More than  
**10,000**  
employees



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What We Do

Our Upstream business is involved in the exploration and development of hydrocarbon resources and the operations of oil and gas production assets, with a growing international presence in over 20 locations across the globe. In Malaysia, through Malaysia Petroleum Management (MPM), we regulate and manage the country’s petroleum resources. We spearhead the growth and development of the nation’s oil and gas industry.



The Upstream business continues to deliver results operationally through strategic and decisive measures. We adopted digitalisation and technology in the way we work to deliver business excellence. We reduced costs and maintained liquidity, strengthening our portfolio by encouraging more value-driven exploration and development of discovered resources to promote a vibrant oil and gas landscape.

Key Priorities and Results

Key Priorities


Sustainable Supply

- Ensured a sustainable supply of energy to stakeholders.

Capitals Deployed:   

Portfolio Expansion

- Grew business portfolio as part of our global strategy.

Capitals Deployed:  

Results

- Recorded a total daily production average of 2,275 thousand barrels of oil equivalent (boe) per day.
- Achieved first hydrocarbon for 21 projects – 14 in Malaysia (12 Brownfield, 2 Greenfield) and 7 abroad – 2 Greenfields (in Turkmenistan and Brazil), 5 Brownfields (2 in South Sudan, 1 in Chad, 1 in Myanmar and 1 in Indonesia).
- Achieved Final Investment Decision (FID) for 22 projects; in Malaysia (18), Indonesia (2), Brazil (1) and Turkmenistan (1).
- A total of 10 exploration discoveries were made in 2021 of which eight discoveries contributed to our resource addition, namely in Malaysia, Indonesia and Brunei.
- Signed seven Production Sharing Contracts (PSCs) in Malaysia, attracting four new investors.
- Awarded six of the 13 offshore exploration blocks offered in the Malaysia Bid Round (MBR) 2021. MBR is an annual Malaysia licensing round hosted by MPM which offers investors diverse upstream opportunities.

- Expanded footprint in Brazil with the acquisition of the Sépia field, located in the Santos Basin. This marks PETRONAS Petróleo Brasil Ltda’s entry into the prolific basin, strengthening its ventures in the country and presence in the Americas.
- Secured a 20-year extension for the Jabung Production Sharing Contract. With the extension, PETRONAS Carigali (Jabung) Ltd. will continue to add value to Indonesia’s energy industry and grow its business portfolio in the region.
- Acquired 10 per cent participating interest from JAPEX Montney Ltd in the North Montney Joint Venture (NMJV), bringing PETRONAS Energy Canada Ltd’s interest to 72 per cent, up from 62 per cent.
- Signed the Block 29 Production Sharing Contract in Angola, which expands our presence in West Africa.
- Signed a Multi-Well Participation Agreement with Chevron USA Inc for participation in exploration acreages in the US Gulf of Mexico, in line with PETRONAS’ continuous efforts to explore opportunities in the Americas.

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Key Priorities

Technology-Driven Operational Excellence

- Leveraged technology, digitalisation, and intelligent facilities to reduce costs and increase productivity and efficiency to drive informed decision-making.
- Harnessed data to gain integrated, end-to-end visibility across key markets and data centres for better decision making on new discoveries and new block acquisitions.

Capitals Deployed:  

Results

- Gained incremental production of 1,320 thousand barrels of oil equivalent per day (boe/d) from Brownfields via Digital Fields solutions that unlocked production enhancement opportunities leveraging on artificial intelligence and machine learning technologies.
- Achieved cost avoidance of RM17.5 million in production maintenance and drilling operations through execution of predictive maintenance and machine learning technologies across Malaysia Assets namely Baronía, Baram, D35 and Angsi.
- Enabled 30 per cent process efficiency improvement at Dulang, Belud, PC4, Baronía, Tukau Timur and PM Gas fields via a cloud-based Software as a Service (SaaS) solution with LiveFDP that allows secured data accessibility to users.
- Implemented non-intrusive inspection of TharJath export pipeline using Magnetic Tomography Method (MTM) technology for Sudd Petroleum Operating Company (SPOC) which lowered the risk of pipeline failure and shortened the duration of inspection campaign compared to conventional methods. This resulted in a safe production resumption, six weeks earlier than scheduled.
- Replication of Physical Asset Management (PAM) digital solutions such as PROTEAN (real time alerts), VINCI (digital inspection reporting), SICS (digital risk ranking and prioritisation) in Turkmenistan and Iraq operations enabled for faster, accurate and transparent decision making, which improves overall process cycle efficiency.







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Key Priorities and Results

Key Priorities





Health and Safety

- Robust management of COVID-19 cases among employees and contractors to ensure business continuity at our areas of operations.
- Fostered Generative HSE Culture at all our areas of operations.

Capitals Deployed: 

Sustainability

- Operational Excellence and Collaboration to lower overall carbon footprint.

Capitals Deployed: 

Results

- Introduced the My Personnel e-Tracker (MyPeT) app, designed for more than 10,000 oil and gas personnel in Malaysia. The app allows for real-time check-in and tracking of COVID-19 vaccination and health status from embarkation to disembarkation points at various offshore locations in the country.
- Recorded the best HSE performance in terms of major HSE incidents in five years.
- PETRONAS Carigali Sdn Bhd received 15 Gold Merit Awards and six Gold Class 1 Awards at the 39<sup>th</sup> Malaysian Society for Occupational Safety & Health Award ceremony for its HSE performance.

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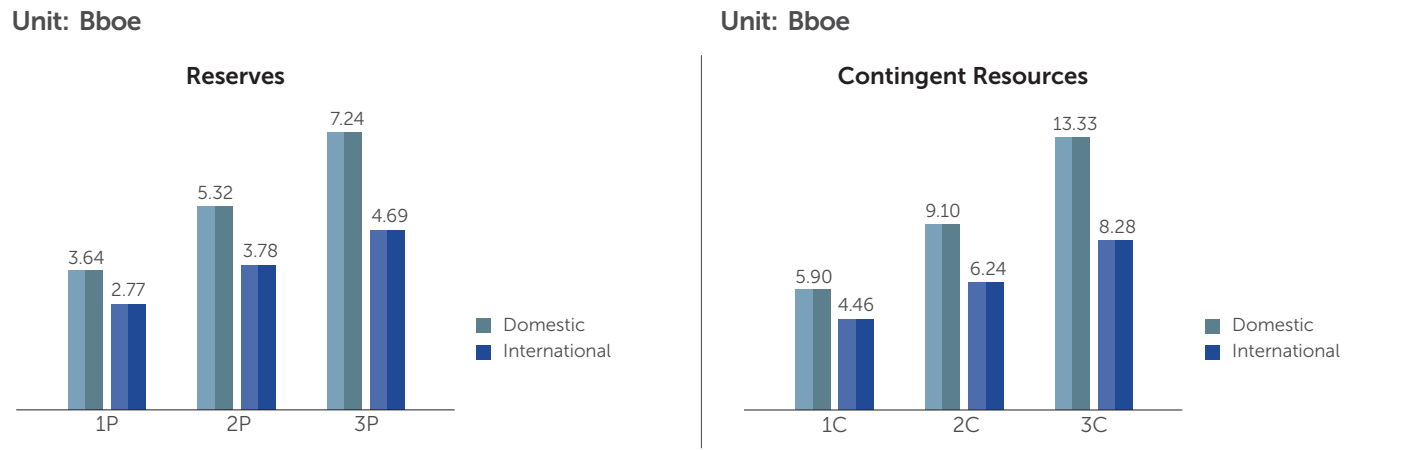
- Completed eight GHG emissions reduction projects estimated to reduce GHG emissions by 3.83 million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) annually from Upstream operations in Malaysia with an estimated value creation of RM161 million per annum. This includes the integrated Bokor-Betty project, located off the coast of Sarawak, which achieved zero continuous flaring of hydrocarbon while monetising the recovered flared and vented gases.
- Signed three agreements with industry partners to explore carbon capture and storage technologies as well as carbon dioxide (CO<sub>2</sub>) storage solutions to decarbonise Malaysia’s upstream sector and provide CO<sub>2</sub> storage solutions for the region. The partners are ExxonMobil Exploration and Production Malaysia Inc, Sarawak Shell Berhad and POSCO International Corporation and POSCO Engineering & Construction Co Ltd.

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Performance Highlights and Achievements

- A re-baselining of the PETRONAS Reserves and Resources volumes is performed through the application of a new gas to oil-equivalent conversion factor. This new conversion factor (i.e., barrel oil equivalent, boe) is more representative of the PETRONAS gas Reserves portfolio. The change is from an assumed value of 6,000 scf per boe to 5,650 scf per boe and resulted in a once-off uplift in the Reserves and Resources volumes and the associated indicators.
- As at 1<sup>st</sup> January 2022, PETRONAS’ total petroleum 2P Reserves stood at 9.11 Bboe, an increase of 7% from 2020. Of the 7%, 2% is due to better performance in 2021, while the remaining 5% is due to the once-off conversion factor uplift.
- The improvement in Reserves performance is primarily due to the healthy maturation of Contingent Resources to Reserves and the acquisition of another 10% equity in the North Montney Joint Venture (NMJV) asset in Canada.
- Our 3-year average 1P Reserves Life Index (RLI), improved from 8.9 years in 2020 to 9.8 years in 2021 due to the better Reserves position.
- PETRONAS total Contingent Resources (2C) stood at 15.34 Bboe, an increase of less than 1% from 2020. Without the uplift from the change in the gas conversion factor, the 2C reduces by – 4%, primarily attributed to the healthy conversion of the CR into Reserves and the sale of the PETRONAS Sasol Montney Partnership (PSMP) asset in Canada.
- 10 new exploration discoveries were made during the year, with 8 contributing to 0.20 Bboe of 2C to our portfolio
- Most of the 2C addition (from Exploration discoveries) came from our Malaysia operations.

(i) ARPR 1.1.2022 Reserves and Contingent Resources

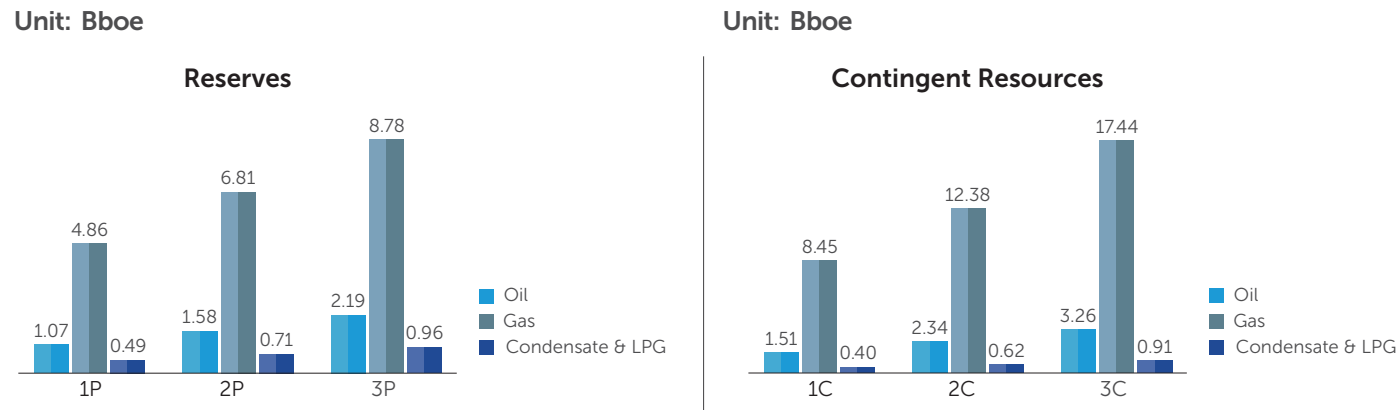


**Note:**  
1. Volumes based on the new gas to oil-equivalent conversion factor of 5,650 scf = 1 boe. The new conversion factor results in an approximately 5% increase in Reserves and Contingent Resources volumes across all levels of uncertainty.

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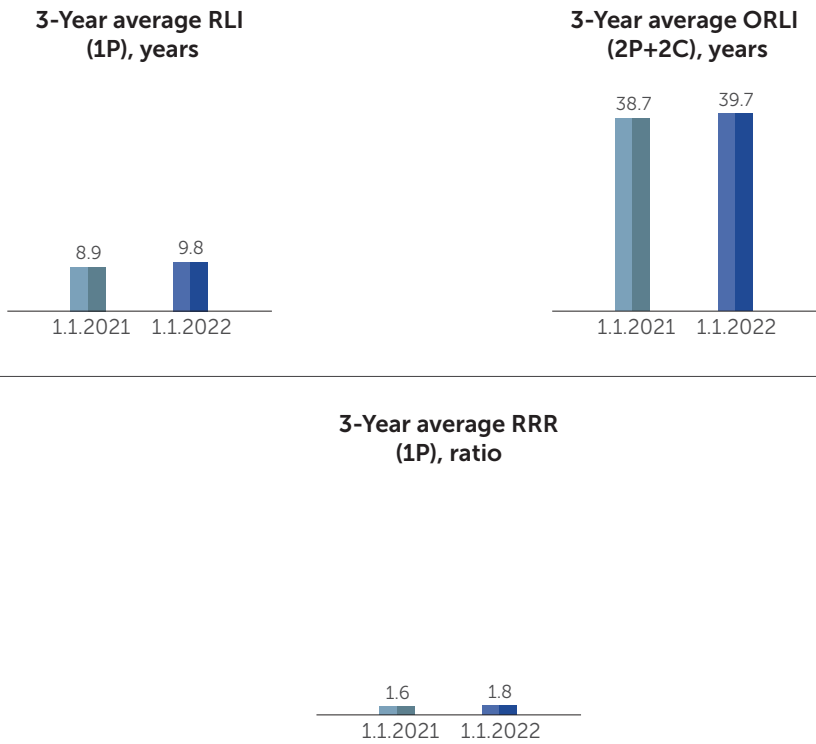
Performance Highlights and Achievements

(i) ARPR 1.1.2022 Reserves and Contingent Resources (Cont'd.)



**Note:**  
1. Volumes based on the new gas to oil-equivalent conversion factor of 5,650 scf = 1 boe. The new conversion factor results in an approximately 5% increase in Reserves and Contingent Resources volumes across all levels of uncertainty.






(ii) Reserves and Resources Performance Indicators



**Note:**  
1. Indicators for ARPR 1.1.2022 are calculated using the new gas to oil-equivalent conversion factor of 5,650 scf = 1 boe. No restatement of the ARPR 1.1.2021 indicators.

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Value Created for Stakeholders

Stakeholder	Expectations	Value Created
 <b>Government</b>	<b>Malaysia</b> <ul style="list-style-type: none"><li>Maximise long-term value of the nation's oil and gas resources.</li></ul> <b>International host authorities</b> <ul style="list-style-type: none"><li>Development of host nation's oil and gas industry.</li></ul>	<ul style="list-style-type: none"><li>Spearhead the growth and development of Malaysia's exploration and production (E&amp;P) industry towards maximising the value of the country's hydrocarbon resources whilst ensuring sustainable energy security.</li><li>Promote Malaysia as an investment destination to grow energy portfolio with the right infrastructure and attractive opportunities via the annual Malaysia Bid Round.</li><li>Contribution to host countries through our commitment to deliver safe energy supply as well as socio-economic development by creating job opportunities and upskilling of the workforce via training programmes.</li></ul>
 <b>Petroleum Arrangement Contractors</b>	<ul style="list-style-type: none"><li>Healthy return on investments.</li></ul>	<ul style="list-style-type: none"><li>Facilitate and champion industry-wide collaboration with the industry players including the government bodies to ensure business continuity post pandemic recovery and production sustained for year 2021 in a prudent and safe manner for people, facilities and the environment.</li><li>Significant enhancements in the Malaysia Bid Round 2021, both in fiscal and non-fiscal of the PSC terms, designed to match the risk and rewards of the investments with the type of assets available.</li></ul>
 <b>Partners</b>	<ul style="list-style-type: none"><li>Monetisation of oil and gas discoveries.</li></ul>	<ul style="list-style-type: none"><li>Leveraging on our fully integrated value chain to meet with customers' demands and expectations.</li><li>Adopt innovative technical and commercial solutions to enable monetisation of resources and to prolong the economic life of fields.</li><li>Implement measures to lower cost and promote efficiency in operations.</li><li>Proven track record of prudent financial management.</li><li>Implementation of HSE measures and standards at our operations to ensure safety of personnel.</li></ul>
 <b>Communities</b>	<ul style="list-style-type: none"><li>Corporate Social Responsibility initiatives to support community development.</li></ul>	<ul style="list-style-type: none"><li>We have invested in programmes designed to promote and support health, environment, education and social welfare initiatives in our areas of operations.</li><li>Examples:<ul style="list-style-type: none"><li>COVID-19 contribution in both our domestic and international operations amounted to RM1.2 million.</li><li>PETRONAS Carigali Sdn Bhd (PCSB) planted 500 saplings in Kerteh, Terengganu and 300 saplings in Miri, Sarawak, as part of PETRONAS Sentuhan Alam mangrove rehabilitation programme.</li><li>PCSB also contributed fire extinguishers, safety helmets, life jackets, floating rope and safety boats to the villagers in Sabah as part of the Community Emergency Response Team programme for safety awareness.</li><li>PETRONAS Carigali Brunei Ltd sponsored and organised the PETRONAS School of Life Programme aimed at educating the youth in Brunei on essential life skills beyond the classroom.</li><li>As part of PETRONAS Carigali Iraq Holding B.V. (PCIHBV)'s commitment to the social well-being of the Republic of Iraq, PCIHBV together with its partner refurbished two schools at the Garraf Contract Area.</li><li>PETRONAS Carigali Nile Ltd completed Water for Life project for Nyakuron West, Juba, South Sudan. The project aims to provide clean water to the community in the area.</li></ul></li></ul>
 <b>Employees</b>	<ul style="list-style-type: none"><li>Opportunities to upskill themselves.</li></ul>	<ul style="list-style-type: none"><li>Upstream continuously upskills all of its employees with the right training to improve their capabilities according to their skill groups (Technical and Business).</li></ul>

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Risks and Opportunities			
Risks	Opportunities	Actions Taken	Results
<ul style="list-style-type: none"><li>Energy transition coupled with COVID-19 pandemic.</li></ul>	<ul style="list-style-type: none"><li>Leveraged digitalisation and technological innovation.</li><li>Collaborated with industry partners and solution providers.</li></ul>	<ul style="list-style-type: none"><li>Focused on cost optimisation for both CAPEX and OPEX to maintain our resilience and competitiveness through technical, commercial and operational excellence.</li><li>Pursued strategic assessment on investment and acquisition globally to align with our growth agenda.</li><li>Carried out phased initiatives to reduce emissions in keeping with our NZCE 2050 aspiration.</li></ul>	<ul style="list-style-type: none"><li>Paved the way for strict liquidity management and financial disciplines which contributed to cost containment and successful cash repatriations in 2021.</li><li>Acquisition of new assets globally in strengthening PETRONAS' presence in Brazil, US Gulf of Mexico, Angola and Indonesia.</li><li>Completed eight GHG emissions reduction projects, which is estimated to reduce 3.83 million tCO<sub>2</sub>e of GHG emissions from offshore operations.</li><li>Improved production output, increased operational efficiency and cost savings through digitalisation and technology such as machine learning, artificial intelligence, Open Subsurface Data Universe (OSDU), and the cloud-based Software as a Service (SaaS) solution.</li><li>Three agreements were signed to collaborate on CCS technologies as well as CO<sub>2</sub> storage solutions to decarbonise the country's upstream sector and provide CO<sub>2</sub> storage solutions for the region, namely Memorandum of Understanding (MoU) with POSCO International Corporation and POSCO Engineering &amp; Construction Co Ltd, MoU with ExxonMobil Exploration and Production Malaysia Inc.</li></ul>

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Moving Forward

Throughout 2021, the upstream business experienced volatility due to the pandemic and geopolitical tensions that disrupted output from key producers. In 2022, the adoption of cleaner alternatives is expected to accelerate, given growing calls to decarbonise the sector.

Production is expected to increase as governments worldwide focus on increasing the security of energy supply.

Upstream will continue to execute its plans anchored on making sure our business is safe, resilient, low cost and low carbon.

**Moving forward into 2022, our key focus areas include:**

- Malaysia**  
Our plan to revitalise Malaysia's E&P landscape remains imperative in ensuring continued growth and to make Malaysia a home for dynamic and robust investors. Focused efforts such as the Malaysia Bid Rounds would offer investors attractive exploration blocks and discovered fields, with innovative fiscal terms. In addition to these efforts, Late Life Assets and Small Field Assets are being effectively managed through techno-commercial solutions with simplified processes and governance.
- International**
  - Canada**  
PETRONAS has a unique integrated position in Canada that allows maximising our value from Upstream production to LNG markets. Moving forward, PETRONAS will continue focusing on monetising its competitive resources while leveraging on the growing gas demand markets in North America and globally.
  - Mexico and Brazil**  
We will pursue and realise material growth in Mexico and Brazil by focusing on exploration activities with a clear path to monetisation to build a value driven portfolio. Key efforts are being put in place to realise planned resource addition while we continue to be a safe operator and partner, leveraging on our synergy with partners and host authorities.

- Carbon management**  
In delivering the aspiration towards a low carbon Upstream business, the establishment of a centralised Carbon Management Division (CMD) shall drive carbon capture and storage and physical decarbonisation at pace. This is in alignment with PETRONAS' NZCE 2050 aspiration to maximise value while executing sustainable production through physical decarbonisation of Upstream activities, monetising resources from high carbon dioxide fields and delivering carbon dioxide storage facilities. Additionally, CMD is empowered to deliver carbon capture and storage business to generate new revenue for Upstream and PETRONAS.
- Technology and digitalisation**  
There will be continued focus and investments being placed on key technologies to further compress cost while maintaining asset integrity and reliability. This includes the development and adoption of robotic inspection tools, online sensors, and advanced materials as part of the new way of working in Upstream.

The development of new competitive advantages is being supported through rigorous R&D efforts and digitisation of the Upstream ecosystem to help address the pain points and achieve higher operational efficiency. We are determined to create an agile, secure and trusted digital ecosystem that is fundamental to the new way of working in a data-driven organisation.

