

## Business Review



# Project Delivery and Technology



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Senior Vice President,  
Project Delivery and Technology

The journey towards achieving net zero carbon emissions has created more innovation, collaboration and inclusivity opportunities. PD&T focuses on delivering secure and affordable energy solutions through the operational excellence of our core activities, underpinned by innovation and data, while delivering our projects safely on time, within budget and scope. We also accelerated growth efforts, ensured we had the right talent and did what we could to protect our environment.

PD&T's functions increased significantly over the past year as we moved into new areas to realise our NZCE 2050 Pathway. We fortified our expertise in project management, technical expertise, technology research and development and digitalisation. We pushed the needle on developments in several key growth areas across our value chain namely carbon capture and storage (CCS), specialty chemicals, hydrogen, renewables, advanced materials and circular economy. At the same time, we focused on building our talents in these non-traditional sectors, a critical component in realising our NZCE 2050 Pathway. We continued our journey to facilitate a just transition, building an innovation ecosystem where we strengthened our collaborations with stakeholders and partners. We developed and deployed our proprietary technology and digital solutions to accelerate decarbonisation across and beyond the energy landscape at scale and pace.





**975** projects worth  
**RM12.63**  
billion.



**RM5.1**  
billion value realised  
through enterprise  
and business digital  
solutions.



PD&T managed projects recorded over **37 million** man-hours with a Full Time Equivalent of **12,800** personnel at the work site. **13** projects were executed according to On Time, On Budget, On Scope (OTOBOS), while **11** were completed ahead of schedule.

**RM4.23 million** in value creation via the establishment of PETRONAS' Groupwide 5G Enterprise Price Agreement with Telekom Malaysia. This is Malaysia's **first 5G Enterprise** Network and a first for Southeast Asia's oil and gas industry.

PD&T workforce  
**4,966**  
in **13**  
countries.



Delivered  
**450kW**  
electrolyser to Malaysia's first multi-fuel station and secured sales following market launch of Proton Membrane (PEM) Electrolyser.



Achieved over  
**RM150** million  
from the commercialisation of technology and digital solutions.

Trained  
**28,032**  
employees (**63%** of the workforce) in digital competencies and skills at the PETRONAS Digital Academy.

# Business Review

## Creating Stakeholder Value

Stakeholder	Expectations	Value Created
<p><b>C</b></p> <p><b>Customers</b></p>	<p>Introduce sustainable and innovative products and solutions.</p>	<ul style="list-style-type: none"> <li>Managed a total of 975 projects worth RM12.63 billion.</li> <li>Achieved over RM150 million in revenue from technology and digital solutions' commercialisation, including the supply of PETRONAS proprietary electrolyser technology for hydrogen production multi-fuel stations in Sarawak, as well as the deployment of technology products in remote and autonomous operation, production chemicals and production enhancement, asset integrity and health and beauty aid.</li> <li>Generated RM879 million in value by converging engineering and digital domains through innovative approaches and technologies under the ARIES Project, highlighting the power of interdisciplinary collaboration in driving growth and success.</li> </ul>
<p><b>IPG</b></p> <p><b>Industry Partners</b></p>	<p>Elevate industry capabilities and shape industry standards via multilateral knowledge sharing.</p> <p>Create opportunities to collaborate on the latest technologies for application in other industries and broader purposes.</p> <p>Unlock growth in non-traditional businesses to support our business and sustainability targets with Sarawak as a launching pad.</p>	<ul style="list-style-type: none"> <li>More than 20 Malaysian contractors participated in projects to drive project delivery transformation following our collaboration with the Malaysian Oil, Gas and Energy Services Council (MOGSC).</li> <li>Supported Sarawak's adoption of hydrogen and renewable oil as alternative fuels through collaboration between PETRONAS Technology Ventures Sdn Bhd (PTVSB) and SEDC Energy.</li> <li>Accelerated technical and decarbonisation efforts via joint ventures with other industry players.</li> <li>Signed an MoU with Tenaga Nasional Berhad (TNB) to collaboratively study the development of a green hydrogen ecosystem and CCS technology.</li> <li>Established Artificial Intelligence Centre of Excellence (AI CoE) with initial partners Baker Hughes, Boston Consulting Group and Microsoft to drive the advancement of AI solutions.</li> <li>Collaborated with Accenture and Amazon Web Services (AWS) to explore commercialisation opportunities for a cloud-based logistics solution and services platform, STEAR.</li> </ul>
<p><b>ET</b></p> <p><b>Employees and Talent</b></p>	<p>Create a future-ready workforce with embedded digital competencies to augment organisational capability, accelerate adoption and realise value.</p> <p>Introduce training and capability development opportunities for PD&amp;T's talents and higher learning institutions.</p>	<ul style="list-style-type: none"> <li>Curated programmes to strengthen digital literacy among local graduates to meet the demands of current and future job markets via BeDigital Bootcamp.</li> <li>Collaborated with 20 higher learning institutions in Malaysia under the Collaboration with Higher Education Strategic Initiatives (CHES).</li> <li>Raised social consciousness among students and interns via the University of Malaya (UM) Odyssey Hackfest.</li> </ul>



## Key Focus Areas and Results

### Core Business – More Energy, Less Emissions

#### What We Did in 2022

- Delivered projects safely and ahead of schedule despite COVID-19 challenges.
- Delivered more value to the Group through cost reduction, operational efficiency and cash generation.
- Improved efficiency, enhanced productivity and strengthened operational resilience via digital transformation and technical solutions.
- Achieved progress on key technology projects.
- Improved workforce digital competency through Digital Academy and Citizen Analytics.
- Increased resilience and automation through scalability.
- Leveraged the Internet of Things (IoT) to monitor plants and facilities remotely.
- Utilised a maturity model framework and data analysis to develop a future-ready strategic workforce.
- Reshaping talents with a broad-based approach encompassing the concepts of systemic thinking, sustainability, carbon sensitivity and a value-driven mindset.
- Developing an empowered, enabled and agile talent pipeline to drive business results and future growth.
- Pursued industry-academia collaborations for talent development and innovation advancement.

#### Results

- PD&T's managed projects recorded over 37 million man-hours with a Full Time Equivalent of 12,800 personnel at the work site. Regrettably we recorded a fatality at one of our projects, mainly due to the intensity and complexity of project-related activities despite increased HSE risk preventive measures. Following this, we intensified HSE efforts by forming a Pre-emptive Intervention Taskforce to execute measures based on data analytics (Artificial Intelligence Incident Risk Analytics), key findings from the investigation and personnel's feedback.
- Executed 13 projects according to On Time, On Budget, On Scope (OTOBOS) and completed 11 projects ahead of schedule.
- Installed and piloted two units of 250 m<sup>3</sup> Flexible Subsea Storage and integrated to floating host platforms with potential RM500 million cost saving compared to average new build floating storage and offloading (FSO) unit.
- RM5.1 billion value realised through enterprise and business digital solutions driven by cash generation, cost saving, cost avoidance and efficiency enhancement levers, for example:
  - Realised cost savings on logistics spend for Upstream business through STEAR.
  - In-house digital solution enabled LNG business to plan for third party cost avoidance while adhering to contractual obligations.
- Digital Twin Enterprise Optimisation Centre delivers molecular transparency across the value chain and brings together digital twins of all business sectors.
- Remote Autonomous Operation (RAO) piloted at Institut Teknologi Petroleum PETRONAS to accelerate the implementation of this technology at plants.
- The industry has recognised PETRONAS' tech-digital solutions at Asian Downstream Awards, Asian Oil & Gas Awards, IDC Future Enterprise Awards, Databricks Data Team Awards and Malaysia Technology Excellence Awards.
- Realised RM4.23 million in value creation from establishing the PETRONAS Groupwide 5G Enterprise Price Agreement with Telekom Malaysia. It is Malaysia's first 5G Enterprise Network and a first for Southeast Asia's oil and gas industry.
- Reached a managed maturity in cyber security with capabilities to ensure a secure ecosystem and defend against threats.
- Enterprise Data Hub (EDH), a centralised and unified data store, has liberalised data to cater to enterprise and business-specific needs.
- PETRONAS data now resides in Cloud, allowing for flexibility and scalability. This resulted in better collaboration, reduced costs and improved data security.
- Upskilled close to 30,000 PETRONAS employees through our Digital Academy to future-proof the organisation with a digital-ready workforce. In analytics, developed 850 dashboards and 150 machine-learning modules via the Citizen Analytics programme under Digital Academy.

# Business Review

## Key Focus Areas and Results

### Core Business – More Energy, Less Emissions

#### What We Did in 2022

#### Results

- Elevated industry-level capabilities through expertise exchange across disciplines between technical professionals, businesses and strategic partners within and beyond PETRONAS via Technical Professional Forum.
- Worked closely with 20 local universities under the Collaboration with Higher Education Strategic Initiatives (CHESS) programme to drive progress in technical areas that support energy sustainability via industry-academia knowledge sharing and human capital development.
- Expanded academic network collaborations with more than 10 foreign universities in research and talent development, including establishing PETRONAS global technology centres in Malaysia, the United Kingdom and Norway.
- Approximately 400 women employees participated in the Code Without Barriers programme with Microsoft to promote gender diversity and upskill women talent in Data and AI.
  - 107 completed the self-learning modules curated by Microsoft.
  - 38 were certified in Microsoft Azure Data Fundamentals.

## Key Focus Areas and Results

### New Business – Capturing New Growth Opportunities

#### What We Did in 2022

- Intensified innovation to drive long term sustainability in key focus areas:
  - CCS
  - specialty chemicals
  - hydrogen
  - renewables
  - advanced materials
  - circular economy.
- Forged industry-wide partnerships to accelerate technology and digital transformation, talent development, knowledge transfer, solutions adoption and improve market penetration.
- Pursued new revenue streams through technology and digital products to drive competitive advantage.
- Elevated sustainability-driven competencies such as circular economy and waste management in driving operational excellence amid climate concerns.
- Identified new capabilities for talent development to support PETRONAS' ventures into growth businesses and ensure proper career transition for talents identified for redeployment.

#### Results

- Commercialised and marketed proprietary solutions to drive holistic cross-industry efforts towards decarbonisation and sustainability.
- Launched PETRONAS' Advanced Proton Exchange Membrane (PEM) Electrolyser, secured sales and established a new market for our electrolyser.
- Delivered 450kW electrolyser to Malaysia's first multi-fuel station and secured sales following the market launch of PEM Electrolyser.
- Partnered with industry players along the supply chain to create the right ecosystem and widen hydrogen adoption.
- Delivered 1kg/day Coke-to-Graphene (CtG) production unit reactor.
- Signed a Sales and Purchase Agreement with a paint manufacturer to use graphene-based paint additive with a contract value of USD1.6 million as market entry.
- Integrated Bio Hub Facilities completed the Front End Engineering Design for its pilot plant, marking a milestone in specialty surfactants development to capitalise on the demand for higher quality personal care, hygiene and beauty products.
- Delivered bio-polymer (from waste biomass) coated fertiliser prototype capable of reducing fertiliser application frequency and overall fertilising cost, with potential bioplastic applications in medicine, cosmetics, packaging and consumer goods.
- Deployed plastic bitumen road paving trials in collaboration with the Malaysian Public Works Department, utilising 790 kg of plastic waste for every 1km lay.
- Obtained acceptance from Sabah's Department of Fisheries for our Master Reefing Plan to improve future local seafood sources and reduce dependency on imported sources.

### NZCE – Pathway to Zero

#### What We Did in 2022

- Accelerated the decarbonisation of our assets.
- Strengthened emissions accounting in fulfilling PETRONAS' pledges to international ESG reporting.
- Leveraged technologies to reduce environmental footprints and HSSE risks.
- Embedded sustainability technical know-how in our capability inventory.

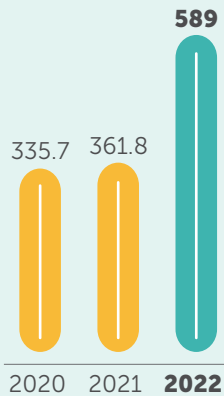
#### Results

- Established the Enterprise Decarbonisation unit to intensify and accelerate strategic groupwide decarbonisation encompassing multiple programmes across Upstream, Downstream and Gas assets.
- Progressively deployed the following:
  - Improvement of fuel gas utilisation baseline and forecasting.
  - iCON GHG modelling for enterprise transparency and granularity of emission data.
  - Methane emissions accounting and forecasting.
- Organised the Race2Decarbonise hackathon to spur ideation and crowdsource innovative solutions, the first to be conducted by an oil and gas company worldwide.
- Achieved first steel cut milestone for our Offshore Low-Speed Wind Turbine project.
- Bio-MEG pilot plant became the first GPM360-certified green project.
- Conducted the first field deployment of floating solar PV technology for open sea application at Pulau Redang and Tok Jembal, Terengganu.

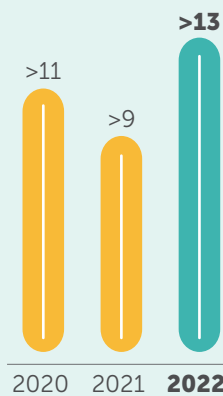
## Business Review

### Performance Highlights

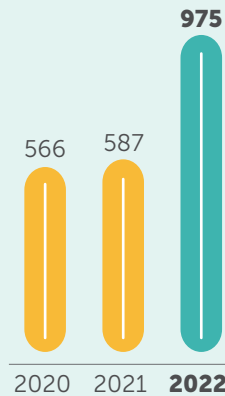
#### Investment in Technology (RM Mil) – Technology Delivery and R&D Budget



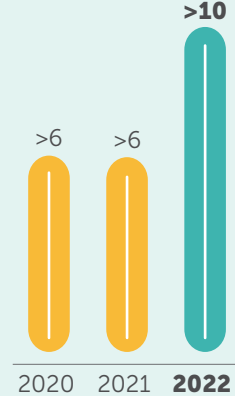
#### Portfolio size (including CAPEX and OPEX) (RM Bil)



#### Number of Projects



#### Value Creation (RM Bil)



### Risks and Challenges

#### Risks

- Sporadic global resurgence of COVID-19 and geopolitics disrupt the supply chain, impacting pace and cost.
- Shortage of critical talents to drive the non-traditional business sector to achieve targets.
- Gaps in agility towards meeting innovation requirements and lacking pace in adopting best practices will affect PETRONAS' competitive edge and diminution in projected returns.
- Shortcomings in innovation can leave current physical and intellectual assets obsolete and lack of cyber defence leaves assets vulnerable to attacks.

#### Mitigation Strategies

- Diversified suppliers based in vulnerable COVID-19 locations and identified alternative reliable supply points.
- Strengthened Crisis Management and Business Continuity Plans in meeting post-pandemic challenges.
- Identified and secured niche talents externally while developing employees with relevant skills in non-traditional business areas.
- Strengthened competitive advantage with in-house technology solutions meeting business needs and aspirations, guided by the PETRONAS Technology Management System (PTMS).
- Established a robust Intellectual Property (IP) Policy at enterprise level to protect our innovations and provide an orchestrated systematic approach to managing technology IPs effectively.
- Continuously strengthened Cyber Security governance through various measures including the enforcement of the PETRONAS Enterprise Cyber Security Framework, PETRONAS Cyber Security Incident Response Procedure and Cyber Security Ransomware Crisis Management.

**Risks and Challenges**

**Risks**

**Mitigation Strategies**

- Exchange knowledge on best practices and intelligence in the energy sector among the cybersecurity community.
- Continued talent capability advancement through upskilling and best-in-class recruitment policy.

**Growth Opportunities**

**Opportunities**

There is rising demand for digital and technology commercialisation.

Increasing trends in global innovation for decarbonisation to meet emissions capping targets.

Shape industry trends to improve human capability development/ talent pipeline.

**Our Approach**

- Achieved more than RM150 million in revenue, a five-fold increase compared to 2021.
- Conducted crowdsourcing and open innovation to identify decarbonisation solutions through Race2Decarbonise global hackathon to accelerate progress towards NZCE 2050 Pathway.
- Shaped International Oil and Gas Producers (IOGP) and Malaysian standards by leveraging our Technical Professionals.
- 50 per cent of our BeDigital Bootcamp participants secured employment offers from PETRONAS and our partners.
- Launched PETRONAS Career Resides in You (CARRY) Youth Outreach to increase awareness of the multitude of career opportunities within the energy industry.





## Business Review

### Our Approach to Sustainability

What We Did	Results
Intensified Technology Innovation.	<ul style="list-style-type: none"> <li>➤ Unlocked floating solar photovoltaic (PV) technology for the first open sea field deployment at Pulau Redang and Tok Jembal, Terengganu.</li> <li>➤ Established a joint framework with PETRONAS Chemicals Group (PCG) to develop Nitrile Butadiene Latex (NBL) technology capabilities.</li> </ul>
Accelerated progress of NZCE 2050 pathway.	<ul style="list-style-type: none"> <li>➤ Intensified and accelerated enterprise-wide decarbonisation through streamlined initiatives.</li> <li>➤ First-ever Race2Decarbonise aims to supplement the carbon abatement mission to cap emissions from Malaysian operations at 49.5 Million tCO<sub>2</sub>e by 2024.</li> <li>➤ Delivered PETRONAS' New Leadership Centre project                             <ul style="list-style-type: none"> <li>– Recorded the highest Green Building Index (GBI) score of 96/100.</li> <li>– Targeted to achieve the lowest Building Energy Index (BEI) in Malaysia at 62.61 kWh/m<sup>2</sup>/year.</li> </ul> </li> <li>➤ Entered into a collaboration with Tenaga Nasional Berhad (TNB) to drive innovative solutions towards decarbonisation in supporting Malaysia's aspiration to be a carbon-neutral nation by 2050.</li> <li>➤ PETRONAS Technical Services Sdn Bhd (PTSSB) collaborated with Green Project Management to jointly work on sustainability in project management focusing on capability building, processes and practices.</li> </ul>
Supported the nation's human capital development and digital economy initiatives.	<ul style="list-style-type: none"> <li>➤ Strengthened local graduates' digital literacy via BeDigital Bootcamp, organised by PETRONAS' Digital Academy.</li> <li>➤ Established the Sabah-PETRONAS Human Capital Development Agenda (HCDA) to build a sustainable talent pipeline for the state and the country.</li> <li>➤ Increased career awareness within the energy industry among youths via PETRONAS Career Resides in You (CARRY) Youth Outreach Programme.</li> </ul>

## Outlook

### Short Term (2023-2027)

PD&T will continue to advance PETRONAS' core business through Project Delivery Excellence, Asset Operational Excellence, expertise leadership and advancements in technology and engineering, as well as sustain and scale up our digital ecosystem.

Our short-term key focus areas include:

- Drive, intensify and accelerate decarbonisation efforts through all-around measures to support energy transition.
- Ensure technology investments support key business growth priorities in CCS, renewable energy, hydrogen and advanced materials.
- Intensify commercialisation of matured technologies and digital solutions.
- Establish an Artificial Intelligence Centre of Excellence (AI CoE) to accelerate the advancement in AI solutions that support energy delivery, operational efficiency and sustainability through collaboration with a network of global partners.

### Medium to Long Term

As PETRONAS' CoE and solutions partner of choice for the energy industry and beyond, PD&T will continue to identify innovative solutions to maintain its competitive edge, leveraging its expertise in project delivery, technology, technical and digital solutions, while ensuring safe and efficient operations throughout the value chain. PD&T will also drive, advocate and monitor enterprise decarbonisation to support PETRONAS in meeting its emissions reduction targets.

In accelerating towards a just energy transition, PD&T has fortified its Five-Year Strategic Plan (2023-2027) to drive sustainable growth, focusing on three key thrusts:

- Ensure continuous improvements in safety, reliability and efficiency through distinctive digital and technology solutions.
- Unlock and accelerate commercialisation opportunities to generate new revenue for the Group.
- Intensify research advancements and business ventures in the identified focus areas:
  - Circular economy: Repurpose waste into new products
  - Advanced materials: Strengthen asset integrity, extend service life and reduce overall carbon footprint
  - Improve decarbonisation: Manage and reduce GHG emissions from assets
  - Drive renewables: Support the growth of hydrogen to fast-track the energy transition
  - Advance specialty chemicals: Ensure progress in producing and utilising specialty chemicals beyond oil and gas into everyday consumer products.

Moving forward, we will continue to pursue technology and digital advances throughout our value chain to ensure we meet the Group's business goals and realise our NZCE 2050 pathway.