



Gas + New Energy



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Despite a challenging year in 2020, G+NE successfully weathered the storm by implementing agile measures to preserve value, optimise production and ensure our contractual obligations with our customers were met. We leveraged PETRONAS' integrated gas value chain to respond to price volatility and market challenges while continuing to expand our market presence. These efforts saw us make good progress by way of securing new natural gas sales and concluding liquefied natural gas (LNG) deals that encompassed contract extensions, new customer segments and expansion into new markets.

Today, as a reliable provider of cleaner energy solutions, G+NE with its expanded portfolio is well positioned to respond to the shifting needs of governments and customers as they move toward their goal of net zero carbon emissions. By tapping our strength as an adaptive organisation, we will endeavour to ensure long-term value creation for PETRONAS via innovative, sustainable and customer-centric solutions in LNG, gas, renewable energy and hydrogen.

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Adnan Zainol Abidin

Executive Vice President and Chief Executive Officer,
Gas + New Energy

In 2020, the LNG market was faced with oversupply and unprecedented low prices due to demand destruction. Against this backdrop, the Gas + New Energy (G+NE) business leveraged PETRONAS' robust integrated gas value chain and adaptive advantage, to switch from a traditional produce-and-sell approach to a demand-led approach to deliver innovative LNG and natural gas solutions. At the same time, we collaborated with our term buyers and provided flexible contractual terms, as well as introduced more accessible, affordable and sustainable cleaner energy solutions to our customers.

G+NE maintained its LNG sales volume at 33.1 million tonnes per annum (mtpa) and achieved an overall Operational Equipment Effectiveness (OEE) rate of 96.8 per cent. We also successfully delivered 11,547 cargoes to date, while our second floating LNG facility, PFLNG DUA, achieved its Ready for Start-Up (RFSU) milestone.

In Malaysia, PETRONAS Gas Berhad (PGB) went on to achieve top quartile performance in both energy index and maintenance costs, as well as sustained world class asset reliability propelled by its four-year strategic roadmap, 301Q99 Pushing Forward, which was launched in 2019 with clear goals to be achieved every year up to year 2022. In 2020, the identified efforts generated a RM97.7 million improvement in PGB's Profit Before Tax (PBT). On the back of these robust financial results, PGB declared total dividends amounting to 127 sen per share for the year (the highest dividend payout in the company's history) which translated into a dividend payout ratio of 125 per cent to its shareholders in 2020.

On the New Energy front and through M+ by PETRONAS, we rolled out rooftop solar solutions for commercial and industrial customers such as Lotuss Stores (previously known as TESCO) and for our own sites. Today, we have over 90-megawatt (MW) solar capacity under development and operation in Malaysia. Internationally, our subsidiary Amplus Energy Solutions (Amplus), has secured projects with over 900 MW of solar capacity under operation and development in India and Dubai.

In November 2020, G+NE established the Hydrogen business and signed a Memorandum of Understanding (MoU) with Sarawak Energy Berhad (SEB) to explore the commercial production of green hydrogen. Our venture into hydrogen builds upon our experience in extracting blue hydrogen from our facilities as well as our experience as a reliable LNG supplier.

The year also saw the energy transition to cleaner and more sustainable energy sources gather greater momentum as governments reaffirmed their commitment to achieving net zero carbon emissions by 2050 (NZCE 2050). In response to this, G+NE continues to strengthen its position as a one-stop-centre for cleaner energy solutions to meet future demand and requirements.



How We Created Value

1 Delivering Operational Excellence

The G+NE business segment, comprising the Liquefied Natural Gas (LNG), Gas & Power (G&P), New Energy and Hydrogen businesses, aims to deliver long-term value creation and profitable growth to PETRONAS and its partners.

Providing a Reliable and Competitive Natural Gas Supply

PETRONAS continues to make the case for natural gas as a crucial component of the global energy mix and LNG as a cleaner choice of fuel for our global customers. Natural gas provides clean, secure, reliable and flexible energy to drive the energy transition towards a sustainable future. It is also the ideal complementary fuel for renewable energy sources such as solar.

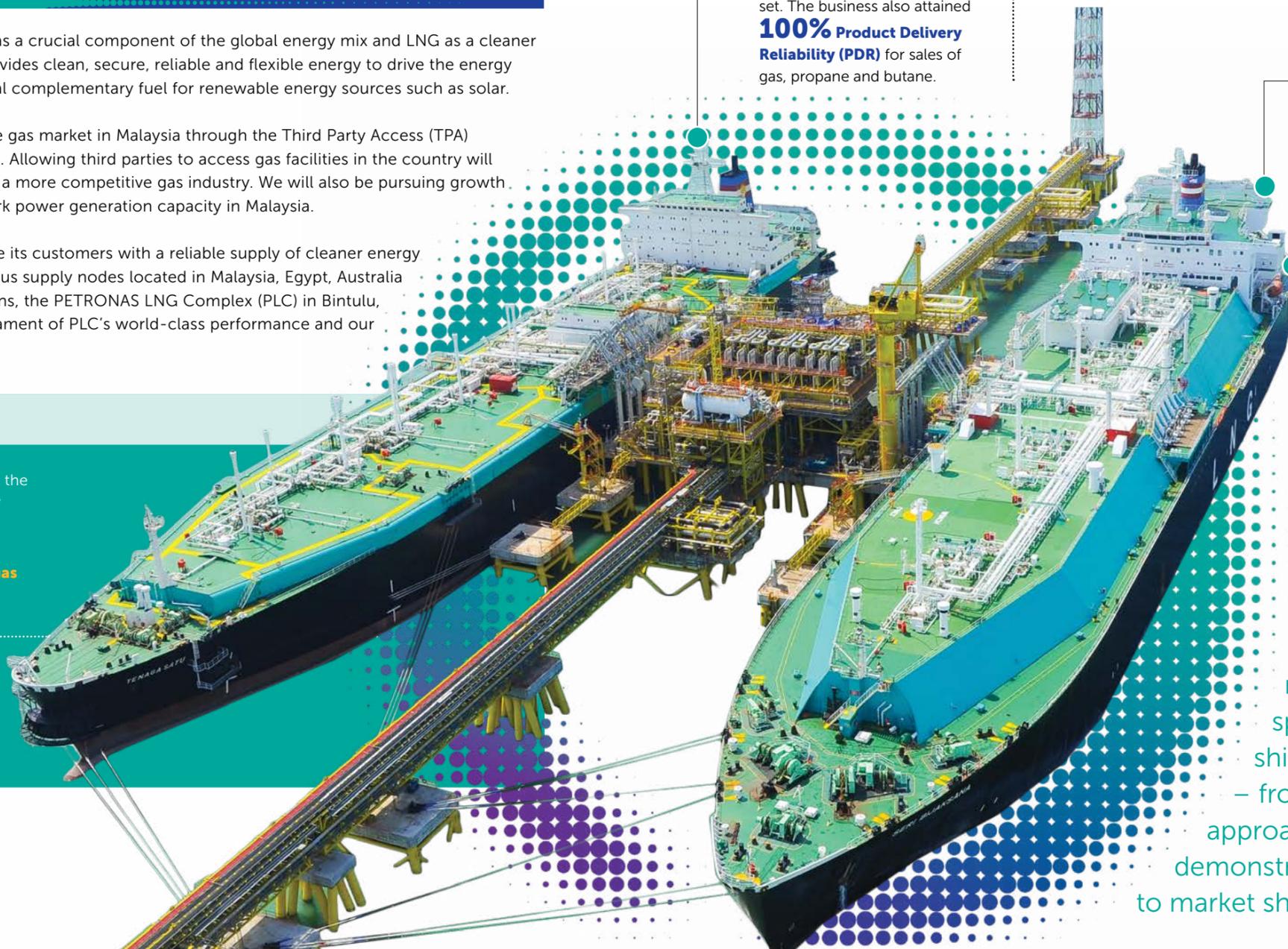
In Malaysia, PETRONAS supports the liberalisation of the gas market in Malaysia through the Third Party Access (TPA) mechanism governed by Malaysia's Energy Commission. Allowing third parties to access gas facilities in the country will contribute positively towards market-based pricing and a more competitive gas industry. We will also be pursuing growth opportunities leveraging on our integrated industrial park power generation capacity in Malaysia.

In the global LNG space, PETRONAS continues to assure its customers with a reliable supply of cleaner energy by leveraging on our global portfolio of assets and various supply nodes located in Malaysia, Egypt, Australia and, in the future, Canada. The bedrock of our operations, the PETRONAS LNG Complex (PLC) in Bintulu, Sarawak delivered its 11,547th LNG cargo in 2020, a testament of PLC's world-class performance and our focus on delivering operational excellence.

In Maximising Cash Generators, we:

Worked with the **Malaysia's Energy Commission** during the Movement Control Order (MCO) phase to ensure energy security by maintaining power sector sales gas offtake at a minimum of **600 million standard cubic feet per day (MMscfd)**, while securing new and extended **sales gas volume at 1,123 MMscfd**.

Produced **26.7 million metric tonnes (MMT)** of LNG and achieved gross LNG sales of **33.1 MMT**, to meet our customers energy requirements, despite the challenges posed by the pandemic.



We also accomplished the following in 2020:

Sustained **top quartile performance of our G&P and LNG assets** demonstrating our strength in operational excellence and enabling us to extract more from less in difficult market conditions. This saw us turning in a world-class operational performance on the gas processing, gas transportation, regasification and utilities fronts:

→ The gas processing business achieved an **Operational Equipment Effectiveness or OEE rate of 99.4%, 99.6%, 99.7% and 99.7%** for sales gas, ethane, propane and butane respectively – above the targets set. The business also attained **100% Product Delivery Reliability (PDR)** for sales of gas, propane and butane.

→ Our gas transportation business and utilities plant for steam, electricity and industrial gases as well as LNG regasification terminals achieved **100% reliability** and PDR respectively.

→ Our onshore gas and offshore floating LNG plants in Malaysia achieved an **overall OEE of 96.8%**.

Facilitated third-party shipper supply under the TPA for a **7 MMscfd capacity** at the offshore LNG Regasification Terminal Sungai Udang (RGTSU) and the Peninsular Gas Utilisation (PGU) gas pipeline network.

Bolstered shareholders' confidence via PGB's **total dividend payout of 127 sen per share including special dividend of 55 sen per share**, was achieved through the Group's focus on safety, reliability and efficiency of operations, despite the global pandemic.

Strong commercial excellence enabled G+NE to respond well to fundamental and emergent shifts in the market while at the same time maximising value. In the LNG space for example, a significant shift in our mode of operations – from a produce-and-sell approach to demand-led planning – demonstrated our agility in responding to market shifts.

2 Innovative, Customer-centric Solutions for Growth

We support the PETRONAS Group in its efforts to expand its existing markets and capture new markets through innovative, end-to-end customer-centric solutions across the cleaner energy value chain.

From Reliable Supplier to Innovative LNG Solutions Partner

With more than 37 years to our name as a reliable supplier of LNG and some 11,547 LNG cargoes delivered to date from the PETRONAS Integrated LNG Complex in Bintulu, Sarawak (one of the world's largest LNG production facilities in a single location with a total capacity of 29.3 mtpa), we continue to deploy innovative solutions to existing and new markets. The year saw G+NE **Maximising Cash Generators** by securing over 6.5 mtpa of LNG deals through innovative, end-to-end customer-centric solutions that opened up new routes-to-market to serve new customer segments.

In 2020, G+NE went on to deliver the following achievements:



PETRONAS Floating LNG SATU and DUA

PETRONAS continues to harness its capabilities in floating LNG (FLNG) technologies to monetise stranded gas fields and further augment Malaysia's resource investment potential. In 2020, PETRONAS became the first global energy company to own and operate two FLNG facilities, following the successful arrival of the PFLNG DUA at the Rotan gas field in Block H, offshore Sabah, where it has achieved its Ready for Start-Up (RFSU) milestone and progressing towards commercial operations. PETRONAS' first FLNG, PFLNG SATU, has delivered 38 cargoes to date since start of production in 2017. These floating facilities provide an environmentally-friendly alternative to conventional onshore plants, which would otherwise require sizeable tracts of land to build and whose longevity depends on the supply of nearby gas reserves.



Virtual Pipeline System (VPS)

This first-of-its-kind business solution for Peninsular Malaysia enables LNG to be supplied to small-scale customers and off-grid customers located away from the PGU gas pipeline network via trucks fitted with cryogenic tanks. In 2020, a total of 62 tanks of LNG were delivered via the VPS.



LNG Bunkering service via an LNG Bunkering Vessel (LBV)

PETRONAS is one of the first service providers in Southeast Asia to launch the LBV service. The maiden delivery saw LNG from our modified Floating Storage Unit 1 at RGTSU being loaded onto the MV Avenir Advantage, PETRONAS' first LNG bunkering vessel. The vessel then sailed for the ship-to-ship transfer to the SIEM Aristotle in the waters off Pasir Gudang in Johor. This solution underscores the Group's efforts to drive greater use of LNG as a cleaner and economically competitive source of energy in the marine industry as well as support the concerted efforts under the IMO 2020 Regulations to limit sulphur content in marine fuels.



LNG export via ISO tank

This customer-centric and pragmatic solution supports and enables greater accessibility to cleaner energy, particularly for remote customers located away from physical LNG pipelines and customers with smaller parcel requirements. Furthermore, the delivery of LNG via ISO tanks can also act as an agile backup solution to address importing terminal restrictions for large vessel deliveries. In 2020, we signed a long-term deal with Tiger Clean Energy Limited (TCEL) for the supply of LNG to TCEL's LNG ISO Tank filling facility at Bintulu for distribution to China.

Securing New Markets with Novel Solutions

By tapping PETRONAS' strength as an adaptive organisation, we endeavour to ensure long-term value creation and profitable growth for the Group and its partners by providing innovative, end-to-end customer-centric solutions that will help the Group secure new markets covering gas, renewable energy and hydrogen in the near future. The renewable energy developments that took place in the year under review were:

We introduced **Yelo (a last mile logistic provider)** in the B2B segment as a unique offering in the electric vehicle (EV) space in India.

Today, **Amplus is offering risk-free solar solutions to its customers via a service model** where Amplus invests its own capital to set up rooftop solar photovoltaic (PV) plants on customers' premises.

Amplus has also introduced innovative products that suit urban homeowners' needs to render their terrace space useful rather than occupying it with low height solar structures. Under the **HomeScope** brand, Amplus offers **real time and remote monitoring of solar generation and home energy consumption** on a HomeScope app.

Digitalisation at G+NE



Note: This photo was taken before the pandemic.

In 2020, several measures were taken to strengthen G+NE's digital focus and transformation. These included the following:

Implemented **PGB's Gas Processing Unit (GPU) Technical Centre (GTC)**, a centralised location empowered by digital that provides descriptive, predictive and prescriptive analyses to maximise plant reliability and prevent business interruptions.

Upgraded our signature **Alpha LNG** digital solution to enable demand-led production in order to improve the agility of our value chain amidst a volatile LNG market. To date, some **USD42.4 million** in value has been realised from data-driven planning and optimisation of scheduled deliveries.

Embarked on the digital transformation for our **RGTSU asset** to build a new way of working through step-changes in the terminal's digital operations. This entailed a **Unified Operation Centre, Virtual Asset Walkabout and JIT (Just in Time) Field Responder** which all led to improved operational efficiency.

Improved pipeline and Right-of-Way (ROW) encroachment monitoring through technological and digital means such as **PiriGIS, Drone, CCTV and Parameter Intrusion Detection System (PIDS)**.

3 Blazing a Trail on the New Energy Front

In line with PETRONAS' **Stepping-Out** strategy and NZCE 2050 aspiration, G+NE continues to make good progress in the energy transition by diversifying its suite of cleaner energy solutions. In 2020, we fast-forwarded our presence in the renewables and new energy space by making strategic moves into new areas of opportunity. The following are some of the developments that took place and are underway:

Bolstering Our End-to-End Solar Solutions Market Position

In Malaysia, PETRONAS is **focusing on rooftop solar solutions** for commercial and industrial customers via M+ by PETRONAS which has over 90 MW capacity under development. In 2020, a **total of 13 out of 15 Lotuss stores** (previously known as TESCO) across Malaysia were fitted with rooftop solar solutions. Upon completion, this initiative will help Lotuss reduce approximately **13,624 tCO₂e**.



We are also making good progress by way of cleaner energy generation in our own backyard. PETRONAS' assets and facilities including our retail stations, operations sites, as well as the Malaysia Marine and Heavy Engineering Holdings Bhd and Universiti Teknologi PETRONAS sites, are all being fitted with rooftop solar solutions. A **49 MW rooftop and ground mounted solar panel installation** is being planned for PETRONAS Refinery and Petrochemical Corporation (PRPC) and Projek Air Mentah RAPID (PAMER) as part of the PRPC Solar Master Plan located at Pengerang, Johor.



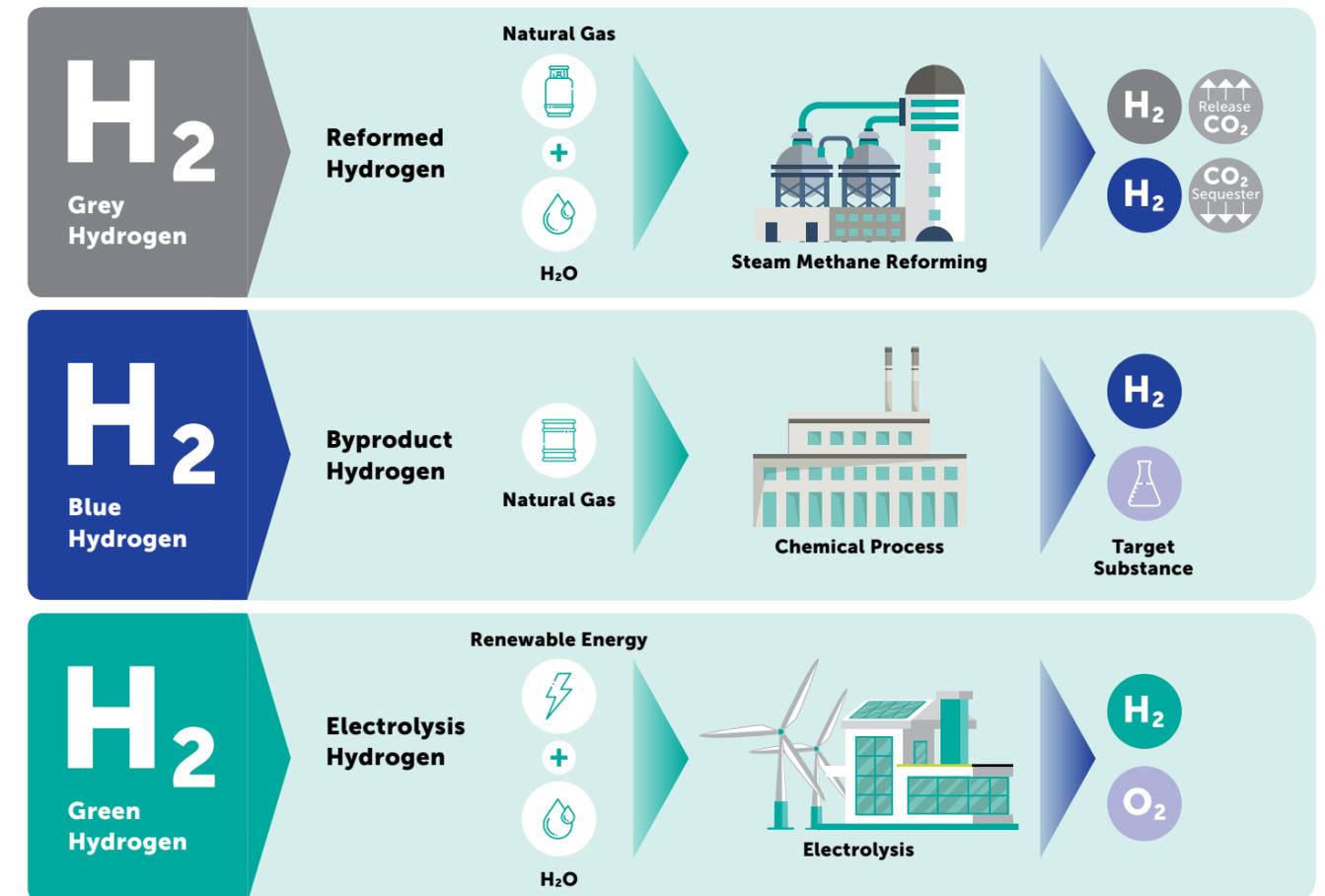
With **close to 1GW of solar capacity** projects under operation and development in India and Dubai, PETRONAS New Energy's wholly-owned distributed energy company, Amplus, continues to reinforce its position as a key regional clean energy provider. **Amplus** is now capable of providing cleaner energy to India's utility sector on top of its commercial, industrial and residential customers. It is also the first solar company in India to trade power online through the **Green Term Ahead Market (GTAM)** for electricity, a move that will spur participation in India's renewable energy sector.

We also encouraged PETRONAS' employees to transition to solar energy to power their homes with competitive solar solutions offered through the employee-exclusive **HomeScope by PETRONAS programme**. This resulted in the registration of a **total capacity of 3.2MW** for installation at the employees' homes in Peninsular Malaysia.

Hydrogen Solutions



G+NE rolled out its Hydrogen business through the signing of an MoU with Sarawak Energy Berhad (SEB) in November 2020, to explore the development of competitive green hydrogen production and a value chain to serve emerging markets in Asia. These efforts will supplement the low-carbon hydrogen that PETRONAS is already producing as a co-product at its facilities. PETRONAS has to date been involved in producing grey and blue hydrogen; and will now work with stakeholders to explore the production of green hydrogen.



Hydrogen is a clean and a versatile source of energy that can be used as an energy carrier as fuel for mobility, power and heating, as well as feedstock for industry. Grey hydrogen is produced using fossil fuels like natural gas and coal, which emit CO₂ into the air in the process. Blue Hydrogen is made in a similar manner using carbon capture technologies to prevent CO₂ from being released, enabling the captured carbon to be safely stored deep underground or utilised in industrial processes. Green hydrogen, the cleanest of these three varieties, produces zero carbon emissions. It is produced using electrolysis powered by renewable energy, like offshore wind, to produce a clean and sustainable fuel.



Moving into 2021, G+NE will execute PETRONAS' Three-Pronged Growth Strategy to push our four businesses forward. In line with the Group's Stepping-Out strategy and NZCE 2050 aspiration, G+NE continues to reinforce its position on the energy transition front by making strategic moves into new areas of opportunity in the cleaner energy space.

Having reviewed our business portfolio, G+NE as PETRONAS' one-stop-centre for cleaner energy solutions, is determined that moving forward, it will anchor itself on this winning formula, namely Operational Excellence, Commercial Excellence and Customer-centricity and Sustainability.

G+NE's focus on Operational Excellence will see us leveraging the years of experience we have accumulated, to enable us to ride out the current challenges brought on by the pandemic. Our current assets will continue to prioritise reliability and efficiency, while we will benchmark ourselves against industry leaders to match or surpass their performances. It is through these lenses that we will fulfil our role of maximising value through LNG and domestic gas sales. However, in our pursuit of operational excellence, there will be no compromise on safety, and it will continue to be one of our topmost priorities.

Commercial Excellence and Customer-centricity focuses G+NE's efforts on value-centric opportunities. It covers our existing business segment as well as our new growth engines.



The pace of global economic recovery post pandemic and governments' decarbonisation efforts will greatly influence the short-term and long-term energy supply demand outlooks. Gas + New Energy is well positioned to capitalise on the evolving market dynamics.

In our LNG business, as market leadership comes under pressure, we will be defending our core markets and getting expanding to new ones. To do so, our LNG marketing efforts and touch points with customers will be increased to truly provide innovative customer-centric solutions such as our VPS, LBVs and ISO tank solutions. This will enable us to capture opportunities in this period of low demand and amidst the global supply glut.

The Gas & Power (G&P) is also expected to continue facing a growingly competitive domestic market. While routes to increase sales are being explored including scaling up sales via VPS and LNG bunkering, we are also looking into

more fundamental shifts for the G&P business to realise its growth plans. In Malaysia, PETRONAS remains committed to support the gas market liberalisation and is working closely with the government to shape the future of gas demand through energy policy developments such as the National Energy Policy and Natural Gas Roadmap.

New Energy and Hydrogen, will serve as the new growth engines for G+NE. New Energy continues to gain momentum in both the domestic and international markets and is currently on track with its growth trajectory that is set to hit 3 gigawatts (GW) in 2024. This will be achieved through partnerships and acquisitions on top of building New Energy's capacities organically. With the increased push towards a green and sustainable energy, growth in this sector is expected to be substantial although competition is expected to intensify. Our focus markets in India, Malaysia and Asia Pacific offer sizeable opportunities and we hope to capture significant capacity from these markets. New Energy is expected to grow considerably in our portfolio to capture new value pools as well as contribute to our reduced emissions target.

For the Hydrogen business, we continue to set in place the building blocks to drive the business with the immediate target of exporting hydrogen from our existing facilities. Through partnerships, we are also making our move to become a competitive green hydrogen producer. The MoU with SEB to explore the commercial production of green hydrogen bodes well in supplementing the ongoing low carbon hydrogen production efforts. Additionally, pursuing low carbon solutions through renewables and hydrogen, lend support to our Sustainability Agenda as well as contribute to PETRONAS' NZCE 2050 aspiration.