



MANAGEMENT DISCUSSION & ANALYSIS 4Q2021 & YE2021



POWERING LIFE
with **FUTURE ENERGY** and **BEYOND**
ขับเคลื่อนทุกชีวิตด้วยพลังแห่งอนาคต

Management's Discussion and Analysis (MD&A) and operating result for the fourth quarter of 2021 and year ended December 31, 2021

Executive Summary

Unit : Million Baht	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	% Inc. (Dec.)
				YoY	QoQ			
Sales Revenue	407,174	558,888	688,837	69.2%	23.3%	1,615,665	2,258,818	39.8%
EBITDA	71,614	110,522	101,271	41.4%	(8.4%)	225,672	427,956	89.6%
Net Profit	13,147	23,653	27,544	>100.0%	16.5%	37,766	108,363	>100.0%
Earnings per share (Baht/share)	0.46	0.82	0.97	>100.0%	18.3%	1.32	3.79	>100.0%
Average Dubai Price	44.6	71.7	78.4	75.8%	9.3%	42.2	69.2	64.0%

In the fourth quarter of 2021 (4Q2021), PTT and its subsidiaries reported Earnings before Interest, Tax, Depreciation and Amortization or EBITDA in an amount of Baht 101,271 million, decreased by Baht 9,251 million or 8.4% from 3Q2021 at Baht 110,522 million mainly from the decrease in the performance of Petrochemical and Refining businesses due to lower petrochemical product spreads of both Aromatics and Olefins. Meanwhile, Refinery performance increased due to the higher Accounting Gross Refining Margin (Accounting GRM) from US\$ 3.2 per bbl in 3Q2021 to US\$ 5.9 per bbl in 4Q2021 following the increase in most of all petroleum product spreads. However, PTT Group's stock gain decreased approximately Baht 3,400 million because the crude oil prices increased in the lower extent compared to the previous quarter. The performance of Gas business also decreased mainly from Supply and Marketing business (S&M) and Natural Gas for Vehicles (NGV) businesses which had gas cost increased more than the selling prices despite Gas Separation Plant business (GSP) improved performance due to the rise of average selling prices following the higher referenced petrochemical prices. In addition, the performances of Exploration and Production business improved due to the increase in average selling prices. Net income of PTT and its subsidiaries' net profit in 4Q2021 amounting to Baht 27,544 million increased by Baht 3,891 million or 16.5% from net profit of Baht 23,653 million in 3Q2021 mainly because, in 4Q2021, there were lower loss on derivatives amounting to Baht 11,596 million and higher gain on foreign exchange rate amounting to Baht 11,544 million when compared to the previous quarter despite higher tax expense amounting to Baht 4,240 million. Moreover, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 6,931 million mainly from the impairment loss (after tax) of PTT Group's assets approximately by Baht 7,000 million primarily from PTT Exploration and Production Public Company Limited (PTTEP)'s exploration and production projects, PTT's NGV assets, and PTT Global Chemical Public Company Limited (GC)'s U.S. Petrochemical project. Moreover, there was PTT's recognition of Take or Pay of Myanmar gas to government according to the resolution of Committee on Energy Policy Administration (CEPA) approximately by Baht 2,700 million offset with PTT's benefit from discount from production shortfall approximately by Baht 1,700 million and gain on disposal of gas pipeline business in Egypt of PTT Energy Resources Co., Ltd (PTTER) approximately by Baht 1,400 million. While, in 3Q2021, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 459 million mainly from PTT's write-off on obsolete materials and supplies approximately by Baht 700 million.

In the fourth quarter of 2021 (4Q2021), PTT and its subsidiaries reported EBITDA in an amount of Baht 101,271 million, increased by Baht 29,657 million or 41.4% when compared to 4Q2020 of Baht 71,614 million mainly from the increase in Exploration and Production business's performance due to higher average selling prices and sales volume primarily from the acquisition of Oman Block 61 in March 2021 and the first gas production in February 2021 of Malaysia Block H project. Petrochemical and Refining business's performance increased due to improved Refining business's performance as Accounting GRM increased, from US\$ 2.5 per barrel in 4Q2020 to US\$ 5.9 per barrel in 4Q2021 following higher spread of most products from easing of lockdown as well as higher sales volume despite the decrease in Petrochemical business's performance due to the drop in Olefins product spreads. Moreover, Gas business's performance improved primarily from the GSP businesses due to the higher average selling prices following the rise in referenced prices despite the increase in gas cost as aforementioned. Net income of PTT and subsidiaries in 4Q2021 was Baht 27,544 million, which increased by Baht 14,397 million or more than 100.0% from the net profit amounting to Baht 13,147 million in 4Q2020 in line with the improved EBITDA. In addition, in 4Q2021, there were lower loss on derivatives amounting to Baht 4,412 million despite lower gain on foreign exchange rate amounting to Baht 3,672 million and higher income tax expenses amounting to Baht 11,306 million. Moreover, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 6,931 million in 4Q2021 as aforementioned; whereas, in 4Q2020, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 7,696 million mainly from the impairment loss on asset (after tax) approximately by Baht 8,000 million mainly from PTT Global Management Company Limited (PTTGM)'s coal mining and PTTEP's Yetagun project.

For the year 2021, PTT and its subsidiaries reported EBITDA of Baht 427,956 million, increased by Baht 202,284 million or 89.6% when compared to 2020 of Baht 225,672 million. This was mainly from Petrochemical and Refining businesses which significantly improved from the increase in Accounting GRM, from loss US\$ 0.4 per barrel in 2020 to gain US\$ 5.1 per barrel in 2021. In addition, petrochemical product spreads both of Olefins and Aromatics were increased. Besides, PTT Group had stock gain approximately by Baht 46,000 million in 2021 following the rise of crude oil price, while in 2020, there was stock loss approximately by Baht 19,000 million. Furthermore, Exploration and Production business's performance enhanced according to the higher sales volume and average selling prices. The performance of Gas business increased mainly from GSP and S&M businesses due to the higher average selling prices and sales volume. Moreover, International Trading business's performance increased from the improved spreads of domestic crude and condensate together with the higher sales volume. Net income of PTT and its subsidiaries in 2021 was Baht 108,363 million increased by Baht 70,597 million or over 100.0% from Baht 37,766 million in 2020 in line with the improved EBITDA. Conversely, in 2021, there were higher loss on derivatives amounting to Baht 34,224 million and higher loss on foreign exchange rate amounting to Baht 15,739 million together with higher income tax expenses amounting to Baht 42,424 million. In addition, in 2021, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 6,945 million mainly from PTT's Group impairment loss after tax approximately by Baht 9,000 million from PTTEP, PTT, and GC as aforementioned. Also, there were PTTEP's partial write-off of the assets in the exploration project in Brazil approximately by Baht 2,900 million and PTT's recognition the return of Take or Pay benefit approximately by Baht 2,700 million. While, there were PTTEP's gain on bargain purchase in Oman Block 61 approximately by Baht 7,000 million, PTT's benefit from discount from production shortfall approximately by Baht 1,700 million, and gain on disposal of gas pipeline business in Egypt of PTTER approximately by Baht 1,400 million. Meanwhile, in 2020, there was the loss from non-recurring items (PTT's portion after tax) amounting to Baht 9,478 million mainly from

impairment loss on assets approximately Baht 9,000 million from PTTGM's coal mining and Exploration and Production Projects of PTTEP.

As of 31 December 2021, PTT and its subsidiaries had the total assets amounting to Baht 3,078,019 million, increased by Baht 533,836 million or 21.0% from 31 December 2020 which had total asset amounting to Baht 2,544,183 million mainly from the increase in intangible assets and goodwill from the acquisition of Allnex Holding GmbH (Allnex) of GC. Furthermore, property, plant, and equipment increased mainly due to PTTEP's business acquisition of Oman Block 61. In addition, trade accounts receivable and inventories increased from the higher product prices. The long-term investments also increased mainly from the investment in PT Chandra Asri Petrochemical Tbk (CAP) of TOP and Avaada of Global Power Synergy Public Co., Ltd (GPSC). Whereas, the total liabilities were recorded at Baht 1,605,079 million, increased by Baht 346,741 million or 27.6% from the increase in the short-term and long-term loans amounting to Baht 154,322 million mainly from long-term loan and bond issuances of GC, PTT, and TOP together with the increase in accounts payable following the increase in product purchased prices. The total shareholders' equity as of 31 December 2021 was Baht 1,472,940 million, increased by Baht 187,095 million or 14.6%, mainly from the increase in PTT and its subsidiaries' net income of 2021 and PTT Oil and Retail Business Public Company Limited (OR)'s capital increase offset with dividend payment from the operating results of the second half of 2020 and the first half of 2021.

Economic Overview in the Fourth Quarter of 2021

The world economy in 4Q2021 recovered at a slower rate from 3Q2021 mainly due to the spread of the COVID-19 both the Delta as the main variant and the Omicron which began to spread rapidly in December. As a result, several countries were moving to reimpose tougher COVID-19 containment measures and restrict international travel again. In particular, China has imposed draconian measures under its zero-tolerance COVID-19 policy, which further prolongs the shortages of key inputs and global supply chain disruptions. Those supply-side constraints coupled with a rise in demand during the festive season, resulted in accelerated commodity prices, especially energy prices, putting pressure on inflation to increase continuously in several countries. While, many central banks have tightened their monetary policies, including, the Federal Reserves (the Fed) that gradually reduced their massive asset purchases in accordance with Quantitative Easing (QE) tapering since 4Q2021 and signaled plans to begin raising interest rates further. Moreover, there is a pressure from Chinese government's strict measures to restructure their economy, both from tightening regulation for loans to the real estate sector and power shortages due to the strict emission control measures as well as the increase in energy cost. However, a widespread acceleration of the vaccination and the massive government stimulus packages still support economic recovery. The International Monetary Fund (IMF) in January 2022 maintained its global growth forecast for 2021 at 5.9%.

According to IHS Markit (IHS) report of January 2022, global oil demand in 4Q2021 was averaged at 99.5 million barrels per day (MMBD), increasing from 3Q2021 at 98.7 MMBD and from 4Q2020 at 94.7 MMBD amid easing lockdown measures, following effective vaccine rollout especially in Asia. It is also resulted from economic stimulus packages and higher gas prices which lead to the increase of oil demand. However, COVID-19 Omicron will keep pressuring the increase of oil demand especially in Europe. In 2021, global oil demand is expected to be averaged at 96.8 MMBD, increasing from 2020 at 91.0 MMBD.

Unit : US\$/barrel	4Q2020	3Q2021	4Q2021	% Inc. (Dec.)		2020	2021	% Inc. (Dec.)
				YoY	QoQ			
Average Dubai crude oil price	44.6	71.7	78.4	75.8%	9.3%	42.2	69.2	64.0%
Gasoline Crack Spread	4.1	11.8	15.4	>100.0%	30.5%	4.4	11.0	>100.0%
Diesel Crack Spread	3.7	5.4	11.4	>100.0%	>100.0%	6.1	6.7	9.8%
FO Crack Spread (180 – 3.5%S)	(0.6)	(3.4)	(6.9)	<(100.0%)	<(100.0%)	(3.0)	(4.9)	(63.3%)
GRM-Singapore Crack	1.2	3.8	6.1	>100.0%	60.5%	0.4	3.4	>100.0%

Dubai oil price in 4Q2021 was averaged at US\$78.4 per barrel, increasing from 3Q2021 at US\$71.7 per barrel, and from 4Q2020 at US\$44.6 per barrel, following demand increase especially in Asia amid reopening plan after COVID-19, economic stimulus packages and effective vaccine rollout. Also, higher gas prices drove additional gas to oil switching

demand. On the downside, resurgence of COVID-19 Omicron kept pressuring on the increase of oil demand during the end of 4Q21.

Petroleum product prices at Singapore spot market

- **Gasoline crack spread** in 4Q2021 was averaged at US\$15.4 per barrel, increasing from 3Q2021 at US\$11.8 per barrel and from 4Q2020 at US\$4.1 per barrel amid increasing demand from easing lockdown measures as the mobility index already get back to pre-COVID-19 level especially in Asia. It is also supported by gasoline inventory which stay lower than five-year average level, even though the level recently picks up at the end of the quarter. On the other hand, end of driving season in US and resurgence of COVID-19 Omicron put pressure on upcoming crack spread.
- **Diesel crack spread** in 4Q2021 was averaged at US\$11.4 per barrel, increasing from 3Q2021 at US\$5.4 per barrel and from 4Q2020 at US\$3.7 per barrel amid increase of diesel demand from the easing lockdown measures and economic recovery especially in Asia. In addition, diesel crack spread also got support by higher LNG price and upcoming winter season of North Asia especially Japan resulted in lower than five-year average diesel inventory. However, the rise of COVID-19 Omicron especially in Europe and back-from-turnaround refineries will put pressure on the crack spread.
- **Higher Sulfur fuel oil 3.5% crack spread (HSFO)** in 4Q2021 was averaged at US\$ -6.9 per barrel, decreasing from 3Q2021 at US\$ -3.4 per barrel and from 4Q2020 at US\$ -0.6 per barrel amid ending summer season in Middle East and South Asia resulted in lower power demand. In addition, increasing HSFO supply in Asia from Europe and back-from-turnaround refineries also put pressure on crack spread. On the other hand, HSFO crack spread got support by low HSFO inventory.

Singapore Gross Refining margin (GRM) in 4Q2021 was averaged at US\$6.1 per barrel, increasing from 3Q2021 at US\$3.8 per barrel, and from 4Q2020 at US\$1.2 per barrel amid increasing product demand in US, Asia, and Europe especially in gasoline and diesel. In addition, high LNG price leads to increasing product demand for power generation. However, COVID-19 Omicron and increasing refineries run will put pressure on Singapore GRM.

Unit : US\$/Ton	4Q2020	3Q2021	4Q2021	% Inc. (Dec.)		2020	2021	% Inc. (Dec.)
				YoY	QoQ			
HDPE: CFR SEA	1,000	1,138	1,252	25.2%	10.0%	880	1,182	34.3%
PP: CFR SEA - Film	1,142	1,250	1,335	16.9%	6.8%	992	1,321	33.2%
BZ: FOB Korea	529	993	945	78.6%	(4.8%)	485	914	88.5%
BZ: FOB Korea Spread	121	318	200	65.3%	(37.1%)	106	268	>100.0%
PX: CFR Taiwan	561	919	893	59.2%	(2.8%)	577	859	48.9%
PX: CFR Taiwan Spread	153	243	148	(3.3%)	(39.1%)	198	213	7.6%
Naphtha (MOPJ)	408	676	745	82.6%	10.2%	380	646	70.0%

Petrochemical prices of Olefins in 4Q2021 rose from 3Q2021, while petrochemical prices of Aromatics softened from the previous quarter.

- **Olefins:** High density polyethylene (HDPE) and polypropylene (PP) increased from 3Q2021, due to the rise in crude and naphtha prices together with the delay of new capacities. Additionally, the increase in seasonal demand from online shopping activities also support the price. However, the decision to keep inventory lean toward the end of the year limited prices upside at the year end.
- **Aromatics:** Benzene (BZ) price and BZ spread over naphtha decreased from 3Q2021, following a slowdown in demand from styrene monomer (SM) producers due to the dramatically drop in SM price, as well as concerns over the strict dual control policy that impacts Chinese downstream demand, amid the pressure from the continued increasing in China's inventory. Meanwhile, BZ supply in Asia increased due to the use of naphtha as feedstock for production. Paraxylene (PX) price and PX spread over naphtha decreased from 3Q2021, following a slowdown in downstream market for both Purified terephthalic acid (PTA) and Polyester in China, due to concerns over the strict dual control policy. Besides, an increase of PX supply in China and the remaining high inventory level put pressure on PX price.

Comparing to the same period of last year, petrochemical prices of Olefins and Aromatics increased, following a surged in crude and naphtha prices as well as higher demand boosted by a gradual global economic recovery, and the widespread of global COVID-19 vaccination amid less restrictive of COVID-19 measures compared to the same period last year.

Thai economy in 4Q2021 recovered from 3Q2021, as merchandise exports continued to expand in line with the recovery of trading partner economies and private consumption recovered due to easing lockdown restrictions, amid greater access to vaccines among Thai citizens. Besides, government spending continued to support growth. Moreover, tourism sector also recovered, as the government introduced quarantine free entry to fully vaccinated visitors from low risk countries (Test & Go scheme) since 1 November 2021. However, Omicron outbreak in December 2021 prompted a temporary suspension of Test & Go scheme from 21 December 2021 onwards. Moreover, the flooding in some areas during September to November added to growth risks. The Fiscal Policy Office, in January 2022, revised up its Thai economic expansion forecast for 2021 to 1.2%, from its previous estimate of 1.0% in October 2021.

Non-recurring items in 2021 until present



Summary of non-recurring items in 2021 until present are as follows:

January 2021

- PTT: On 1 January 2021, the retail price of NGV for public transportation vehicles was adjusted to be similar to retail price of private vehicles. Consequently, NGV retail price for all vehicles will base on cost-plus pricing structure.
- PTT: On 8 January 2021, Mekha Technology Co., Ltd. was established by Alpha Com Co., Ltd. (“Alpha Com”) which is a wholly owned subsidiary of PTT with the registered capital of Baht 30 million. The objective of the company establishment is to investment in the business of Public Cloud which provides various types of information system services via the Internet including data storage, data processing, and data management to companies, organizations as well as PTT group which is aligned with PTT's investment strategy in Digitalization.
- PTT & OR: On 14 January 2021, OR's Registration Statement and Draft of Prospectus, as filed with the Office of the Securities and Exchange Commission, has become effective, with the total amount of the newly issued ordinary shares up to 3,000 million shares. The final offering price is Baht 18.00 per share. The share's allocation structure as follows;
 - For PTT's existing shareholders: offering to the eligible shareholders of PTT as recorded in PTT's share registered book as of the Record Date (5 January 2021) with allocate up to 300 million shares. The pre-emptive ratio is 95.1997 PTT ordinary shares per 1 newly issued ordinary share of OR.
 - For domestic subscribers: offering approximately 1,860 million shares which allocating to retails investor approximately 595.7 million shares, and institutional investors approximately 1,264.3 million shares.
 - For foreign subscribers: offering approximately 450 million shares to institutional investors.
 - For the over-allotment: an additional up to 390 million shares.
 - On 11 February 2021, OR's securities first traded in the Stock Exchange of Thailand.
 - According to the Initial Public Offering (IPO) of OR, totaling 3,000 million shares, the trading price of OR's shares was not fallen below the IPO price of Baht 18 per share. Consequently, the Over-allotment Agent does not need a process to maintain the price level. On 16 March 2021, OR completed its registration of the increase to the paid-up capital, and the Over-allotment Agent returned OR's shares amounting to 390 million shares to PTT. As a result, OR's total paid-up capital is amounted to Baht 120,000 million with total issued ordinary shares of 12,000 million shares at the par value of Baht 10 per share. The OR's ordinary shares held by PTT is totaling 9,000 million shares or equivalent to 75% of OR's total outstanding ordinary shares.
- GC: On 26 January 2021, the Board of directors on 22 October 2020 has approved the Company's plan to invest in the Olefins 2 Modification Project which will allows GC to increase

Propane usage as feedstock and enhance feedstock flexibility and long-term competitiveness. The total investment of this project is approximately USD 165 million or equivalent to Baht 5,198 million and expect to start the commercial operation within the first quarter of 2023.

February 2021

- **PTTEP:** On 1 February 2021, PTTEP MENA Limited (a subsidiary of PTTEP) has signed a Sale and Purchase Agreement (SPA) to acquire 20% of BP Exploration (Epsilon) Limited (“BP”)’s interest in Block 61 of Oman. The transaction value of this acquisition is approximately USD 2,450 million and the transaction was completed on 23 March 2021. Oman Block 61 has the capacity to deliver approximately 35% of total gas output in Oman. The project is expected to develop 10.5 trillion cubic feet of gas resources, with a combined daily production capacity of 1.5 billion cubic feet of gas and more than 65,000 barrels of condensate.
- **GPSC:** On 8 February 2021, GPSC has entered into the capital increase agreement with Anhui Axxiva New Energy Technology (“AXXIVA”) of the People’s Republic of China with total investment of approximately Baht 500 million for acquisition of around 11.1% of equity interest in AXXIVA after such capital increase. AXXIVA operates a battery manufacturing business at production capacity of 1 GWh per annum using the technology license of 24M Technologies Inc.
- **PTTEP:** On 10 February 2021, PTTEP HK Offshore Limited (Malaysia Branch) (“PTTEP HKO”), a wholly-owned subsidiary of PTTEP, has completed the Lang Lebah-2 appraisal well in the Sarawak 410B Project. The appraisal well has the proven over 600 meters of net gas pay. The well test shows a flow rate of 50 million cubic feet of gas per day (MMSCFD).
- **PTTEP:** On 16 February 2021, PTTEP Sabah Oil Limited, a wholly-owned subsidiary of PTTEP, and its joint venture partners have completed the development of the first phase of Block H Project. Natural gas production from Rotan and Buluh deepwater fields of the Block H under the production sharing contract, has commenced on 6 February 2021, for delivering to PETRONAS Floating Liquefied Natural Gas-2 (“PFLNG2”) facility with a maximum production capacity of 270 MMSCFD as its target.
- **PTT:** On 18 February 2021, Alpha Com has completed the establishment of On-I on Solutions Co., Ltd. (“On-I on Solutions”)(later changed the name to ARUN PLUS Co., Ltd. (“ARUN PLUS”), a wholly owned subsidiary of Alpha Com, with the registered capital of Baht 30 million later increased its registered capital to Baht 5,000 million). The company will be responsible for operating in EV value chain business in accordance with New S-Curve strategy to support PTT’s expansion plan in EV business.
- **PTT:** On 21 February 2021, PTT has completed the establishment of PTT MEA Ltd. in the United Arab Emirates, which is wholly owned by PTT International Trading Pte., Ltd. (“PTTT”) (a subsidiary of PTT), with the registered capital of USD 1.5 million. The objective of the

establishment is to operate the international trading business especially in the Middle East and Asia region.

- **PTT:** On 25 February 2021, the Central Administrative Court rendered a judgment to dismiss the case that the Ombudsman filed a lawsuit against the Ministry of Finance and others, totaling 11 parties, including PTT. The complaint alleged that the separation and transfer of assets in accordance with the Supreme Administrative Court was not in compliance with the Cabinet's Resolution on 18 December 2007. Consequently, the Central Administrative Court rendered a judgment to dismiss the case on the ground that the issues presented in this case are the same issues in which the Supreme Administrative Court rendered the final judgment and; therefore, the Central Administrative Court is prohibited from reconsidering such issues. The judgment is consistent with the Supreme Administrative Court and the subsequent orders of the Court in various cases that PTT and the relevant government agencies completed the separation and transfer the assets to the Ministry of Finance.

March 2021

- **PTT:** On 8 March 2021, PTT has completed the deregistration of PTT International Trading DMCC ("PTTT DMCC"), a wholly owned subsidiary of PTT. PTT DMCC was established for international trading business in petroleum products in the United Arab Emirates. However, PTT has adjusted the strategy of the petroleum product transactions in the United Arab Emirates, which PTT DMCC reduced its commercial operation and focused only on taking care of the relationship with the business partners. The resolution of PTT DMCC's deregistration is aligned with PTT's strategy in closing down the dormant companies and did not affect PTT's business operation.
- **PTT&IRPC:** On 18 March 2021, PTT passed the resolution of the establishment of Innopolymed Company Limited, which is a joint venture between Innobic (Asia) Company Limited ("Innobic") (wholly owned subsidiary of PTT) and IRPC, with a registered capital of Baht 260 million. The Innopolymed Company Limited is 40% stake held by Innobic and 60% stake held by IRPC. The objective of the establishment is to manufacture and sell Non-Woven Fabric products as well as medical consumables, which is aligned with PTT's new business strategy in Life Science. The Company's registration was completed. The commercial operation is expected to start within the first quarter of 2022.
- **GC:** On 19 March 2021, GC cooperated with AGC Inc. in relation to the proposed delisting of securities of Vinythai Public Company Limited (VNT) from the Stock Exchange of Thailand (SET), in which the Company will make a tender offer for all ordinary shares in VNT (excluding the ordinary shares in VNT currently held by GC) in the amount of 889,154,755 shares, representing 75.02% of the total number of issued and paid-up shares in VNT at the tender offer price of Baht 39 per share. However, on 21 December 2021, GC reported that AGC Inc. has expressed an intention not to sell the ordinary shares held by AGC Inc., and on 21 January

2022, GC report the result of tender offer which accounted for 0.39% of total shares, resulting in GC currently having a total shareholding of 25.37% (from existing 24.98%) and AGC Inc. is a 58% direct shareholder with control over VNT's business.

April 2021

- PTT: On 9 April 2021, the annual general meeting of shareholders approved the dividend payment from 2020 performance which will be paid at Baht 1.00 per share to the shareholders of totaling 28,562,996,250 shares in an approximated amount of Baht 28,563 million. The dividend payments are divided into the interim dividend payment from the first half of 2020 performance which PTT had already paid to shareholders at Baht 0.18 per share. PTT also paid the dividend from the second half of 2020 performance at Baht 0.82 per share on 30 April 2021.
- PTT: On 16 April 2021, Board of Directors of PTT and Lotus Pharmaceutical Company Limited (Lotus), the Taiwan listed company on TWSE, approved the investment in Lotus' newly issued shares by Innobic LL Holding Co., Ltd., which is a wholly owned subsidiary of Innobic (Asia) Co., Ltd., in an amount of 17,517,348 common shares at NTD 80.7 per share and the total investment is approximately USD 50 million. After the aforementioned subscription of Lotus' newly issued shares, Innobic LL Holding Co., Ltd. has a stakeholding in Lotus at 6.66% of the total registered and paid-up capital. On 18 November 2021, PTT's Board of Directors Innobic to join with Aztq HK Limited, the affiliate of Aztq Investment Group to acquire all stakes in Alvogen Emerging Markets Holdings Limited, a major shareholder of Lotus and also holds 100% stake in Alvogen Malta (Out-Licensing) Holding Limited who owns 100% of the company so called Adalvo Limited ("Adalvo"), B2B pharmaceutical company with the massive global network. The total consideration of the transaction is approximately USD 475 million with an expected closing date in 1Q2022. After the closing date, Innobic will then has an indirect shareholding in Lotus Pharmaceutical of approximately 37% of the total issued capital and 60% of the total issued capital in Adalvo. The objective for the investment is to align with PTT's New S-curve strategy in expanding into new business especially in Life Science area. Lotus is a fully integrated pharmaceutical company that focuses on research and development, manufacturing, and distribution of Generic drugs that cover therapeutic areas especially oncology and central nervous system. This investment will enable PTT to expand into addressable markets of oncology portfolio as well as the strong global network and commercialization capabilities will reinforce business expansion not only in Asia but also globally.
- PTT: On 19 April 2021, Energy Complex Company Limited ("EnCo") (a subsidiary of PTT) is the bidding winner of land with buildings, Thai Airway Crew Center at Lak Si district in Bangkok of Thai Airway International Public Company Limited in order to support PTT group's business expansion at Baht 1,810 million.

- **PTT&GC:** On 22 April 2021, PTT's Board of Directors Meeting approved the shareholding restructure of PTT's power business. PTT and Siam Management Holding Company Limited ("SMH"), a wholly-owned subsidiary of PTT will purchase 358,936,756 shares of GPSC or equivalent to 12.73% of GPSC's total issued and paid-up shares, from GC, for the value of Baht 70 per share or total approximately Baht 25,126 million. Before the transaction, PTT owns 31.72% and GC owns 22.73% of GPSC's total issued and paid-up shares. After this transaction, PTT and SMH will own 44.45% and GC will own 10.00% of GPSC's total issued and paid-up shares. The Restructuring Transaction will enable PTT to increase its investment in the power business through flagship company which align with PTT's strategy. The Share Purchase Agreement of GPSC's common shares was signed in May 2021 and the transfer of the shares in GPSC to relevant parties was completed on 8 June 2021.
- **PTTEP:** On 26 April 2021, TOTAL E&P Mozambique Area 1 Limitada, the operator of the Mozambique LNG Project and holds 26.5% participating interest has declared Force Majeure for safety reason referring to recent security situation in the city of Palma, Mozambique. PTTEP Mozambique Area 1 Limited, a wholly owned subsidiary of PTTEP, holds 8.5% participating interest in this project. It is expected that it will be able to return to operations in 2022.
- **TOP:** On 26 April 2021, TOP's Board of directors has approved TOP Solvent Company Limited ("TS") (a subsidiary of TOP) to purchase the shares for investment in JSKEM Private Limited ("JSKEM") up to 80% of total shares from the existing shareholders and 1 share in TOP Solvent India Chemtrade ("TSI") which is a subsidiary of JSKEM from the existing shareholder for the amount up to USD 1.44 million, or approximately Baht 45.36 million. TS and JSKEM's shareholders signed the Share Purchase Agreement on May 2021 and completed the share transfer on July 2021. JSKEM is the distributor of solvent and chemical products in the Republic of Singapore. Furthermore, the abovementioned investment is the overseas expansion of solvent distributor business.
- **TOP:** On 30 April 2021, TOP has completed the restructuring of marine transport business unit. TOP disposed of and transferred all ordinary shares in Thairoil Marine Company Limited ("TM") to the buyer at the total share purchase price of Baht 858.60 million, leading to TM's termination as a subsidiary of TOP.

May 2021

- **OR:** On 11 May 2021, ORBIT Digital Company Limited was established with the initial registered capital of Baht 100,000 which is a joint venture between Modulus Venture Company Limited ("Modulus") (a subsidiary of OR), and Bluebik Group Public Company Limited at 40% and 60% of the registered capital respectively. The objective of the ORBIT is to enhance technological and innovative capabilities as well as competitiveness and increase value through digital business development.

- PTT: On 20 May 2021, PTT's Board of Directors has approved on the following;
 - Approved Innobic to establish a new joint venture company with Nove Foods Company Limited (a subsidiary of NR Instant Produce Public Company Limited: NRF) with the registered capital not in excess of Baht 300 million. Innobic and Nove Foods Company Limited will equally hold 50% stakes in this joint venture company. The investment objective aims to operate alternative proteins business that the initial phase will cover the entire supply chain of Plant-based Proteins from the development, manufacture, and distribution. The manufacturing plant using state-of-the-art imported technology will be based in Thailand with a production capacity of 3,000 tons per year. The company completed its registration on 25 August 2021 and start its commercial operation within the first quarter of 2023.
 - Approved the establishment of T-ECOSYS Company Limited ("T-ECOSYS"), which is 100% owned by SMH, with a registered capital of Baht 350 million. The objective is to operate the industrial digital platform business under the cooperation between PTT and the Ministry of Industry, together with the Industrial Estate Authority of Thailand, the Board of Investment Office (BOI), financial institutions, etc. The Platform is created as an Ecosystem for service providers and customers who want access to robotics, automation systems, and digital technologies through the Industrial Digital Platform ("IDP") which is developed by PTT. The company is expected to complete its registration by 2022.
- PTTEP: On 21 May 2021, AI and Robotics Ventures Company Limited ("ARV"), a subsidiary of PTTEP, in partnerships with Aerodyne Group ("Aerodyne") from Malaysia and Digital Creation Co., Ltd. ("DC") has launched a joint venture company "AeroSky (Thailand) Company Limited" (AeroSky) with a registered capital of 30 million Baht and its shareholding proportion will consist of ARV at 33%, Aerodyne Group at 34% and DC at 33%. AeroSky will provide state-of-the-art drone-based enterprise solutions across the Thai market, including clients in the telecoms, electricity, oil & gas, and other infrastructure-led industries.
- OR: On 25 May 2021, OR's Board of Directors has passed a resolution to extend the contract of business collaboration with CP All Public Company Limited to operate convenience store (7-Eleven) in PTT Station network in Thailand with the extension period of 10 years. The objective of the contract extension is to continue in 7-Eleven operation in PTT Station network and in line with OR's business plan.

June 2021

- GPSC: On 14 June 2021, established Global Renewable Synergy Company Limited ("GRSC") which GPSC holds a 100 percent stake and has an initial registered capital of Baht 1 million. The objective is to support an investment in renewable energy abroad.
- GPSC: On 16 June 2021, GPSC's Board of Directors has approved to enter into the long-term loan agreement between GPSC and/or GPSC Treasury Center Company Limited ("GPSC TC") and PTT and/or PTT Treasury Center Company Limited ("PTT TCC") in the amount not

exceeding Baht 20,000 million, contract period not more than 3 years and at the comparable to the market interest rate which is not more than 3.00% per year. The objective is to support for investment in renewable energy abroad.

- **PTT:** On 17 June 2021, PTT's Board of Directors has approved to extend the reduction of liquefied petroleum gas (LPG) price for low-income people, shops, hawkers and food stalls who holding the state welfare cards in the amount of Baht 100 per person per month for another 6 months starting from 1 July 2021 to 31 December 2021. This price reduction aims to help reducing the cost of living during COVID-19 pandemic situation which the number of infected still increasing continuously. In January 2022, PTT has expanded its subsidies until 31 March 2022.
- **PTT:** On 23 June 2021, the Supreme Court judgment of the Dispute between PTT and RPCG PLC ("RPCG") reported as follows;
 - Dispute of the Thai Arbitration Institute No. Black 114/2552 No. Red 23/2559, in which RPCG sought damages from PTT on the ground of wrongful termination of contract. The Supreme Court rendered judgment in concurrence with the Civil Court's judgment, to enforce the arbitral award and the case was final. As a result, PTT was obliged to make payment to RPCG in the approximate amount of Baht 2,200 million within 30 days from the judgment date.
 - Dispute of the Thai Arbitration Institute No. Black 78/2555 No. Red 37/2560, in which PTT sought an overdue payment for goods delivered from RPCG. The Supreme Court rendered judgment in reverse of the Civil Court's judgment, to enforce the arbitral award and the case was final. As a result, RPCG was obliged to make payment to PTT in the approximate amount of Baht 2,800 million within 30 days from the judgment date.
 - On 23 July 2021, PTT has exercised the right to offset the obligation that RPCG has to pay to PTT from another case, RPCG has to pay PTT in the amount of 600 million baht. Subsequently, on 26 November 2021, RPCG paid the remaining obligation to PTT completely according to the Supreme Court's judgment. The rest will be given to PTT in full according to the Supreme Court's judgment.
- **OR:** 30 June 2021, the Eastern Economic Corridor Office of Thailand (EECO) issued the Letter of Intent to award the joint venture between OR and Bangkok Aviation Fuel Services Public Company Limited (BAFS) for providing aviation fuel services at U-Tapao International Airport. The Joint Venture will establish under the name Global Aero Associates Company Limited which OR and BAFS will hold 45% stake and 55% stake respectively, with an initial investment of Baht 2,337 million and the establishment reaches completion on 15 July 2021.
- **IRPC:** On 2 July 2021, IRPC's Board of Directors has approved the investment in the Refinery Efficiency and Diesel Quality Improvement Project (Ultra Clean Fuel Project: UCF) for EURO V

July 2021

Standards Compliance which Ministry of Energy determines to start the policy since 1 January 2024. The investment cost is approximately Baht 13,300 million and has been planned to commercial operate within January 2024.

- **GC:** On 10 July 2021, PTTGC International (Netherlands) B.V. ("GC Inter B.V."), the wholly owned subsidiary of GC has signed Shares Purchase Agreement to acquire the ordinary shares in Allnex Holding GmbH (a global leader in specialty coating resins and crosslinkers business) from Allnex Holdings S.à.r.l equivalent to 100 percent of the total shares, Shareholder Loan and the preferred shares. The total consideration of the transactions is EURO 4,002.2 million or equivalent to approximately Baht 148,417 million. This acquisition highly fits to the Company Group's growth strategy that aims to diversify the Company Group's business toward specialties arena, specifically to increase profit contribution from and capture growth opportunities in High Value Business ("HVB"). GC and PTT Treasury Center Company Limited ("PTT TCC") also signed the loan agreement in the amount of not exceeding Baht 73,920 million, contract period of 24 months and at the comparable to the market interest rate of not exceeding 2.5% per year on 7 July 2021. The objective is to support for investment in High Value Business ("HVB") Project. The transaction was completed on December 29, 2021.
- **GPSC:** On 13 July 2021, GRSC has completed the acquisition of the shares in Avaada Energy Private Limited ("Avaada") in the Republic of India. GRSC has invested by way of subscription of new shares approximately 41.6% of total equity interest in Avaada with total investment of approximately Baht 14,825 million. Avaada has developed and is operating a large portfolio of solar power plants in India, with a total committed capacity of approximately 4,560 megawatts, of which approximately 2,205 megawatts are in operations as of 31 December 2021 and approximately 2,355 megawatts are under construction with expected commercial operations by 2022.
- **GPSC:** On 14 July 2021, GRSC has entered into Share Purchase Agreements to acquire a 25% interest in CI Changfang Limited and CI Xidao Limited with Copenhagen Infrastructure II K/S and Copenhagen Infrastructure III K/S, with the total investment (until the project completion) of approximately USD 500 million. The aforementioned companies are developing and constructing an offshore wind power project in Taiwan with a total capacity of 595 megawatts, comprising the Changfang Project and the Xidao Project with capacity of 547 megawatts and 48 megawatts, respectively. The project is expected to start full commercial operation date in the first quarter of 2024. GPSC expects that the conditions precedent will be satisfied, and that the transfer of shares will be completed by the end of the second quarter of 2022.
- **OR:** On 20 July 2021, OR's Management Committee has approved Modulus to establish Care for Car Company Limited to operate business related to online automotive service with the initial registered capital not exceeding Baht 106 million and 100% owned by Modulus.

- **PTT:** On 22 July 2021, Arun Plus has established EVME PLUS Co., Ltd. (“EVME PLUS”) which is 100% owned by Arun Plus, with the registered capital of Baht 1,000 million and initial paid-up capital of Baht 340 million. The objective of the company establishment is to operate in the electric vehicle business through the digital platform in order to promote and to create an EV ecosystem for the widespread use of electric vehicles in Thailand which includes EV rental services, information services for the charging and maintenance stations.
- **PTT & GPSC:** On 27 July 2021, Global Renewable Power One Co., Ltd. (a wholly owned subsidiary of Global Renewable Power Co., Ltd. which is a subsidiary that PTT and GPSC equally hold at 50%) has met the conditions precedent under the share purchase agreement to acquire 90% stakes in Sheng Yang Energy Co., Ltd. (“Sheng Yang”) from Tatung Forever Energy Co., Ltd. with the total value of approximately Baht 2,560 million. This transaction resulted that Sheng Yang is a subsidiary of PTT. Currently, Sheng Yang operates a solar power generation business in Taiwan with a total installed generation capacity of 55.8 MW with all commenced commercial operation.
- **PTT & TOP:** On 29 July 2021, notification on the direct investment in PT Chandra Asri Petrochemical Tbk (“CAP”) which will be made by PT TOP Investment Indonesia (TOP’s subsidiary) up to 15.38 percent of CAP’s total shares with the total value of the Share Acquisition Transaction will not exceed USD 1,183 million or approximately Baht 39,116 million. The investment proceeds will be exclusively used for the investment in the development and construction of a petrochemical plant by PT Chandra Asri Perkasa (“CAP2”). CAP is the premier petrochemical producer with an integrated plant incorporating world class in the Republic of Indonesia. Moreover, TOP’s Board of Director approved to enter into the Facilities Agreement with PTT with the bridging loan amount not exceed USD 670 million, duration not exceed 18 months and interest rate not exceed 2.5 percent per annum in line with market rate as well as approved the long-term recapitalization plan including sale of GPSC’s share of not exceeding 10.8 percent of GPSC’s paid up capital and approximately Baht 10,000 million capital increase which is in consideration for the appropriate fund raising structure. PTT will support TOP’s long-term recapitalization plan.
- **PTTEP:** On 30 July 2021, Participations and Explorations Corporation and Partex (Brazil) Corporation, subsidiaries of PTTEP, entered into a Sale and Purchase Agreement (SPA) to sell Partex Brasil Ltda. and Partex Brasil Operações Petrolíferas Ltda., which are registered in the Federative Republic of Brazil, altogether with all obligations to Ubuntu Engenharia e Serviços Ltda. The project has the average crude sales volume of 94 barrels per day (50% interest). The Completion of sale has been fulfilled on 29 October 2021.
- **PTT:** On 6 August 2021, PTT has issued unsubordinated and unsecured debentures No. 1/2021 for the total amount of Baht 47,000 million at interest rate of compound THOR+0.18% to 2.37%

August 2021

per annum with a tenor of 1 year 6 months to 10 years to the institutional investors and/or high net worth investors (excluding individual). The debentures are issued under Baht 130,000 million Medium -Term Note Program (MTN Program) 2020.

- **GC:** On 10 August 2021, Board of Directors of NatureWorks LLC (“NatureWorks”), which GC International Corporation (a wholly owned subsidiary of GC) holds 50 percent of shares and Cargill, Incorporated holds 50 percent of shares, has approved NatureWorks to invest in the Bioplastic Polylactic Acid (“PLA”) Plant 2 located in Nakorn Sawan Biocomplex, Thailand. The plant will use sugar from sugar cane as the main feedstock for production of lactic acid, which is used for the production of PLA at the nameplate capacity of 75,000 metric tons per year. The project has been planned to commercial operate within 2024.
- **GC:** On 16 August 2021, GC Marketing Solutions Company Limited (“GCM”) which is a wholly-owned subsidiary of GC, has established a subsidiary company called GC Marketing Solutions (Shanghai) Company Limited. GCM holds 100% in GC Marketing Solutions (Shanghai) Company Limited which has the registered capital USD 600,000 to support trading business on import and export and to do retail and wholesale distribution of Polymers products in the People's Republic of China.
- **GC:** On 17 August 2021, the Board of Directors of PTTGC International Private Limited (“GC Inter”), a wholly-owned subsidiary of PTTGC has approved GC Inter to enter into a Share Purchase Agreement (“SPA”) to sell, together with Sime Darby Plantation Berhad (“SDP”), their collective 100% of ordinary shares in the Asia Pacific business of Emery Oleochemicals (M) Sdn. Bhd. and Emery Specialty Chemicals Sdn. Bhd. (Emery Group is a 50:50 joint venture between GC Inter and SDP) to Edenor Technology Sdn. Bhd. (“ETSB”) for a total cash consideration of RM 38 million. The Emery Group business was restructured with a separate business in the Asia-Pacific business and the North America and Europe business apart. On 1 November 2021, GC Inter has completed the sale of their collective 100% of ordinary shares.
- **PTT:** On 23 August 2021, PTT Global LNG Company Limited (“PTTGL”) (a subsidiary of PTT which PTT and PTTEP equally hold at 50% shares) completely subscribed the 250,000 newly issued ordinary shares in B.Grimm Power LNG JV Limited (“BGP LNG JV”) with the subscription price at par value of Baht 100 per share, totaling Baht 25,000,000. As a result, PTTGL and B.Grimm Power Company Limited equally hold 50% stakeholding in BGP LNG JV. The objective of BGP LNG JV is to procure and supply LNG and explore other business opportunities related to LNG value chain both domestically and internationally as well as creating business alliance with the potential partner to expand our business opportunities.

September 2021

- **PTTEP:** On 6 September 2021, PTTEP has established two subsidiaries to support future investments in renewable energy business, per the following details:

- Asia Power and Transportation SG Holding Pte. Ltd. has been established with registered capital of USD 50,000 with 100% shareholding by EP-Tech Ventures Holding Company Limited, a subsidiary of PTTEP.
- Delta Gas Transportation SG Holding Pte. Ltd. has been established with registered capital of USD 50,000 with 100% shareholding by Asia Power and Transportation SG Holding Pte. Ltd. Consequently, Delta Gas Transportation Limited has been established with a registered capital of USD 50,000 with 100% shareholding by Delta Gas Transportation SG Holding Pte. Ltd.
- PTT: On 14 September 2021, Arun Plus has signed the joint venture agreement with Lin Yin International Investments Co., Ltd. (“Lin Yin”), the wholly owned affiliate of Hon Hai Precision Industry Company Limited (“Foxconn”) and established the joint venture company, Horizon Plus Company Limited (“Horizon Plus”), on 3 February 2022 with the registered capital not in excess of Baht 3,220 million. Arun Plus and Lin Yin will hold 60% and 40% stakes respectively. The objective of the company establishment is to operate the electric vehicle manufacturing business in Thailand using Foxconn’s state-of-the-art technology in manufacturing and developing of MIH (Mobility-In-Harmony) platform collectively with PTT Group’s expertise in business operation within Thailand and the final investment decision shall reach within the first half of 2022 and start the commercial production within the first quarter of 2024.
- PTT: On 16 September 2021, PTT’s Board of Directors has approved a resolution of interim dividend payment for the first six-month performance of year 2021 to PTT’s shareholders at the rate of Baht 1.20 per share, totaling approximately Baht 34,276 million, or 60% of the consolidated net income.
- GPSC: On 16 September 2021, the Glow Energy Phase 5 power plant had an unplanned outage since August 14, 2021. The Company is operating a reparation and inspecting the cause with technical specialists from the manufacturer and insurance company. It is expected to resume normal operation within February 2022. The outage had no impact on the sale of electricity and steam to industrial customers.
- PTT: On 18 September 2021, PTT Regional Treasury Center Pte. Ltd. (“PTT RTC”), PTT’s wholly owned subsidiary, has been completely dissolved which aligned to PTT’s policy to close down the dormant company that did not affect to PTT’s business operation.
- PTTEP: On 21 September 2021, AI and Robotics Ventures Company Limited (“ARV”), a subsidiary of PTTEP, has established four subsidiaries with an initial registered capital of Baht 1,000,000 per company, and ARV holds 100% shareholding, per the following details:
 - Rovula (Thailand) Company Limited (“ROVULA”) focuses on using advanced artificial intelligence (“AI”) and robotics to provide end-to-end subsea and marine inspection, repair, and maintenance.

- Skyller Solutions Company Limited (“SKYLLER”) provides integrated asset inspection and management services via its proprietary platform to industry asset owners by leveraging multiple fleets from drones to robotics and AI platform-as-a-service (“PAAS”).
- Varuna (Thailand) Company Limited (“VARUNA”) leverages AI, satellite technology, and unmanned aerial vehicles (“UAV”) to offer state-of-the-art smart-farming and smart-forestry solutions to farmers and agricultural businesses.
- Cariva (Thailand) Company Limited (“CARIVA”) is a health data network which leverages AI, IoT, and robotics to empower and generate health insights to users, both individuals and businesses.

October 2021

- **PTT:** On 5 October 2021, PTT’s Board of Directors has approved SMH (PTT’s 100% owned subsidiary to establish PTT and TGES Optec Company Limited, a new joint investment with Tokyo Gas Engineering Solutions Corporation (“TGES”) (a 100% owned subsidiary of Tokyo Gas Co., Ltd.) with the registered capital not in excess of Baht 60 million. SMH and TGES will hold 51% and 49% shareholdings, respectively in this joint investment. The registration was completed on 15 November 2021. The investment objective aims to provide One-stop Total Improving Efficiency Technology Solutions and Services for Machinery and Equipment including fuel supply to the customers in industrial, power, and utilities sectors.
- **OR:** On 5 October 2021, OR’s Board of Directors has approved PTTOR International Holdings (Singapore) Pte. Ltd. (“SGHoldCO”), OR’s wholly-owned subsidiary, together with companies in 500 Startups Group (“500 Startups”), to set up a Private Fund registered in Delaware, USA, in the form of Limited Partnership under the name ORZON VENTURES, L. P. (“ORZON VENTURES”) with an initial investment value of USD 25 million, and the investment value can be increased to USD 50 million thereafter, where SGHoldCO will have 99% stake and 1% stake will be held by the 500 Startups company and individual investors in 500 Startups Group. The investment objectives of a venture capital are to invest in high-potential startup companies in Thailand and Southeast Asia, to seek new opportunities to build new S-Curve, which is a strategy to strengthen and expand OR’s business.
- **PTTEP:** On 21 October 2021, PTTEP has dissolved a non-active subsidiary, namely Cove Energy Mozambique Rovuma Onshore Limited with no impact to its operations.
- **PTTEP:** On 27 October 2021, PTTEP has established subsidiaries to support future investments in renewable energy business, per the following details:
 - FutureTech Energy Ventures Company Limited has been established with registered capital of Baht 5,000,000, with 100% shareholding by EP-Tech Ventures Holding Company Limited, a subsidiary of PTTEP.

- FutureTech Solar (Thailand) Company Limited has been established with registered capital of Baht 1,000,000, with 100% shareholding by FutureTech Energy Ventures Company Limited.
- **OR:** 27 October 2021, OR's Management Committee has approved Modulus, to invest by purchasing newly issued common shares of Imsub Global Cuisine Company Limited ("ISGC"), with a total investment amount not exceeding Baht 192 million. After such investment, Modulus will hold 25% and the ISGC's former shareholders will hold 75% of all common shares issued by ISGC. ISGC owns and operates KOUEN Brand, a Japanese restaurant, along with other brands. The investment objective is to strengthen OR's food and beverage business by increasing product diversification and creating opportunities for domestic and international growth.
- **GPSC:** 29 October 2021, GRSC has been established Global Renewable Synergy Company Limited Taiwan, new subsidiary of the Company in Taiwan on October 21, 2021. GRSC holds a 100 percent stake and has an initial paid-up capital of NTD 500,000. The objective is to invest in renewable energy in Taiwan.

November 2021

- **PTT:** 1 November 2021; To support on energy prices for Thai people, PTT has capped the NGV retail price for the taxi in Bangkok Metropolitan Area at 13.62 Baht/kg. from 1 November 2021 to 15 March 2022, and the NGV retail for general cars at 15.59 Baht/kg from 16 November 2021 to 15 Mar 2022.
- **PTT:** 25 November 2021, Board of Directors of PTT Tank Terminal Company Limited ("PTT Tank"), a wholly owned subsidiary of PTT, approved to establish a new joint venture with Gulf Energy Development Public Company Limited ("GULF") and CHEC OVERSEA INFRASTRUCTURE HOLDING PTE. LTD ("CHEC OVERSEA") under the name of GPC International Terminal Company Limited ("GPC") with the registered capital of Baht 4,000 million. PTT Tank, CHEC OVERSEA, and GULF will hold 30%, 30%, and 40% stakeholding, respectively in this joint investment. The investment objectives are to operate a seaport and to provide services covering mooring, docking, loading, unloading of goods for container vessels as well as to conduct warehouse business. This is in line with PTT's strategy in pursuing Logistics & Infrastructure business and supporting infrastructure growth in Thailand.
- **PTT:** 29 November 2021, Board of Directors of Alpha Com approved the establishment of ReAcc Co., Ltd. which is 100% owned by Alpha Com, with the registered capital of Baht 29 million, to be the trading platform for clean energy and climate neutrality through the digital platform for the companies, which have targets and needs to procure renewable energy.

December 2021

- **PTT:** 2 December 2021, PTT's Board of Directors approved PTT Energy Resources Company Limited ("PTTER") (a wholly owned subsidiary of PTT) to sell its entire investment of 25% of the total issued shares in East Mediterranean Gas S.A.E ("EMG") with the total amount of

approximately USD 50 million to Snam S.p.A. The transaction caused EMG to cease to be the associated company of PTTER.

- **PTTEP:** 3 December 2021, PTTEP MENA Limited, a subsidiary of PTTEP, has signed Farm-in/Farm-out Agreement to acquire 25% stake in the Concession Area C onshore the Emirate of Sharjah from Eni Sharjah B.V. , it is an onshore gas and condensate concession block, situated in the central part of Sharjah Emirate.
- **PTT:** 16 December 2021, PTT's Board of Directors approved the five-year (Year 2022 – 2026) investment plan of PTT and its wholly owned subsidiaries in an aggregate amount of Baht 102,165 million. PTT has invested in the core businesses which are accounted for 65% i.e. Gas business and Transmission business. Additionally, PTT has prepared provisional capital expenditure for the next 5 years amounting to Baht 238,032 million mainly for the investment expansion into new businesses with the focus on clean energy businesses toward a low-carbon society i.e. investment in renewable energy to achieve PTT group's renewable energy target of 12,000 megawatts within year 2030, Electricity Value Chain project, Life Science, Logistics and Infrastructure businesses. Furthermore, there is investment in gas business which is the transition fuel with the focus on the expansion of pipeline network (subjected to government approval) and the investment in LNG value chain both in Thailand and overseas.
- **OR:** 27 December 2021, OR's Board of Directors approved Modulus to invest by purchasing shares of KAMU KAMU Company Limited (KAMU) from its former shareholders, with a total investment amount not exceeding Baht 480 million. After such investment, Modulus will hold 25% and the KAMU's former shareholders will hold 75% of all shares issued by KAMU. KAMU operates tea-based drinks, under the brand Kamu tea. The investment objective is to increase product diversification and creating opportunities for domestic and international growth.

January 2022

- **PTT & GPSC:** 11 January 2022, Board of Directors of Arun Plus approved the establishment of Nuovo Plus Company Limited (“NUOVO PLUS”), a joint venture company with GPSC with the registered capital of Baht 4,200 million and an initial paid-up capital of Baht 1,050 million. ARUN PLUS and GPSC hold 51% and 49% of the shares in NUOVO PLUS, respectively. The objectives of the company establishment are to study the possibility of the investments in the battery value chain in order to support the electric vehicle industry in accordance with Thailand's automotive industry policy to promote electric vehicles, energy storage system (for the storage of electricity from renewable sources), as well as the investment in the related businesses.

Financial Results of PTT Group by Business

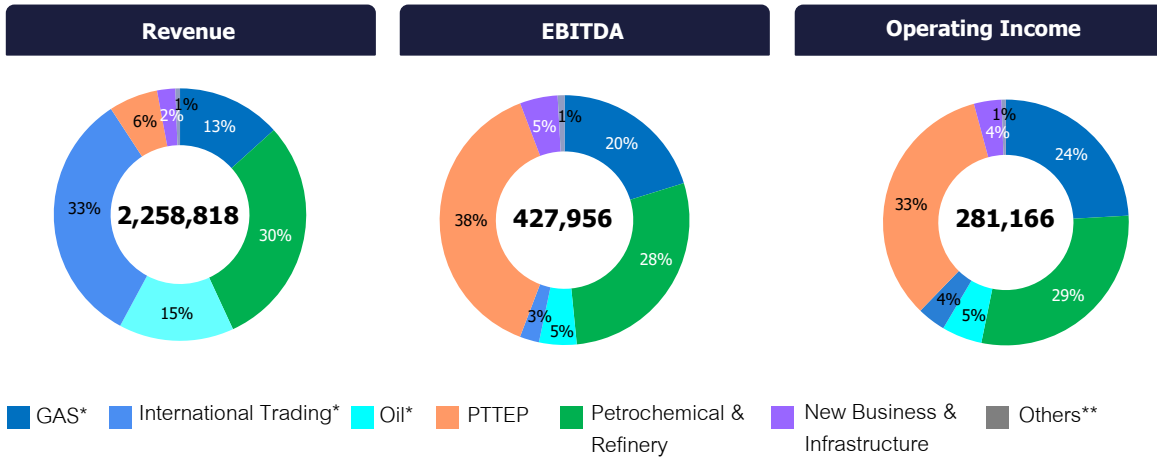
Financial performance of 4Q2021 compared with 4Q2020 and 3Q2021 as well as 2021 compared with 2020 are summarized as follows:

Unit : Million Baht	4Q2020	3Q2021	4Q2021	% Inc. (Dec.)		2020	2021	% Inc. (Dec.)
				YoY	QoQ			
Sales revenue	407,174	558,888	688,837	69.2%	23.3%	1,615,665	2,258,818	39.8%
: Exploration & Production	40,124	58,295	63,189	57.5%	8.4%	160,401	219,068	36.6%
: Gas	91,600	115,933	132,464	44.6%	14.3%	403,626	464,038	15.0%
: Coal	2,740	4,947	5,774	>100.0%	16.7%	10,779	16,983	57.6%
: Oil	110,036	117,274	158,265	43.8%	35.0%	430,605	513,895	19.3%
: International trading	162,618	287,583	378,076	>100.0%	31.5%	656,218	1,146,564	74.7%
: Petrochemical & Refining	191,071	254,978	310,044	62.3%	21.6%	728,568	1,037,276	42.4%
: New Business & Infrastructure	18,313	19,438	24,263	32.5%	24.8%	76,226	81,262	6.6%
: Others	891	938	889	(0.2%)	(5.2%)	3,439	3,558	3.5%
EBITDA	71,614	110,522	101,271	41.4%	(8.4%)	225,672	427,956	89.6%
: Exploration & Production	25,659	42,961	47,419	84.8%	10.4%	110,044	164,365	49.4%
: Gas	16,202	23,388	19,200	18.5%	(17.9%)	54,942	86,497	57.4%
: Coal	901	2,051	2,943	>100.0%	43.5%	3,176	7,158	>100.0%
: Oil	5,261	4,158	4,513	(14.2%)	8.5%	18,098	20,807	15.0%
: International trading								
- Excluding effect of FX and derivatives	1,032	3,409	(54)	<(100.0)%	<(100.0)%	(766)	10,740	>100.0%
- Including effect of FX and derivatives	265	1,942	1,449	>100.0%	(25.4%)	3,024	5,436	>100.0%
: Petrochemical & Refining	18,743	30,260	23,573	25.8%	(22.1%)	20,638	120,733	>100.0%
: New Business & Infrastructure	5,028	5,178	4,423	(12.0%)	(14.6%)	22,160	20,918	(5.6%)
: Others	(794)	(868)	(1,125)	(41.7%)	(29.6%)	(2,669)	(3,349)	(25.5%)
Depreciation and amortization expenses	34,823	39,295	33,851	(2.8%)	(13.9%)	139,880	146,790	4.9%
Operating income (loss)	36,791	71,227	67,420	83.3%	(5.3%)	85,792	281,166	>100.0%
: Exploration & Production	8,946	23,060	33,439	>100.0%	45.0%	45,035	94,303	>100.0%
: Gas	11,400	18,695	14,411	26.4%	(22.9%)	35,696	67,768	89.8%
: Coal	642	1,617	2,257	>100.0%	39.6%	1,303	5,404	>100.0%
: Oil	3,827	2,673	2,939	(23.2%)	10.0%	12,713	14,899	17.2%
: International trading								
- Excluding effect of FX and derivatives	961	3,357	(108)	<(100.0)%	<(100.0)%	(1,054)	10,536	>100.0%
- Including effect of FX and derivatives	194	1,890	1,395	>100.0%	(26.2%)	2,736	5,232	>100.0%
: Petrochemical & Refining	9,944	20,403	13,662	37.4%	(33.0%)	(16,554)	81,788	>100.0%
: New Business & Infrastructure	2,445	2,420	1,682	(31.2%)	(30.5%)	11,703	10,182	(13.0%)
: Others	(956)	(983)	(1,241)	(29.8%)	(26.2%)	(3,099)	(3,801)	(22.7%)
Share of net income from investments in joint ventures and associates	1,677	2,233	1,937	15.5%	(13.3%)	4,178	9,010	>100.0%
Loss on impairment of assets (reversal)	9,038	876	9,250	2.3%	>100.0%	11,917	13,286	11.5%
Gain (loss) on derivatives	(4,584)	(11,768)	(172)	96.2%	98.5%	2,266	(31,958)	<(100.0)%
Gain (loss) on foreign exchange	8,811	(6,405)	5,139	(41.7%)	>100.0%	9,270	(6,469)	<(100.0)%
EBIT	34,977	55,729	65,019	85.9%	16.7%	93,652	247,821	>100.0%
Finance costs	7,426	7,470	7,153	(3.7%)	(4.2%)	28,536	28,163	(1.3%)
Income taxes	8,342	15,408	19,648	>100.0%	27.5%	25,166	67,590	>100.0%
Net income (loss)	13,147	23,653	27,544	>100.0%	16.5%	37,766	108,363	>100.0%
Earnings per share (Baht/share)	0.46	0.82	0.97	>100.0%	18.3%	1.32	3.79	>100.0%

Segmentation performance of PTT Group

The details of revenue, Earnings before Interest, Tax, Depreciation and Amortization (EBITDA) and operating income by segmentation of 2021 are as follows;

Unit : Million Baht



* Including PTT own operation and PTT's affiliates **Including coal and others.

1. Upstream Petroleum and Gas Business Group

Petroleum Exploration and Production Business: PTT Exploration and Production Public Co., Ltd. (PTTEP)

	4Q2020	3Q2021	4Q2021	%Inc.(Dec.)		2020	2021	%Inc.(Dec.)
				YoY	QoQ			
Average selling price (US\$/BOE)	36.9	44.3	46.9	27.1%	5.9%	38.9	43.5	11.8%
Average sales volume (BOED)	381,285	417,167	420,965	10.4%	0.9%	354,052	416,141	17.5%

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, sales revenue of PTTEP was Baht 63,189 million, increasing by Baht 4,894 million or 8.4% from 3Q2021 as the average selling price increased by 5.9% from US\$ 44.3 per BOE in 3Q2021 to US\$ 46.9 per BOE in 4Q2021 due to the rise in both crude oil and gas prices. As well as, the average sales volume increased by 0.9% from 417,167 BOED in 3Q2021 to 420,965 BOED in 4Q2021 primarily from Malaysia Project due to higher sales of crude oil and MTJDA Project as there was higher gas nomination from buyer, offset with Zawtika Project which had a decrease in sales volume from maintenance shutdown.

EBITDA in 4Q2021 was Baht 47,419 million, increasing by Baht 4,458 million or 10.4% from 3Q2021 mainly due to an increase in sales revenue as aforementioned. Together with a decrease in depreciation, depletion and amortization

primarily from Bongkot Project caused the operating income in 4Q2021 was Baht 33,439 million, increasing by Baht 10,379 million or 45.0% from 3Q2021.

The overall performance of Exploration and Production business increased according to an increase in EBITDA despite impairment loss on assets of Baht 6,142 million on Mozambique Area 1 Project and Yetagun Project. While no recognition in 3Q2021.

Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of PTTEP was Baht 63,189 million, increasing by Baht 23,065 million or 57.5% from 4Q2020 as the average selling price increased by 27.1% from US\$ 36.9 per BOE in 4Q2020 to US\$ 46.9 per BOE in 4Q2021. As well as, the average sales volume increased by 10.4% from 381,285 BOED in 4Q2020 to 420,965 BOED in 4Q2021 primarily from the acquisition of Oman Block 61 Project and Malaysia Project which had the first gas production of Malaysia Block H Project.

EBITDA in 4Q2021 was Baht 47,419 million, increasing by Baht 21,760 million or 84.8% from 4Q2020 mainly due to an increase in sales revenue as aforementioned. Together with a decrease in depreciation, depletion and amortization of Baht 2,733 million primarily from Bongkot Project caused the operating income in 4Q2021 was Baht 33,439 million, increasing by Baht 24,493 million or more than 100.0% from 4Q2020.

The overall performance of Exploration and Production business increased due to an increase in EBITDA whereas income tax increased by Baht 12,465 million mainly from better performance and Oman Block 61 Project. Moreover, there was an increase in impairment loss on assets of Baht 4,816 million. In 4Q2021, the Group recognized impairment loss on Mozambique Area 1 Project and Yetagun Project while 4Q2020 recognized loss on Yetagun Project.

Year 2021 compared with Year 2020

In 2021, sales revenue of PTTEP was Baht 219,068 million, increasing by Baht 58,667 million or 36.6% from 2020. This was from the increase in the average sales volume by 17.5% from 354,052 BOED in 2020 to 416,141 BOED in 2021 primarily from the acquisition of Oman Block 61 Project in March 2021, including Bongkot Project, Contract 4 Project and Arthit Project which had higher gas nomination from buyer, together with Malaysia Block H Project's first gas production in February 2021. As well as the average selling price increased by 11.8% from US\$ 38.9 per BOE in 2020 to US\$ 43.5 per BOE in 2021.

EBITDA in 2021 was Baht 164,365 million, increasing by Baht 54,321 million or 49.4% from 2020 mainly due to an increase in sales revenue as aforementioned. As a result, operating income in 2021 was Baht 94,303 million, increasing by Baht 49,268 million or more than 100.0% from 2020. Although petroleum royalties increased primarily from higher

domestic sales revenue together with an increase in depreciation, depletion and amortization, which was primarily from the acquisition of Oman Block 61 Project and S1 Project due to additional completed assets despite the decrease from Bongkot Project.

The overall performance of Exploration and Production business increased due to an increase in EBITDA and there was gain from a bargain purchase of Oman Block 61 Project amounting to Baht 10,694 million. However, the income tax increased by Baht 22,764 million mainly from better performance and Oman Block 61 Project, loss on financial instruments also increased by Baht 10,476 million mainly from oil price hedging instruments. Furthermore, PTTEP recognized partial write-off of the assets in the exploration project in Brazil amounting to Baht 4,455 million, and impairment loss on assets of Baht 6,142 million in 2021 from Mozambique Area 1 Project and Yetagun Project in 2021. Meanwhile, in 2020 PTTEP recognized impairment loss mostly from Mariana Oil Sands and Yetagun Project amounting to Baht 1,369 million.

Gas Business Group

The details of all product sales volume from GSPs are as follows:

Unit : Ton	4Q2020	3Q2021	4Q2021	% Inc.(Dec.)		2020	2021	% Inc.(Dec.)
				YoY	QoQ			
LPG	760,777	815,058	767,362	0.9%	(5.9%)	2,947,307	3,113,277	5.6%
Ethane	568,430	520,591	512,947	(9.8%)	(1.5%)	2,198,542	2,181,272	(0.8%)
Propane	239,192	205,175	201,818	(15.6%)	(1.6%)	853,025	953,395	11.8%
NGL	161,453	144,541	143,620	(11.0%)	(0.6%)	603,433	617,011	2.3%
Pentane	6,621	8,929	11,440	72.8%	28.1%	37,161	43,057	15.9%
Total	1,736,473	1,694,294	1,637,187	(5.7%)	(3.4%)	6,639,468	6,908,012	4.0%

The details of reference product prices of GSPs are as follows:

Unit : US\$ per Ton	4Q2020	3Q2021	4Q2021	% Inc.(Dec.)		2020	2021	% Inc.(Dec.)
				YoY	QoQ			
LPG ^{1/}	423	648	807	90.8%	24.5%	400	639	59.7%
LDPE ^{2/,3/}	1,239	1,398	1,592	28.5%	13.9%	1,010	1,516	50.1%
LLDPE ^{2/,3/}	983	1,185	1,285	30.7%	8.4%	867	1,200	38.4%
HDPE ^{2/,3/}	1,000	1,138	1,252	25.2%	10.0%	880	1,182	34.3%
Propane ^{4/}	418	648	822	96.7%	26.9%	397	648	63.2%

Note: ^{1/} Global LPG Price (Contract Price Saudi Aramco) as a reference for selling prices of petrochemical customers, calculated from the proportion of Propane and Butane by 50:50

^{2/} South East Asia - Spot Price

^{3/} GSP had agreed to new sale and purchase product agreements with GC: The petrochemical reference prices of Ethane selling prices is HDPE, LDPE and LLDPE effective since January 1, 2020

^{4/} GSP had agreed to new sale and purchase product agreements with GC: The petrochemical referenced prices of Propane selling prices is global Propane Price (Contract Price Saudi Aramco) effective since January 1, 2020

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, gas business reported sales revenue of Baht 132,464 million, increasing by Baht 16,531 million or 14.3% from 3Q2021. This resulted mainly from S&M business due to the higher average selling prices because of the increase in Pool Gas price as well as the average selling prices for industrial customers, which increased from the higher fuel oil referenced prices. However, the average sales volume (calculated at heating value of 1,000 BTU per cubic feet) decreased by 66 MMSCFD or 1.6% from 4,224 MMSCFD in 3Q2021 to 4,158 MMSCFD in 4Q2021 mainly from power plant customer due to the decreased in overall electricity demand in Thailand mainly from the residential sector as seasonal factor. In addition, the Electricity Generating Authority of Thailand (EGAT) managed to revise operational plan for some power plants by substituting with fuel oil and diesel instead of using natural gas in order to minimize the impact from the rising in global gas prices. Moreover, there was a shortfall of gas delivery in 4Q2021 during end of concession period and field shutdown.

For GSP business, sales revenue increased from higher average selling prices of all products following the higher petrochemical referenced prices. However, GSP's sales volume (including NGL derived from Dew Point Control units) decreased from 1,694,294 tons in 3Q2021 to 1,637,187 tons in 4Q2021 or 3.4% from almost all products. LPG sales volume decreased due to the lower demand from petrochemical customers to managed production for efficiency and costs optimization as well as the decrease in other products which resulting from the lower gas production of some concession during the end of the concession period.

In 4Q2021, EBITDA of gas business was reported at Baht 19,200 million, decreasing by Baht 4,188 million or 17.9%. The operating income was reported at Baht 14,411 million, decreasing by Baht 4,284 million or 22.9%. This was mainly from the lower gross profit of S&M businesses according to the increase in gas cost following the higher Pool Gas price. In addition, there was the return of Take or Pay benefit from Myanmar gas fields to the government according to the resolution of CEPA approximately by baht 2,700 million despite the shortfall discount from the gas producer approximately by Baht 1,700 million. Even though, in 4Q2021, GSP business has the higher gross profit due to the increase in average selling prices of all product following the higher petrochemical referenced prices in spite of the decrease in sales volume and higher gas cost following the higher Gulf Gas price.

In addition, NGV's loss increased from the higher gas cost following the higher Pool Gas price as well as NGV price has capped for the taxi in Bangkok Metropolitan Area at 13.62 Baht/kg. from 1 November 2021 to 15 March 2022, and the NGV retail price's ceiling for private cars was capped at 15.59 Baht/kg. from 16 November 2021 to 15 March 2022.

Fourth quarter of 2021 compared with Fourth quarter of 2020



In 4Q2021, gas business reported sales revenue of Baht 132,464 million, increasing by Baht 40,864 million or 44.6% from 4Q2020. This resulted mainly from S&M business following the increase in average selling prices as a result of the increase in Pool Gas price as well as the average selling prices for industrial customers increased from the higher fuel oil referenced prices. However, the average sales volume (calculated at heating value of 1,000 BTU per cubic feet) decreased by 97 MMSCFD or 2.3% from 4,255 MMSCFD in 4Q2020 to 4,158 MMSCFD in 4Q2021 mainly from a shortfall of gas delivery during to the end of concession period together with the lower sales volume to power plant customers which resulting from EGAT's switching of fuel for power generation as aforementioned despite higher electricity demand from residential and industry sectors following the recovery of economic activities.

The sales revenue of GSP business increased following the higher average selling prices of all products in accordance with the higher petrochemical referenced prices. However, there was a decrease in sales volume (including NGL derived from Dew Point Control units) from 1,736,473 tons in 4Q2020 to 1,637,187 tons in 4Q2021 or decreased by 5.7%, mainly from Ethane and Propane from the decrease in gas production resulted to lower production of GSP compared to 4Q2020.

In 4Q2021, EBITDA of gas business was reported at Baht 19,200 million, increasing by Baht 2,998 million or 18.5%. The operating income was reported at Baht 14,411 million, increasing by Baht 3,011 million or 26.4%. This was mainly from higher gross profit of GSP business according to the increase in average selling prices of all products following their higher referenced prices despite the decrease in sales volume and the increase in feed gas cost following the higher gulf gas price. While, EBITDA of S&M business decreased mainly from industrial customers as a result of the increase in gas cost following the higher Pool Gas price which higher than the increase in fuel oil referenced selling prices and the return of Take or Pay benefit from Myanmar gas fields to government according to the resolution of CEPA despite shortfall discount from gas producer as aforementioned. However, NGV's loss increased from the higher gas cost following the higher Pool Gas price as well as there was a capped for retail price of NGV as aforementioned.

Year 2021 compared with Year 2020

In 2021, gas business reported sales revenue of Baht 464,038 million, increasing by Baht 60,412 million or 15.0% from 2020. This resulted mainly from GSP business due to the higher average selling prices of all products following the higher petrochemical referenced prices. In addition, there was an increase in sales volume (including NGL derived from Dew Point Control units) in almost all products from 6,639,468 tons in 2020 to 6,908,012 tons in 2021 or increased by 4.0%, mainly from LPG and Propane due to higher demand of petrochemical customers.

The sales revenue of S&M business also increased following the higher average selling prices in line with Pool Gas price, and the average selling prices for industrial customers increased from the higher fuel oil referenced prices. Furthermore, average sales volume (calculated at heating value of 1,000 BTU per cubic feet) increased by 43 MMSCFD

or 1.0% from 4,394 MMSCFD in 2020 to 4,437 MMSCFD in 2021 mainly due to industrial customers in accordance with the economic activities recovered from last year.

In 2021, EBITDA of gas business was reported at Baht 86,497 million, increasing by Baht 31,555 million or 57.4%. The operating income was reported at Baht 67,768 million, increasing by Baht 32,072 million or 89.8%. This was mainly from the increase in GSP's gross profit due to the increase in average selling price of all products following the higher petrochemical referenced prices, the rise in sales volume in almost all products and the drop in gas cost due to the lower Gulf Gas price. Moreover, S&M's gross profit increased from higher average selling prices for industrial customers in line with the higher fuel oil referenced prices together with the increase in sales volume and shortfall discount from gas producer despite higher gas cost due to higher Pool Gas price and the return of Take or Pay benefit from Myanmar gas fields to government according to the resolution of CEPA. However, NGV's loss increased from the higher gas cost as higher Pool Gas price as mentioned.

Coal Business

	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	%Inc. (Dec.)
				YoY	QoQ			
Newcastle index price (US\$ per ton)	67.3	167.5	183.9	>100.0%	9.8%	60.4	137.3	>100.0%
Average selling price (US\$ per ton)	52.0	88.6	95.3	83.3%	7.6%	53.8	83.0	54.3%
Cash cost (US\$ per ton)	35.9	51.1	50.2	39.8%	(1.8%)	42.9	49.2	14.7%
Sales volume (million tons)	1.7	1.6	1.8	5.9%	12.5%	6.4	6.1	(4.7%)

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, sales revenue of Coal business was Baht 5,774 million, increasing by Baht 827 million or 16.7% compared with 3Q2021 mainly due to the increase in average selling prices by US\$ 6.7 per ton or 7.6% from US\$ 88.6 per ton in 3Q2021 to US\$ 95.3 per ton in 4Q2021 according to the increase in Newcastle referenced prices mainly from the energy shortage in China and higher global coal demand, especially in China and India as the economic recovery and increased the electricity demand, including higher natural gas prices and decreased coal supply. Additionally, the sales volume increased by 0.2 million tons or 9.2% from 1.6 million tons in 3Q2021 to 1.8 million tons in 4Q2021, primarily from higher demand in China and accordance with the production plan.

In 4Q2021, EBITDA was Baht 2,943 million, increasing by Baht 892 million or 43.5% mainly from higher gross margin following higher average selling prices and sales volume. Operating income was Baht 2,257 million in 4Q2021, increasing by Baht 640 million or 39.6% according to the increase in EBITDA. As a result, Coal business's overall performance has improved.

Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of Coal business was Baht 5,774 million, increasing by Baht 3,034 million or more than 100.0% compared with 4Q2020 mainly due to the increase in average selling prices by US\$ 43.3 per ton or 83.3 % from US\$ 52.0 per ton in 4Q2020 to US\$ 95.3 per ton in 4Q2021 following the increase in Newcastle referenced prices as aforementioned. In addition, sales volume increased by 0.1 million tons or 5.9% from 1.7 million tons in 4Q2020 to 1.8 million tons in 4Q2021, primarily from higher demand in China.

In 4Q2021, EBITDA was Baht 2,943 million, increasing by Baht 2,042 million or more than 100.0% from 4Q2020 mainly from higher gross profit due to higher sales revenue despite higher mining cost following higher coal and gasoil prices. The operating income was Baht 2,257 million in 4Q2021, increasing by Baht 1,615 million or over 100.0%. Consequently, the overall performance of Coal business improved. In addition, there was the recognized impairment loss on coal assets in 4Q2020 while in 4Q2021 there was no such item.

Year 2021 compared with Year 2020

In 2021, sales revenue of Coal business was Baht 16,983 million, increasing by Baht 6,204 million or 57.6% compared with 2020 mainly due to the increase in the average selling prices by US\$ 29.2 per ton or 54.3% from US\$ 53.8 per ton in 2020 to US\$ 83.0 per ton in 2021 following the increase in Newcastle referenced prices due to energy shortages in many countries and the recovery of the global economy. Meanwhile, sales volume decreased by 0.3 million ton or 4.7% from 6.4 million ton in 2020 to 6.1 million ton in 2021 mainly from cease operating of the Sebuk coal mine since early 2021 despite the increase in Jembayan coal mine following the production plan.

EBITDA in 2021 was Baht 7,158 million, increasing by Baht 3,982 million or more than 100.0% from 2020 mainly due to the increase in gross profit following the increase in the average selling prices despite lower sales volume as aforementioned. The operating income in 2021 was Baht 5,404 million, increasing by Baht 4,101 million in line with the increase in EBITDA. Furthermore, there was an impairment loss on coal assets of Baht 8,773 million in 2020, while there was no such transaction in 2021. As a result, the overall performance of Coal business has improved.

2. Downstream Petroleum Business Group

Oil Business Group

	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	%Inc. (Dec.)
				YoY	QoQ			
Average Sales Volume* (Unit: Million Liter)	6,282	5,217	6,476	3.1%	24.1%	24,400	23,145	(5.1%)
Average selling prices (Unit: US\$ per barrel)								
Gasoline	48.7	83.4	93.8	92.6%	12.5%	46.7	80.3	71.9%
Aviation	47.0	77.0	88.6	88.5%	15.1%	44.7	75.1	68.0%
Diesel	48.3	77.1	89.8	85.9%	16.5%	48.4	76.0	57.0%

*The average sales volume of domestic oil segment only

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, sales revenue of Oil business group was Baht 158,265 million, increasing by Baht 40,991 million or 35.0% from 3Q2021 mainly due to the increase of sales volume by 1,259 million liters or 24.1% from 5,217 million liters or equivalent to 356,681 barrels per day in 3Q2021 to 6,476 million liters or equivalent to 442,757 barrels per day in 4Q2021, mainly from diesel and gasoline, as the easing of COVID-19 restriction measures in Thailand and the reopening for tourists including people's travelling to hometown in year-end period. In addition, average selling prices in all products increased in accordance with higher global refined products prices. Non-oil business revenue increased in line with rising demand and the continuous promotions.

EBITDA in 4Q2021 was Baht 4,513 million, increasing by Baht 355 million or 8.5% from mainly due to non-oil business and oil business' increasing gross margin accordance with sales revenue as aforementioned although there was additional operating expenses. The operating income in 4Q2021 was Baht 2,939 million, increasing by Baht 266 million or 10.0% in line with higher EBITDA. As a result, the overall performance of Oil business has improved.

Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of Oil business group was Baht 158,265 million, increasing by Baht 48,229 million or 43.8% from 4Q2020 due to higher average selling prices which were in line with higher global oil prices. Additionally, sales volume increased by 194 million liters or 3.1% from 6,282 million liters or equivalent to 429,494 barrels per day in 4Q2020 to 6,476 million liters or equivalent to 442,757 barrels per day in 4Q2021, mainly from diesel and fuel oil as the energy shortage has increased the demand for power plants. Non-oil business' revenue increased mainly from growing sales volume as a consequence of expanding food and beverage branches.

In 4Q2021, EBITDA was Baht 4,513 million, decreasing from 4Q2020 by Baht 748 million or 14.2% mainly from oil business following the decreasing gross margin per liter of diesel according to a cap on retail price at gas station in accordance with the cooperating with government to relieve people's burden in the increasing global oil price situation. Although non-oil business had increasing gross margin in line with food and beverage business's sales revenue, EBITDA decreased from higher promotional expenses. The operating income in 4Q2021 was Baht 2,939 million, decreasing by Baht 888 million or 23.2% according to lower EBITDA. This caused the overall performance of Oil business to decline as well.

Year 2021 compared with Year 2020

In 2021, sales revenue of Oil business group was Baht 513,895 million, increasing by Baht 83,290 million or 19.3% from 2020, mainly from higher average selling prices of refined products following global oil prices. While sales volume decreased by 1,255 million liters or 5.1% from 24,400 million liters or equivalent to 420,478 barrels per day in 2020 to 23,145 million liters or equivalent to 398,851 barrels per day in 2021, mainly from decreasing sales volume of aviation fuel, gasoline and diesel since it has not been affected by the pandemic of COVID-19 in the beginning of 2020 and began to return from the easing of government control measures during 3Q2020. For non-oil business, revenue increased mainly due to the increase in sales volume from the expansion of the food and beverage branches.

In 2021, EBITDA was Baht 20,807 million, increasing by Baht 2,709 million or 15.0% from 2020. Oil business increased mainly from the increase in average gross margin per liter of gasoline and diesel. In addition, net operating expenses decreased following the decreased sales volume due to the impact of the COVID-19. While non-oil business' EBITDA decreased due to its increasing promotional expenses although gross margin increases following the increased sales revenue of the food and beverage business according to branch expansions. In 2021, the operating income was Baht 14,899 million, increasing by Baht 2,186 million or 17.2% in line with the increase in EBITDA. As a result, the overall performance of Oil business improved.

International Trading Business Group

Unit : Million Liter	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	%Inc. (Dec.)
				YoY	QoQ			
Average sales volume	18,741	16,906	25,082	33.8%	48.4%	75,527	79,134	4.8%

Fourth quarter of 2021 compared with Third quarter of 2021

Sales revenue of International Trading business in 4Q2021 was Baht 378,076 million, increasing by Baht 90,493 million or 31.5% from 3Q2021 due to the increase in product selling prices following the rise in global oil prices as well as the increase in sales volume of International Trading business by 8,176 million liters or 48.4% from 16,906 million liters or

equivalent to 1,155,845 barrels per day in 3Q2021 to 25,082 million liters or equivalent to 1,714,829 barrels per day in 4Q2021, mainly from higher volume of crude imports for domestic refinery (out-In trading) as well as crude from out-out trading due to global economic recovery. In addition, the relaxing of COVID-19 restrictions in many countries and the continuing increase in vaccination rate resulted in higher global demand of petroleum and petrochemical products including LNG imports and LNG international trading during winter.

EBITDA, adjusted by the impact from foreign exchange rate and derivatives, in 4Q2021 was Baht 1,449 million, decreasing by Baht 439 million or 25.4% mainly from loss on mark-to-market despite cross-regional trade at the right moment with the use of excellent risks management together with the increase in sale volume as aforementioned. The operating income, adjusted by the impact from foreign exchange rate and derivatives in 4Q2021 was Baht 1,395 million, decreasing by Baht 495 million or 26.2% in line with the decrease in EBITDA.

Fourth quarter of 2021 compared with Fourth quarter of 2020

Sales revenue of International Trading business in 4Q2021 was Baht 378,076 million, increasing by Baht 215,458 million or more than 100.0% from 4Q2020. This was due to the increase in product selling price as aforementioned. Besides, sales volume of International Trading business increased by 6,341 million liters or 33.8% from 18,741 million liters or equivalent to 1,281,302 barrels per day in 4Q2020 to 25,082 million liters or equivalent to 1,714,829 barrels per day in 4Q2021, mainly from higher sales volume of crude imports for domestic refinery (out-In trading), crude out-out trading and refined product as well as petrochemical out-out trading due to global economic recovery and the relaxing of COVID-19 restrictions in many countries as aforementioned as well as LNG imports and LNG international trading increased.

EBITDA, adjusted by the impact from foreign exchange rate and derivatives, in 4Q2021 was Baht 1,449 million, increasing by Baht 1,184 million or more than 100.0% mainly from the increase in spreads of domestic crude and condensate following oil referenced price and higher sale volume along with cross-regional trade at the right moment with the use of excellent risks management as aforementioned. The operating income, adjusted by the impact from foreign exchange rate and derivatives, in 4Q2021 was Baht 1,395 million, increasing by Baht 1,201 million or more than 100.0%.

Year 2021 compared with Year 2020

In 2021, sales revenue of International Trading business was Baht 1,146,564 million, increasing by Baht 490,346 million or 74.7% from 2020 in accordance with the increase in product selling prices as aforementioned. Furthermore, sales volume of International Trading business increased by 3,607 million liters or 4.8% from 75,527 million liters or equivalent to 1,297,979 barrels per day in 2020 to 79,134 million liters or equivalent to 1,363,694 barrels per day in 2021 mainly from sales volume of crude out-out activity, LNG imports and LNG international trading, and crude imports for

domestic refinery (out-In trading). According to global economic recovery and the relaxation of COVID-19 restrictions in many countries, this was resulted to the increase in sales volume of refined and petrochemical products.

EBITDA, adjusted by the effect of foreign exchange rate and derivatives, in 2021 was Baht 5,436 million, increasing by Baht 2,412 million or 79.8% mainly due to higher sales revenue as aforementioned. In addition, spreads of domestic crude and condensate increased following oil referenced price as well as higher sale volume. Besides, margin per unit of LNG, LPG, and aromatics products increased including cross-regional trade at the right moment with the use of excellent risks management. The operating income, adjusted by the effect of foreign exchange rate and derivatives in 2021 was Baht 5,232 million, increasing by 2,496 million or 91.2% in line with higher EBITDA.

Petrochemical and Refinery Business Group

Unit : US\$ per barrel	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	% Inc.(Dec.)
				YoY	QoQ			
Market GRM	1.6	2.1	5.5	>100.0%	>100.0%	1.0	2.9	>100.0%
Inventory gain (loss) excl. NRV	1.5	3.3	1.8	20.0%	(45.5%)	(1.7)	3.3	>100.0%
Hedging gain (loss)	(0.6)	(2.2)	(1.4)	<(100.0%)	36.4%	0.3	(1.1)	<(100.0%)
Accounting GRM	2.5	3.2	5.9	>100.0%	84.4%	(0.4)	5.1	>100.0%
Refinery Utilization rate (%)	95.3%	87.5%	101.5%	6.2%	14.0%	96.2%	95.2%	(1.0%)

*From 3 Refineries: TOP, GC and IRPC

Unit : US\$ per Ton	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	% Inc.(Dec.)
				YoY	QoQ			
Olefins								
Naphtha (MOPJ)	408	676	745	82.6%	10.2%	380	646	70.0%
HDPE	1,000	1,138	1,252	25.2%	10.0%	880	1,182	34.3%
LDPE	1,239	1,398	1,592	28.5%	13.9%	1,010	1,516	50.1%
LLDPE	983	1,185	1,285	30.7%	8.4%	867	1,200	38.4%
PP	1,142	1,250	1,335	16.9%	6.8%	992	1,321	33.2%
Aromatics								
Condensate	368	616	683	85.6%	10.9%	350	596	70.3%
PX (TW)	561	919	893	59.2%	(2.8%)	577	859	48.9%
PX (TW) – Condensate	192	303	210	9.4%	(30.7%)	227	263	15.9%
BZ	529	993	945	78.6%	(4.8%)	485	914	88.5%
BZ – Condensate	161	377	262	62.7%	(30.5%)	136	318	>100.0%

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, sales revenue of petrochemical and refining business was Baht 310,044 million, increasing by Baht 55,066 million or 21.6% primarily from the increase in sales revenue of refinery business mainly due to the increase in selling price following the improved referenced price in global market as well as PTT Group refineries' utilization rates increased from 87.5% in 3Q2021 to 101.5% in 4Q2021 following higher demand of refined products after re-opening of countries and easing of lockdown restriction, including GC's planned refinery maintenance shutdown in 3Q2021 for 25 days, IRPC's Hyvahl unit of RDCC plant maintenance shutdown in 3Q2021 for 45 days, and TOP's plant optimization as a result of market situation.

Overall sales revenue of petrochemical business is stable compared to 3Q2021. Olefins business has lower sales volume due to the decrease in utilization rates despite the increase in selling prices of PE following the increase in crude oil price and higher demand from the easing of lockdown in many countries.

EBITDA of petrochemical and refining business in 4Q2021 were Baht 23,573 million decreasing by Baht 6,687 million from Baht 30,260 million in 3Q2021. There was operating income of Baht 13,662 million in 4Q2021, decreasing by Baht 6,741 million when compared to Baht 20,403 million in 3Q2021, details as follows:

- **Petrochemical performance** decreased mainly from aromatics business from lower PX and BZ spread due to the decrease in demand of downstream producer such as Polyester and Styrene Monomer producers as a result of China's energy control policy. Olefins business also decreased due to the higher naphtha and LPG prices which increased at higher proportion to the increase in PE price as well as the decrease in sales volume due to decrease in utilization rates mainly due to planned maintenance shutdown from both GC's OLE and POL plants of HDPE plant for 14 days, LDPE plant for 15 days and LLDPE plant for 20 days in 4Q2021.
- **Refinery performance** increased, according to the higher Accounting GRM from US\$ 3.2 per bbl in 3Q2021 to US\$ 5.9 per bbl in 4Q2021 due to Market GRM increased from US\$ 2.1 per bbl in 3Q2021 to US\$ 5.5 per bbl in 4Q2021 mainly from the increase in most of all petroleum product spreads due to easing of lockdown. However, there was slightly decreased stock gain (There was stock gain of US\$ 1.8 per bbl in 4Q2021 versus US\$ 3.3 per bbl in 3Q2021) despite higher sales volume as aforementioned.

Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of petrochemical and refining business was Baht 310,044 million, increasing by Baht 118,973 million or 62.3% primarily due to refinery business mainly from the increase in selling price as aforementioned. Moreover, PTT Group refineries' utilization rates increased from 95.3% in 4Q2020 to 101.5% in 4Q2021 and sales volume increased due to economic recovery and easing of travel restrictions.

The sales revenue of petrochemical business also increased from both olefins business from higher selling prices of PE following the increase in crude oil price and the easing of Lockdown and aromatics business due to higher selling prices of BZ and PX due to the increase in crude oil price despite the lower utilization rate in line with market situation.

EBITDA of petrochemical and refining business in 4Q2021 were Baht 23,573 million increasing by Baht 4,830 million from Baht 18,743 million in 4Q2020. There was operating income of Baht 13,662 million in 4Q2021, increasing by Baht 3,718 million when compared to Baht 9,944 million in 4Q2020 details as follows:

- **Refinery performance** increased, according to the higher Accounting GRM from US\$ 2.5 per bbl in 4Q2020 to US\$ 5.9 per bbl in 4Q2021 due to Market GRM increased from US\$ 1.6 per bbl in 4Q2020 to US\$ 5.5 per bbl in 4Q2021 mainly from the increase in most of all petroleum product spreads due to the relaxing of Lockdown. Moreover, there was slightly increased stock gain (There was stock gain of US\$ 1.8 per bbl in 4Q2021 versus US\$ 1.5 per bbl in 4Q2020).
- **Petrochemical performance** decreased mainly from olefins business due to the decrease in product spreads following the increase in naphtha and LPG price which increased at higher proportion to the increase in PE price as well as the lower sales volume from maintenance shutdown in 4Q2021 as mentioned.

Year 2021 compared with Year 2020

In 2021, sales revenue of petrochemical and refining business was Baht 1,037,276 million, increasing by Baht 308,708 million or 42.4% primarily due to the increase in sales revenue of refinery business mainly from the increase of oil price. However, PTT Group refineries' utilization rates slightly decreased from 96.2% in 2020 to 95.2% in 2021 because GC had refinery maintenance shutdown in 2021 as mentioned.

Overall sales revenue of petrochemical business also increased mainly due to olefins business from higher selling prices of PE as the increase in feed cost as well as the increase in sales volume of PP. Moreover, sales revenue of aromatics business increased following the higher selling prices of PX and BZ due to the rise in crude oil price and the increase in sales volume of BZ and PX as economic rebounded.

EBITDA of petrochemical and refining business in 2021 were Baht 120,733 million increasing by Baht 100,095 million from Baht 20,638 million in 2020. There was operating income of Baht 81,788 million in 2021, increasing by Baht 98,342 million when compared to loss of Baht 16,554 million in 2020, details as follows:

- **Refinery performance** increased, according to the higher Accounting GRM from loss of US\$ 0.4 per bbl in 2020 to gain of US\$ 5.1 per bbl in 2021 due to higher stock gain (There was stock gain of US\$ 3.3 per bbl in 2021 versus stock loss of US\$ 1.7 per bbl in 2020). Moreover, Market GRM increased from US\$ 1.0 per bbl in

2020 to US\$ 2.9 per bbl in 2021 from the increase in most of all petroleum product spreads mainly due to the increase in gasoline product spreads.

- **Petrochemical performance** increased from both olefins and aromatics business due to the increase in overall product spreads due to the higher demand as the economic recovery. Moreover, sales volume of aromatics business increased as there was GC's Aromatics plant 2 maintenance shutdown for 19 days in 2020.



3. New Business and Infrastructure Group

	4Q2020	3Q2021	4Q2021	%Inc. (Dec.)		2020	2021	%Inc. (Dec.)
				YoY	QoQ			
Power sales volume (GWh)	4,984	4,659	5,295	6.2%	13.7%	19,667	20,148	2.4%
Steam sales volume (Thousand tons)	3,739	3,866	3,741	0.1%	(3.2%)	13,871	15,090	8.8%

Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, sales revenue of New Business and Infrastructure group was Baht 24,263 million, increased by Baht 4,825 million or 24.8% mainly from GPSC. This was due to the higher electricity sales volume and Energy Payment (EP) of Independent Power Producer (IPP) from Sriracha Power Plant according to higher energy dispatch to EGAT. Moreover, Availability Payment (AP) of GHECO-One Power Plant also increased due to there was unplanned maintenance shutdown in previous quarter.

EBITDA in 4Q2021 was Baht 4,423 million, decreased by Baht 755 million or 14.6% mainly from the lower gross profit of GPSC despite higher sales revenue as mentioned. This was due to lower gross profit of Small Power Producer (SPP) mainly from increasing natural gas cost. In addition, electricity and steam sales volume to industrial customers also decreased as there was customers' planned maintenance shutdown in this quarter. Therefore, the operating income in 4Q2021 was Baht 1,682 million, decreasing by Baht 738 million or 30.5% from previous quarter. As a result, the overall performance of New Business and Infrastructure group decreased mainly from GPSC's lower performance following the lower EBITDA and lower share profit from Xayaburi Power Plant as there was lessen electricity generation due to lower water level during the season, despite there was recognized partial insurance claim of Glow Energy Phase 5 in this quarter.

Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of Technology and Engineering business group was Baht 24,263 million, increasing by Baht 5,950 million or 32.5% mainly from the higher sales revenue of GPSC. This was mainly from higher EP revenue of IPP power plants following higher dispatch volume to EGAT as well as higher revenue of SPP power plants from the increases in electricity and steam selling prices.

EBITDA in 4Q2021 was Baht 4,423 million, decreasing by Baht 605 million or 12.0% mainly due to the lower gross profit of GPSC resulting from the drop in SPP power plants' gross profit. This was due to higher natural gas and coal costs, together with Glow Energy Phase 5 Power Plant's maintenance shutdown, which led to the decrease in gross profit margin on electricity and steam sales to industrial customers. In this regard, operating income in 4Q2021 was Baht 1,683 million, decreasing by Baht 763 million or 31.2% from the decrease in EBITDA, as mentioned. This resulted in lower overall performance of New Business and Infrastructure group mainly from GPSC's performance following the lower EBITDA,

dividend income from Ratchaburi Power Company Limited (RPCL) and share of profit from Xayaburi Power Plant, despite there was recognized partial insurance claim of Glow Energy Phase 5 in this quarter.

Year 2021 compared with Year 2020

In 2021, sales revenue of New Business and Infrastructure group was Baht 81,262 million, increasing by Baht 5,036 million or 6.6% mainly from GPSC. This was due to the increase in revenue of SPP power plants from higher electricity and steam sales volume together with the increase in EP revenue of IPP power plants from higher electricity dispatch to EGAT.

EBITDA in 2021 was Baht 20,918 million, decreasing by Baht 1,242 million or 5.6% mainly from GPSC's lower gross profit. This was due to lower gross profit of SPP power plants from higher natural gas and coal costs. In addition, gross profit of IPP power plants also decreased from GHECO-One Power Plant's planned maintenance shutdown in the first quarter and unplanned maintenance shutdowns in second and third quarter, resulting in decreases of AP and EP revenues. In this regard, in 2021, operating income was Baht 10,182 million, decreasing by Baht 1,521 million or 13.0% from lower EBITDA as mentioned. As a result, the overall performance of New Business and Infrastructure group decreased mainly from GPSC which had lower performance, despite higher share of profit from Xayaburi Power Plant due to higher water level compared to last year which facing drought situation.

Overall performance of PTT and its subsidiaries

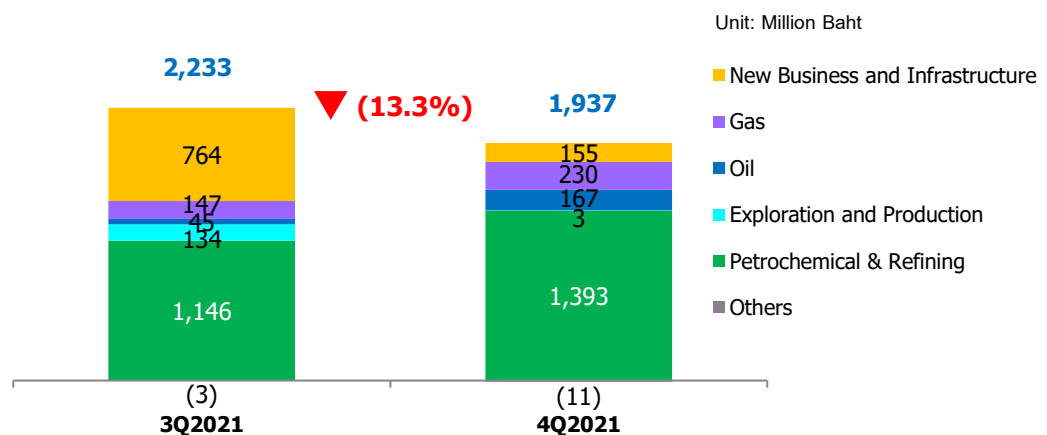
Fourth quarter of 2021 compared with Third quarter of 2021

In 4Q2021, PTT and its subsidiaries' sales revenue was reported at Baht 688,837 million, increased by Baht 129,949 million or 23.3% from 3Q2021 primarily from the increased revenues of International Trading business, Petrochemical and Refining businesses, and Oil business due to higher average selling prices according to increasing in global oil prices, together with higher sales volume from the recovery of economic activities due to the easing of COVID-19 Lockdown. Moreover, Gas business's revenue increased mainly from the higher average selling prices of S&M and GSP despite the decrease in overall gas sales volume compared to the previous quarter.

EBITDA in 4Q2021 was Baht 101,271 million, decreased by Baht 9,251 million or 8.4% mainly from the decrease in the performance of Petrochemical and Refining businesses due to lower petrochemical product spreads of both aromatics and olefins. Meanwhile, the Refinery performance increased due to the higher Accounting GRM from US\$ 3.2 per bbl in 3Q2021 to US\$ 5.9 per bbl in 4Q2021 following the increase in most of all petroleum product spreads. However, PTT Group's stock gain decreased approximately Baht 3,400 million because the crude lower oil prices increased in lower extent compared to the previous quarter. The performance of Gas business also decreased mainly from S&M and NGV businesses according to higher gas cost despite GSP improved performance improved due to the rise of average selling prices following the higher referenced petrochemical prices. In addition, the performances of Exploration and Production business improved due to the increase in average selling prices.

The depreciation and amortization expenses of 4Q2021 were Baht 33,851 million, decreased by Baht 5,444 million or 13.9% mainly from Bongkot project of PTTEP.

Share of profit from investments in joint ventures and associates



In 4Q2021, the share of profit from investments in joint ventures and associates was Baht 1,937 million, decreased by Baht 296 million or 13.3% mainly from the lower performance of associates in New Business and Infrastructure business from Xayaburi Power Plant as the decrease in water volume as a result of seasonal factor.

In 4Q2021, there was loss on derivatives amounting to Baht 172 million, decreased by Baht 11,596 million or 98.5% from 3Q2021 which was loss Baht 11,768 million. This was mainly due to loss on oil price hedging instruments from GC, TOP, PTTT and PTTEP due to lower extent of the crude oil prices' increase compared to the previous quarter.

In 4Q2021, gain on foreign exchange rate was Baht 5,139 million, increased by Baht 11,544 million or more than 100.0% mainly due to higher unrealized loss on foreign currency loan (US Dollar loan) as a result of Baht appreciation in this quarter compared to Baht depreciation in the previous quarter (Thai Baht appreciation in 4Q2021 of Baht 0.50 per US Dollar, Thai Baht depreciation in 3Q2021 of Baht 1.87 per US Dollar).

Finance costs was Baht 7,153 million in 4Q2021 which was close to 3Q2021.

In 4Q2021, there was the loss from non-recurring items (PTT's portion) amounting to Baht 6,931 million mainly from the impairment loss (after tax) of PTT Group's assets approximately by Baht 7,000 million primarily from PTTEP's Mozambique Area 1 Project and Yetagun Project, PTT's NGV business, and GC's U.S. Petrochemical Project. Moreover, there was PTT's recognition of Take or Pay of Myanmar gas to government according to the resolution of CEPA approximately by Baht 2,700 million together with loss from restructuring of Emery Group of GC approximately by Baht 1,000 million net off PTT's benefit from discount from production shortfall approximately of Baht 1,700 million and gain on disposal of gas pipeline business in Egypt of PTTER approximately of Baht 1,400 million, and benefit from lawsuit approximately of Baht 1,000 million. While, in 3Q2021, there was the recognition of non-recurring items amounting to Baht 459 million mainly from PTT's the write-off on obsolete materials and supplies approximately by Baht 700 million.

The corporate income taxes in 4Q2021 was Baht 19,648 million, increased by Baht 4,240 million or 27.5% resulted primarily from Exploration and Production business.

As previously mentioned, this was resulted in PTT and its subsidiaries' net profit in 4Q2021 amounting to Baht 27,544 million increased by Baht 3,891 million or 16.5% from net profit of Baht 23,653 million in 3Q2021.

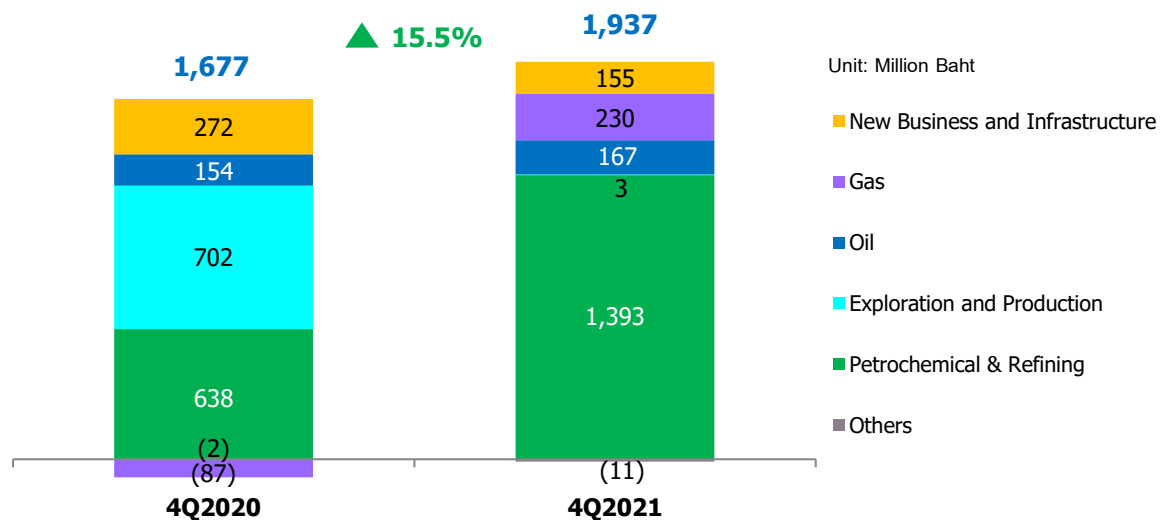
Fourth quarter of 2021 compared with Fourth quarter of 2020

In 4Q2021, sales revenue of PTT and its subsidiaries was reported at Baht 688,837 million, increased from 4Q2020 by Baht 281,663 million or 69.2% from all businesses. Sales revenue of International Trading business, Petrochemical and Refining businesses, Oil business, and Gas business increased due to higher average selling prices following the rise in global petroleum and petrochemical product prices. In addition, Exploration and Production business's revenue increased mainly from the rise of both average selling prices and sales volume.

In 4Q2021 EBITDA was Baht 101,271 million, increased by Baht 29,657 million or 41.4% mainly from the increase in Exploration and Production business's performance due to higher average selling prices and sales volume primarily from the acquisition of Oman Block 61 in March 2021 and the first gas production in February 2021 of Malaysia Block H Project. Petrochemical and Refining businesses's performance increased due to Refining business's performance as Accounting GRM increased, from US\$ 2.5 per barrel in 4Q2020 to US\$ 5.9 per barrel in 4Q2021 following higher spread of most products from easing of lockdown as well as higher sales volume. However, Petrochemical business's performance decreased due to the drop in olefins product spreads. Moreover, Gas business's performance also improved primarily due to the GSP businesses from the higher average referenced selling prices despite the increase in gas cost as aforementioned.

The depreciation and amortization expenses of 4Q2021 were Baht 33,851million, decreased by Baht 972 million or 2.8% mainly from Bongkot project of PTTEP.

Share of profit from investments in joint ventures and associates



In 4Q2021, the share of profit from investments in joint ventures and associates was Baht 1,937 million, increasing by Baht 260 million or 15.5% primarily from higher performance of joint venture in Petrochemical and Refining businesses due to the rise in petrochemical prices mainly from Acrylonitrile (AN) and Polyvinyl Chloride (PVC).

In 4Q2021, loss on derivatives was Baht 172 million, loss decreasing by Baht 4,412 million or 96.2% from loss on derivative of Baht 4,584 million in 4Q2020 mainly due to lower loss on oil price hedging transactions from PTTT, GC, PTTEP, and TOP.

There was gain on foreign exchange rate in 4Q2021 by Baht 5,139 million, decreased by Baht 3,672 million or 41.7% mainly due to lower unrealized gain of US currency loans as a result of the lower appreciation of Thai Baht against US Dollar in 4Q2021 compared to the 4Q2020. (In 4Q2021 Thai Baht appreciation of Baht 0.50 per US Dollar, in 4Q2020 Thai Baht appreciation of Baht 1.62 per US Dollar).

Finance costs was Baht 7,153 million in 4Q2021 which was close to 4Q2020.

In 4Q2021, there was the recognition of non-recurring items (PTT's portion) amounting to Baht 6,931 million as aforementioned; whereas, in 4Q2020, there was the recognition of non-recurring items amounting to Baht 7,696 million mainly from impairment loss approximately by Baht 8,000 million mainly from PTTGM's coal assets and PTTEP's Yetagun Project.

The corporate income taxes in 4Q2021 was Baht 19,648 million, increased by Baht 11,306 million or more than 100.0% mainly from the increase in operating income taxes following the higher performance of PTT Group in 4Q2021.

As aforementioned, this was resulted in PTT Group's net profit in this quarter amounting to Baht 27,544 million, which increased by Baht 14,397 million or more than 100.0% from the net profit amounting to Baht 13,147 million in 4Q2020.

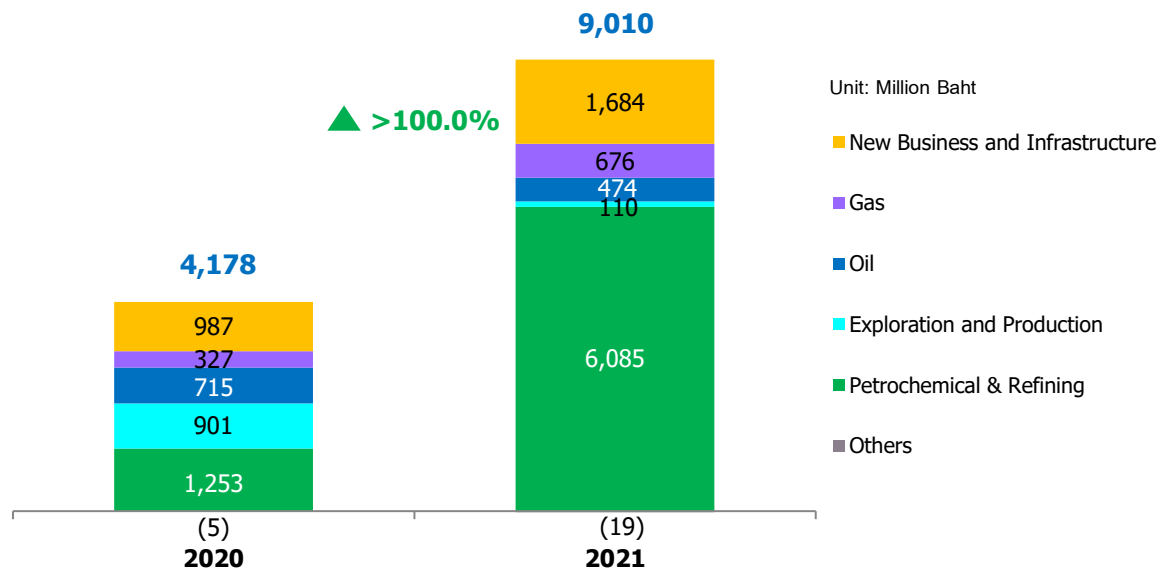
Year 2021 compared with Year 2020

In 2021, sales revenue of PTT and its subsidiaries was reported at Baht 2,258,818 million, increased from 2020 by Baht 643,153 million or 39.8% from all businesses mainly from International Trading business, Petrochemical and Refining businesses, and Oil business due to higher average selling prices following the recovered economic activities from last year.

EBITDA in 2021 was Baht 427,956 million, increased by Baht 202,284 million or 89.6%. This was mainly from Petrochemical and Refining businesses which significantly improved from the increase in Accounting GRM, from loss US\$ 0.4 per barrel in 2020 to gain US\$ 5.1 per barrel in 2021. In addition, petrochemical product spreads both of olefins and aromatics were increased. Besides, PTT Group had stock gain approximately by Baht 46,000 million in 2021 following the rise of crude oil price, while in 2020, there was stock loss approximately by Baht 19,000 million. Furthermore, Exploration and Production business's performance enhanced according to the higher sales volume and average selling prices. The performance of Gas business increased mainly from GSP and S&M businesses due to the higher average selling prices and sales volume. Moreover, International Trading business's performance increased from the improved spreads of domestic crude and condensate together with higher sales volume.

The depreciation and amortization expenses of 2021 were Baht 146,790 million, increased by Baht 6,910 million or 4.9% mainly from PTTEP due to the acquisition of Oman Block 61 Project, additional completed assets from S1 Project despite lower in Bongkot project.

Share of profit from investments in joint ventures and associates



In 2021, the share of profit from investments in joint ventures and associates was Baht 9,010 million, increasing by Baht 4,832 million or over 100.0%. This was primarily from higher performance of joint venture in Petrochemical and Refining businesses due to higher petrochemical prices and product spreads together with higher performance of associates in New Business and Infrastructure Business from Xayaburi Power Plant regarding drought situation 2020.

In 2021, loss on derivatives increased by Baht 34,224 million, from gain on derivatives of Baht 2,266 million in 2020 to loss on derivatives of Baht 31,958 million in 2021 mainly due to loss on oil price hedging transactions from PTTEP, PTTT, PTT, IRPC, TOP and GC due to an upward trend of oil price in 2021

Loss on foreign exchange rate increased by Baht 15,739 million from gain on foreign exchange rate Baht 9,270 million in 2020 to loss on foreign exchange rate by Baht 6,469 million in 2021 mainly due to unrealized loss of US currency loans as a result of Baht depreciation compared to Baht appreciation in the same period of last year (Thai Baht depreciation in 2021 of Baht 3.38 per US Dollar, while Thai Baht appreciation in 2020 of Baht 0.12 per US Dollar).

In 2021, there was the loss from non-recurring items (PTT's portion) amounting to Baht 6,945 million mainly from PTT's Group impairment loss approximately by Baht 9,000 million from PTTEP, PTT, and GC as aforementioned. Also, there were PTTEP's partial write-off the assets in the exploration project in Brazil approximately by Baht 2,900 million and PTT's recognition of Take or Pay approximately by Baht 2,700 million together with loss from restructuring of Emery Group of GC approximately by Baht 1,000 million. In addition, PTT's write-off on obsolete materials and supplies approximately by Baht 700 million while there were PTTEP's gain on bargain purchase in Oman Block 61 approximately by Baht 7,000 million, PTT's benefit from discount from production shortfall approximately by Baht 1,700 million, gain on disposal of gas pipeline business in Egypt of PTTER approximately by Baht 1,400 million and benefit from lawsuit approximately by Baht

1,000 million. Meanwhile, in 2020, there was the loss from non-recurring items) amounting to Baht 9,478 million mainly from impairment loss on assets approximately Baht 9,000 million from PTTGM's coal assets and Mariana Oil Sands Project and Yetagun Project of PTTEP.

Finance costs was Baht 28,163 million in 2021 which was close to 2020.

The corporate income taxes in 2021 was Baht 67,590 million, increased by Baht 42,424 million or over 100.0% mainly from the better performance of PTT Group.

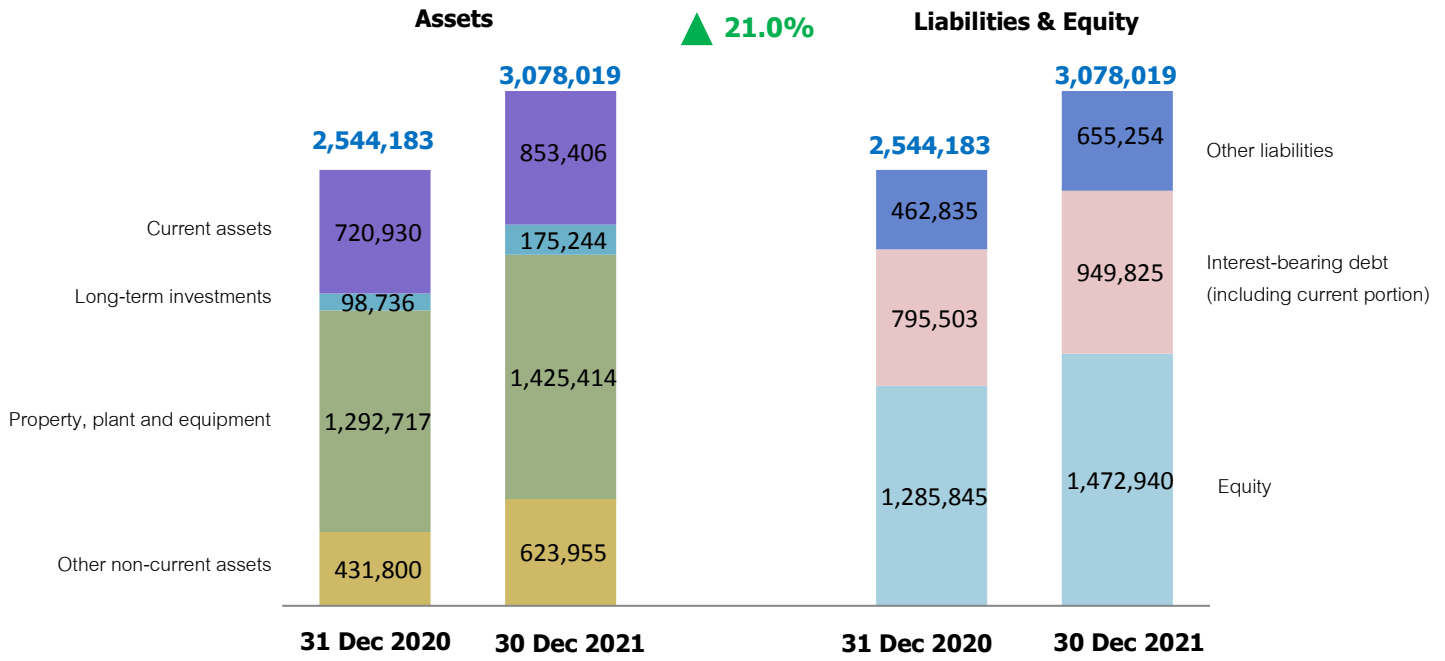
As aforementioned, this was resulted in PTT Group's net profit in 2021 amounting to Baht 108,363 million increased by Baht 70,597 million or over 100.0% from the net profit amounting to Baht 37,766 million in 2020.



The analysis of PTT Group consolidated financial position

As of December 31, 2021 compared with December 31, 2020

Unit: Million Baht



Assets

As of 31 December 2021, total assets of PTT Group were Baht 3,078,019 million, increasing by Baht 533,836 million or 21.0% compared with 31 December 2020 mainly from the net effect as follows:

: Current assets increased by 132,476 million or 18.4% mainly from the following:

- Cash and cash equivalents and current investments decreased by Baht 55,284 million mainly from the purchases of business in the Oman Project Block 61 of PTTEP, the investment in CAP and Clean Fuel Project (CFP) of TOP despite the issued ordinary shares of OR and the increase in long-term borrowing of GC.
- Trade accounts receivables increased by Baht 85,715 million mainly from higher average selling prices and sale volume of PTT, GC, PTTT, OR, and TOP.
- Inventories increased by Baht 75,467 million due to higher prices of crude oil and refined products from GC, TOP, IRPC, PTT, and OR.

: Long-term investments increased by Baht 76,508 million or 77.5% mainly from TOP's investment in CAP and GPSC's investment in Avaada.

: Property, plant, and equipment (PPE) increased by Baht 132,697 million or 10.3% mainly from PTTEP's business acquisition of Oman Block 61, TOP's additional construction in progress of CFP and GC's acquisition of Allnex.

: Other non-current assets increased by Baht 192,155 million or 44.5% mainly from the increase in intangible asset and goodwill of GC from acquisition of Allnex.

Liabilities

As of 31 December 2021, PTT Group had total liabilities of Baht 1,605,079 million, increasing by Baht 346,741 million or 27.6% from 31 December 2020, mainly from the following:

: Other liabilities increased by Baht 192,419 million or 41.6% from the increase in trade accounts payables due to the increase in overall purchase prices from GC, PTT, and PTTT.

: Interest-bearing debt increased by Baht 154,322 million or 19.4% due to the increase in long-term loans and bonds amounting to Baht 135,362 million mainly from GC, PTT, and TOP. Additionally, Short-term loan was increase Baht 7,520 million mainly from PTTT and GC.

Equity

As of 31 December 2021, PTT Group had total shareholders' equity of Baht 1,472,940 million, increasing by Baht 187,095 million or 14.6% from 31 December 2020 as PTT Group reported 2021 net income amounting to Baht 108,363 million. Additionally, non-controlling interests increased by Baht 62,438 million mainly from issued ordinary shares of OR and gain of subsidiaries.

Liquidity

For the year-ended 31 December 2021, PTT Group had net decrease in cash and cash equivalents amounting to Baht 19,302 million. There was cash and cash equivalents at the beginning of the period of Baht 332,032 million. As a result, cash and cash equivalents at the end of the period was Baht 312,730 million. Details of cash flow by activities are as follows:

	Unit: Million Baht
	PTT Group
Net cash provided by operating activities	322,425
Net cash used in investing activities	(385,308)
Net cash provided by financing activities	46,190
Effects of exchange rates on cash and cash equivalents	2,737
Exchange differences on translation	(5,015)
Net decrease in cash and cash equivalents during the period	(18,971)
Cash and cash equivalents classified as assets held for sales	(331)
Cash and cash equivalents at the beginning of the period	332,032
Cash and cash equivalents at the end of the period	312,730

Net cash provided by operating activities of Baht 322,425 million was derived from Baht 219,658 million of profit before income taxes, adjusted to net cash provided by (used in) operating activities. The increase in net cash flow from operating activities mainly resulted from Baht 146,790 million of depreciation and amortization expenses, Baht 28,163 million of finance costs, Baht 18,978 million of loss on foreign exchange rate. The decrease in net cash flow from operating activities mainly resulted from Baht 10,694 million of gain on bargain purchase, Baht 9,010 million of share of profit from investments in joint ventures and associates, the change in net operating assets resulting in the decrease in cash flow of Baht 40,267 million and income taxes paid of Baht 50,648 million.

Net cash used in investing activities was Baht 385,308 million mainly resulted from the following:

: The cash outflow of business acquisition and other long-term investments amounting to Baht 263,750 million, mainly from GC's acquisition of Allnex, investment in Oman Block 61 project by PTTEP and the investment in associates of TOP and GPSC.

: The cash outflow of investments in property, plant and equipment, investment property, intangible assets, and exploration and evaluation assets amounting to Baht 142,252 million, mainly due to additional investment in exploration and production assets in S1 Project, Mozambique Area 1 Project, and G2/61 Project of PTTEP, additional investment of TOP's CFP and expand the capacity of electricity and steam of TOP SPP Company Limited (TOP SPP), GC's Olefins Reconfiguration project, LNG receiving terminal at Nong Fab of PTT LNG Company Limited (PTTLNG), and PTT's the 5th transmission pipeline project.

: The cash inflow from short-term investment in financial assets totaling Baht 34,304 million, mainly from the investment in fixed deposits, treasury bills and government bonds of PTT amounting to Baht 35,741 million.

Net cash provided by financing activities was Baht 46,190 million, mainly from the following:

: The net cash inflow of long-term loans amounting to Baht 93,760 million mainly from PTT, GC, and TOP.

: The net cash inflow of issuance of ordinary shares of subsidiaries amounting to Baht 53,800 million mainly from OR.

: The net cash inflow of short-term loans amounting to Baht 5,648 million mainly from PTTT and GC.

: Dividend payment amounting to Baht 78,469 million mainly from PTT, GC, and PTTEP.

: Finance costs paid amounting to Baht 29,752 million mainly from GC, TOP, PTTEP, GPSC, and PTT.

Financial ratios and earnings per share of PTT Group

Financial Ratio	Unit	2020	2021
<u>Liquidity Ratios</u>			
Current ratio	Times	2.42	1.73
Quick ratio	Times	1.77	1.13
Accounts receivable turnover	Times	11.33	14.43
Collection period	Days	31.77	24.95
Accounts payable turnover	Times	10.76	11.69
Payment period	Days	33.45	30.79
<u>Profitability Ratios</u>			
Gross profit margin	%	10.46	16.67
Net profit margin	%	2.47	6.73
Return on equity	%	4.29	11.47
<u>Activity Ratios</u>			
Return on asset	%	1.59	5.41
Return on fixed assets	%	3.09	11.19
Total asset turnover	Times	0.64	0.80
<u>Solvency Ratios</u>			
Debt to equity	Times	0.62	0.64
Interest coverage	Times	9.74	12.54
<u>Earnings per share</u>			
Earnings per share	Baht/share	1.32	3.79

Note:

Current ratio	=	Current assets divided by Current liabilities
Quick ratio	=	(Cash and cash equivalent + Current investments + Accounts receivable) divided by Current Liabilities
Accounts receivable turnover	=	Sales and service income divided by Average accounts receivable
Collection period	=	360 divided by Accounts receivable turnover
Accounts payable turnover	=	Cost of sales and services divided by Average accounts payable
Payment period	=	360 divided by Accounts payable turnover
Gross profit margin	=	Gross profit divided by Sales and service income
Net profit margin	=	Net profit divided by Sales and service income
Return on equity	=	Net profit divided by Average shareholders' equity
Return on asset	=	Net profit divided by Average total assets
Return on fixed assets	=	Net profit divided by Average total fixed assets
Total asset turnover	=	Sales and service income divided by Average total assets
Debt to equity	=	Interest bearing debt divided by Total shareholder's equity
Interest coverage	=	(Net cash flow from operating activities + Taxes paid from operating activities) divided by Finance costs paid
Earnings per share	=	Net income attributable to ordinary shareholders divided by the weighted average number of ordinary shares which are held by third parties during the periods

Economic Outlook for 2022

The world economy in 2022 is expected to expand at a slower rate from 2021, especially in the first half of 2022, due to the reimposition of stricter COVID-19 containment measures in several countries compared to the end of 2021, the shortages of key inputs, global supply chain disruptions, commodity and energy prices stabilize at high levels, the Chinese government's tightening of lending regulation on real estate sector, and many central banks have started to tighten monetary policies to curb the continuing inflationary surge. While, it is expected that the Fed will raise interest rates in March. However, those pressures are expected to unwind in the second half of 2022, after the COVID-19 outbreak in several countries is expected to be contained, leading to gradually easing COVID-19 international travel restrictions and border controls, amid the widespread vaccinations and more effective treatment for COVID-19. Moreover, fiscal stimulus packages remain to support the economic recovery, despite smaller stimulus size than 2021. Downside risks to the world economy include the uncertainty of the spread of COVID-19 both for the current variants and a possible COVID-19 mutation in the future, global supply chain disruptions that could be prolonged and resulted in an accelerated rate of inflation, a sudden tightening of global financial conditions, geopolitical disputes, and extreme weather-related events. The IMF in January 2022 projected the global growth forecast for 2022 at 4.4%.

According to the IHS's report of January 2022, global oil demand in 2022 is expected to increase 4.0 MMBD to 100.8 MMBD following global economic recovery and expected lower impact of COVID-19 Omicron to oil demand. On supply, it is expected an increase oil production from OPEC+, Non-OPEC as well as from Iran toward settlement of nuclear agreement and the relief of sanction against Iran. In 2022, Dubai crude oil price is expected to average at US\$81-86 per barrel; whereas, Singapore GRM is expected to average at US\$5.4-6.4 per barrel.

Petrochemical prices in 2022 comparing to 2021. Olefins price is expected to stable due to new capacities despite the improve demand from economic recovery. Meanwhile, aromatics price is expected to increase, following expected higher crude oil and naphtha prices. However, aromatics spread over naphtha tends to decline because of the increase in new capacities.

- **Olefins prices** in 2022 is expected to stable from 2021, with average HDPE and PP prices are expected around US\$1,215 - 1,265 per ton, and US\$1,290 - 1,340 per ton, respectively, due to significant amount of new supply in Asia from both new capacities that came on schedule and delayed from 4Q2021 despite the improve demand from economic recovery.
- **Aromatics prices** in 2022 is expected to be higher, with average BZ and PX prices are expected around US\$960 – 1,010 per ton and US\$980 – 1,030 per ton, respectively, due to expected higher crude oil and naphtha prices. However, aromatics spread over naphtha tends to decrease due to new capacities in

China, and remained high inventory level. Although, the demand in Asia tends to improve from the better COVID-19 situation.

Thai economy in 2022 is expected to recover from 2021, as private consumption and private investment tend to recover, due to greater access to vaccines and easing COVID-19 containment measures which help resuming economic activities after COVID-19 outbreak showing sign of slowing with limited impact on the economy. Additionally, tourism is expected to improve, as Thailand resumed its quarantine-free entry program for vaccinated travelers (Test & Go scheme) since 1 February 2022, and tourist's home countries tend to ease travel restrictions. Merchandise exports are also expected to rise, boosted by global economic recovery, particularly in developing countries, and the participation of the Regional Comprehensive Economic Partnership (RCEP) agreement which effective in 2022. In addition, government spending is projected to continue growing, albeit momentum moderating due to smaller amount compared to last year, supported by the fiscal budget and the 500-billion-baht emergency loan. Meanwhile, the uncertainty of reopening plan relying on COVID-19 situation, coupled with supply chain disruptions, cost-push inflation, and higher household and corporate debt are likely to weigh down the economy. Thai economic recovery could face further downside risks, including the emergence of new COVID-19 variants, the tightening of global financial condition, rising geopolitical tensions, a higher likelihood of business and household debt defaults, and the rise of political risk in Thailand. The Fiscal Policy Office, in January 2022, expected Thai economy to grow 4.0% in 2022.

Major Project Plan

Gas Business Group: The progress of major projects

Pipelines Transmission Projects

- The 5th Transmission Pipeline (Rayong - Sai Noi – North/South Bangkok power plants)
 - Total Project Progress as of December 2021: 86.71% (Including 3 phases construction)
 - COD: December 2022

LNG Project:

Currently, PTT have long term LNG contracts with Qatargas, Shell, BP, and Petronas at 5.2 MTA and has a capability to procure LNG in order to fulfill the country demand growth in the future.

- **LNG Receiving Terminal #2:**

Total Project progress as of December 2021: 92.46%

- Total Capacity of 7.5 MTA be approved by the Cabinet meeting on 11 April 2017
 - The capacity of 2.5 MTA is scheduled to COD by the middle of 2022 and capacity of 5 MTA is scheduled to COD in December 2022
- **Other LNG Receiving Terminal Project (LNG Receiving Terminal 3):**
 - On 24 September 2019, the Cabinet approved the private entity selection, negotiations and the draft of the contract between Public Private Partnership (PPP) and the Industrial Estate Authority of Thailand (“IEAT”) on the development of Map Ta Phut seaport phase III (Section 1) as proposed by the Eastern Economic Corridor Office. Gulf MTP LNG Terminal Company Limited, a new joint venture company between PTT Tank Terminal Company Limited (“PTT Tank”) and Gulf Energy Development Public Company Limited (“GULF”) with shareholding of 30%, and 70%, respectively, is to proceed land reclamation with the investment cost of approximately Baht 12,900 million which is expected to be completed by 2023, as well as having the right to construct LNG terminal 3 phase 1 with the capacity not less than 5 million tons per annum. The LNG terminal 3 phase 1 has an investment cost approximately Baht 28,000 million which is expected to be completed by the year 2027.

Summary Planned Shutdown for Gas Separation Plants in 2021

Plant	1Q2021	2Q2021	3Q2021	4Q2021
GSP #2	SD (1 -2 Jan : 2 days)			
GSP #3		TD 70% (12 Apr : 1 day)	SD (23 - 30 Sep : 8 days)	SD (1 - 6 Oct : 6 days)
GSP #5	TD 27-50% (1 - 9 Jan : 9 days)	TD 50% (17 - 27 Apr : 11 days)		
GSP #6		TD 20% (13 Apr : 1 day)	Major SD (1 - 26 Jul : 26 days)	SD (7 -15 Oct : 9 days)
ESP	TD 40% (1 - 2 Jan : 2 days)		TD 60% (23 - 30 Sep : 8 days)	TD 60% (1 - 6 Oct : 6 days)

Summary Planned Shutdown for Gas Separation Plants in 2022

Plant	1Q2022	2Q2022	3Q2022	4Q2022
GSP #2		TD (1-23 May : 23 days)		
GSP #3		TD (1-23 May : 23 days)		
GSP #4			Major SD (1-20 Sep : 20 days)	
GSP #5				Minor SD (Dec 15 days)
ESP		Major SD (1-23 May : 23 days)		

*TD: Turndown

**SD: Shutdown

Summary of Sustainability Management Performance in 2021

PTT has committed to sustainability according to PTT by PTT aspiration (Powering Thailand's Transformation by Partnership & Platform, Technology for All and Transparency & Sustainability) by formulating the "PTT Sustainability Strategic Direction" incorporated in the "PTT Master Plan on Sustainability Management for Corporate Social Responsibility 2021-2025", focusing on managing sustainability issues in 3 dimensions; Environmental (E): Sustainable Production and Consumption, Social (S): People's Well-being, and Governance (G): Good Governance and Performance Excellence with clearly defined targets and plans.

In 2021, climate change risks had been increasingly considered as one of the most significant issues from stakeholders. Thailand is willing to be more aggressive in addressing climate change and will strive to achieve carbon neutrality by 2050, and net zero emissions by 2065. PTT is a national energy company; therefore, considered to take this issue as important input in setting company's long-term targets, strategic directions, and business plans in order to be one of the important mechanisms to drive the country towards a sustainable low-carbon society as follows:

- **Long-term goals and investment directions have been set to enhance the diversity of investment** to high-yield assets and accelerate investment in future energy and beyond to create sustainable growth in 3 areas as follows:
 - **New growth:** Creating the contribution from future energy and beyond more than 30% by 2030
 - **Business growth:** Core business targets are 9 MTA of LNG portfolio, 8 GW of conventional power and 12 GW of renewable energy
 - **Clean growth:** Aimed to reduce greenhouse gas (GHG) emission 15% from 2020 by 2030
- **The "3P" decarbonization pathway was defined as a framework for PTT and PTT Group to be the same direction** as follows:
 - **Pursuit of Lower Emissions:** Reduce GHG emissions as much as possible connected to Clean Growth, consisting of energy efficiency and optimization, renewable energy, carbon capture, utilization and storage, hydrogen power and carbon offset.
 - **Portfolio Transformation:** Adjust investment plans with future energy and beyond connected to the goal of generating growth from the future energy and increase the capacity of renewable energy.
 - **Partnership with Nature and Society:** Increase the amount of GHG sequestration from the atmosphere with the natural solution through planting and maintaining of reforestation including various green areas across the country in collaboration with the government and local communities.
- GHG emission target was revised and deployed to PTT Group in term of PTT Group carbon emission budget to control the total direct and indirect GHG emission in 5 years (2022-2026) of PTT to not exceeding 59.13 million tonnes of CO₂ equivalent and PTT Group to not exceeding 234.45 million tonnes of CO₂ equivalent.

PTT Group has prepared the 5-year investment plan during 2022-2026 with approximately Baht 9.4 hundred billion to restore economic according to the new vision framework and support Thailand's targeted industries. It consists of investments in future energy such as renewable energy, energy storage system, EV value chain, hydrogen, and the investments beyond the energy business such as life science business. In addition, the petrochemical business will expand to high-value products with high technology, transform the oil business to mobility and lifestyle, logistics and infrastructure business including artificial intelligence, robotics and digitalization, as well as the divesting the environmentally polluted businesses such as coal business, etc.

As a result of seriously driving the organization towards sustainability continuously, in 2021 PTT maintained to be listed as a member of Dow Jones Sustainability Indices (DJSI) for the 10th consecutive year in World Index and Emerging Market Index group. PTT was also listed in the Thailand Sustainability Investment (THSI), and awarded a Sustainability Awards of Honor, which is a result of being awarded the Best Sustainability Awards for the 3rd consecutive year in the Market Capital Group of more than Baht 100,000 million from the Stock Exchange of Thailand (SET), which reflects the listed company with continuous sustainable business operations.



In addition, to cope with the situation of the COVID-19 pandemic that has a wide and continuous impact, the PTT Group has closely monitored the situation. PTT are committed to take care of PTT Group personnel and their families by providing vaccines against COVID-19, including booster dose in order to be proper immune, and prevent the country's energy security mission from being interrupted. In addition, there are continuously supported all sectors in all levels of severity of the pandemic under PTT Group's "Giving Breath Project", that provides assistance to both medical personnel and the general public to reduce the rate of infection and the infected person can be maintained efficiently and in a timely manner. In addition, there are increase in employment rates, which will help the government budget to lighten burden.

The overview of the key sustainability performance and activities in 2021 according to the strategic directions in 3 dimensions, environmental, social and governance are summarized as follows:





Environmental: Sustain Production and Consumption



Developing towards low carbon society and environmental-friendly business operation

- PTT Group's absolute GHG Emission (Scope 1 และ Scope 2) is achieved the targets in 2021.
 - 30.60** million tonnes of CO₂ equivalent (PTT Group)¹
 - 11.29** million tonnes of CO₂ equivalent (PTT)¹
- Increasing the forest areas as well as carbon credits from reforestation projects to support the long-term target of reducing greenhouse gas emissions
- Collaborating with key governmental and private sectors, to advocate development of the energy and climate change national policy; for example, Ministry of Natural Resources and Environment, Ministry of Energy, the Carbon Neutral Thailand network, which was established by Thailand Greenhouse Gas Management Organization (public organization) etc.



Driving sustainable resource use by Circular Economy (CE)

- Applying of circular economy principles in business operations, with important pilot projects such as upcycling the lube container to traffic cones, the prototype of plastic cup receiving machine for Cafe Amazon to facilitate separation and collection of PET cups, which were later upcycled as tumblers
- Maintaining **zero** hazardous wastes to landfill, in accordance with the target



Social: People's Well-being



Promoting safe working environment and respecting human rights

- **zero** Lost Time Accident (LTA) of employee and contractor, in accordance with the target
- Total Recordable Injuries Rate (TRIR) of employee and contractor is **0** and **0.05** per 200,000 working hours respectively, in accordance with the target.
- **zero** human rights complaints



Creating social values and uplifting the society's quality of life

- **2%** of the total budget on social investment of the net operating profits according to the target
- **36%** of the donation budget compare with the total budget on social investment
- **25,489** person employed from Restart Thailand campaign
- **25** areas across the country was developed by enhancing innovation under the Smart Farming concept derived from PTT Group



¹ The data is being reviewed by external independent agencies

- **255** community products have been developed and enhanced, which generated more income for the community through the Smart Marketing
- **1,167,613** rai of forest and green area are PTT Reforestation Institute's planted and cared during 1994-2021
- **2.14** million tonnes of CO₂ equivalent per year, forest and green areas which managed by PTT Reforestation Institute can help capture GHG and support Thailand Voluntary Emission Reduction Program (T-VER) registration



Powering the workforce to support the future business growth



- **82%** Human Capital Index (HCI) is higher than target at 78%, considering from competence skill, employee engagement score and the opportunity to rotation for growth
- **80%** employee engagement score, higher than its benchmarking, APAC Best Employer in Oil and Gas business at 74%



Governance: Good Governance and Performance Excellence



Operating with good corporate governance and integrity



- Reviewing the good corporate governance policy, anti-fraud and corruption policy of PTT and PTT Group, including the corporate governance, ethical standards, and code of business ethics handbook, and distributed to all employees throughout the organization to raise PTT's standards to the international level
- No Non-Compliance cases in accordance with the target
- Participating in the Integrity and Transparency Assessment (ITA) of government agency with score **94.26** (A level)
- Receiving the NACC Integrity Award – Consolation Prize for the 10th by the National Anti-Corruption Commission (NACC)
- The assessment score of Governance, Risk and Compliance (GRC)'s culture has higher scores from the previous year; in **good corporate governance** aspect increased from 89% to 96%, **risk management and internal control** aspect increased from 88% to 97%, and **compliance** aspect increased from 88% to 97%



Appendix

Exploration and Production Business consists of PTT Exploration and Production Public Company Limited (PTTEP)

Natural Gas Business consists of PTT natural gas business unit, PTT Natural Gas Distribution Co., Ltd. (PTTNGD), PTT LNG Co., Ltd (PTTLNG), and PTT Global LNG Co., Ltd (PTTGL)

Coal Business consists of PTT Energy Resources Co., Ltd (PTTER), PTT Global Management Co., Ltd (PTTGM)

Oil Business consists of PTT Oil and Retail Business Public Company Limited (OR)

International Trading Business consists of PTT international business unit and PTT International Trading Pte. Ltd. (PTTT), PTT International Trading London Limited (PTTT LDN) and PTT International Trading USA Incorporated (PTTT USA)

Petrochemical and Refinery Business consists of PTT Global Chemical Public Company Limited (GC), Thai Oil Public Company Limited (TOP), IRPC Public Company Limited (IRPC), and PTT Tank Terminal Co., Ltd. (PTT TANK)

New Business and Infrastructure Business consists of PTT New Business and Infrastructure business unit, Global Power Synergy Public Company Limited (GPSC), PTT Energy Solution Co., Ltd. (PTTES), Energy Complex Co., Ltd. (EnCo) and PTT Digital Solutions Co., Ltd. (PTT DIGITAL)

Other Business consists of Business Services Alliance Co., Ltd. (BSA), PTT Green Energy Pte. Ltd. (PTTGE), PTT and PTT Treasury Center Co., Ltd. (PTT TCC)