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POWERING LIFE WITH FUTURE ENERGY AND BEYOND

56-1 One Report 2021
PTT Public Company Limited

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VISION

Powering Life with Future Energy and Beyond

MISSION

To conduct integrated energy and petrochemical business as the nation's energy company whose mission to equally respond to all stakeholders through the following aspects

STRATEGIC FRAMEWORK

POWERING LIFE WITH FUTURE ENERGY AND BEYOND

Aspiration

POWERING THAILAND'S TRANSFORMATION *by*

PARTNERSHIP & PLATFORM | TECHNOLOGY FOR ALL | TRANSPARENCY & SUSTAINABILITY

Strategic Direction

CORE STRENGTHENING

Resilience
Ensure resiliency
- Spend smarter/ Secure liquidity
- Optimize group value chain
- Ensure business continuity
- Safeguard customers & employees

Restart
Enhance competitiveness
- Synergize operation
- Maintain financial strength
- Build efficient & agile workforce
- Engage and retain customers

FOUNDATION *for* GROWTH

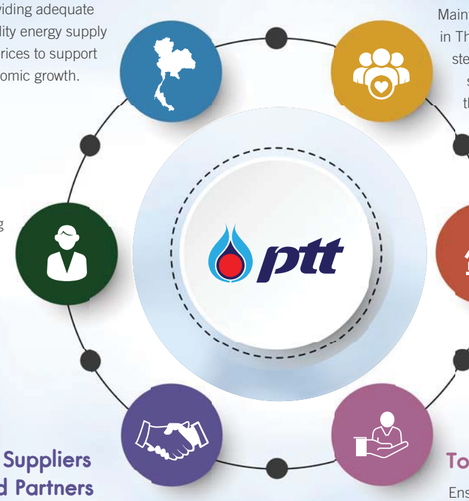
Reimagination
Initiate business action for the next normal
- Reimagine upstream
- Reinforce downstream
- Reignite new business at scale

Reform
Reform to enhance readiness
- Transform organization & structure for regulatory and environmental shift

Group Synergy - People - Finance - Communication

Mindset: Inside out + Outside in Values: SPIRIT

STAKEHOLDER



To Public Sector
Ensuring long-term energy security by providing adequate high-quality energy supply at fair prices to support economic growth.

To Society and Communities
Maintaining an excellent corporate standing in Thai society by exercising environmental stewardship of internationally accepted standards, and helping to improve the quality of life for the community and the wider society.

To Employees
Promoting capability building professionally and ensuring that employees' well-being is level with other leading companies.

To Investors
Operating profitable business that leads to sustainable growth, while generating optimum returns.

To Suppliers and Partners
Conducting fair business practice with all partners while promoting trust, good relationship, and cooperation to expand business capability and increase efficiency in long-term business partnership.

To Customers
Ensuring customers' satisfaction and loyalty by delivering world-class quality products and services at fair prices.

PTT VALUES

Synergy — Synchronize through partnership

Performance Excellence — Agile for excellence

Innovation — Invent future growth through innovation

Responsibility for Society — Reach sustainability with green economy and social care

Integrity & Ethics — Embed integrity & ethics to enhance good corporate citizenship

Trust & Respect — Tune-up trust through empowerment and respect

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PTT Information

Name	PTT Public Company Limited
Abbreviation	PTT
Registered Number	0107544000108

Type of Business
The Company's operated businesses consist of natural gas, gas transmission, international trading, new business and infrastructure business; the rest are invested through subsidiaries joint arrangements and associates, and PTT Group, namely exploration and production, liquefied natural gas, petrochemical and refining, oil and retail, power and utilities, coal and service businesses.

Registered Capital
THB 28,562,996,250 comprising 28,562,996,250 ordinary shares whose value is THB 1 per share
(as of December 31, 2021)

Issued and Fully Paid-up Capital
THB 28,562,996,250 comprising 28,562,996,250 ordinary shares whose value is THB 1 per share
(as of December 31, 2021)

Head Office
555 Vibhavadi Rangsit Road, Chatuchak,
Bangkok 10900, Thailand
Telephone: 66 (0) 2537-2000
Fax: 66 (0) 2537-3498-9
Website: www.pttplc.com

Corporate Communications
Telephone: 66 (0) 2537-2150-1
Fax: 66 (0) 2537-2171
E-mail: pttcorporatecommu@pttplc.com

Investor Relations
Telephone: 66 (0) 2537-3518-9
Fax: 66 (0) 2537-3948
E-mail: ptt-ir@pttplc.com

Office of the President
Telephone: 66 (0) 2537-3855
Fax: 66 (0) 2537-3883, 66 (0) 2537-3887
E-mail: corporatesecretary@pttplc.com

References
- Securities Registrar:
  Thailand Securities Depository Company Limited
  93, 14th Floor, The Stock Exchange of Thailand Building,
  Ratchadaphisek Road, Dindaeng,
  Bangkok 10400, Thailand
  Telephone: 66 (0) 2009-9999
- Auditor:
  EY Office Limited
  193/136-137, 33rd Floor, Lake Rajada Office Complex,
  Ratchadaphisek Road, Klongtoey,
  Bangkok 10110, Thailand
  Telephone: 66 (0) 2264-9090
  Fax: 66 (0) 2264-0789
- THB Debentures Registrar:
  Siam Commercial Bank Public Company Limited
  Registration 1, Markets Operations Division,
  15th Floor, North Wing, G Tower Grand Rama IX,
  9 Rama IX Road, Huai Khwang,
  Bangkok 10310, Thailand
  Telephone: 66 (0) 2128-2324-9, 66 (0) 2128-2326-9,
  66 (0) 2128-3540
  Fax: 66 (0) 2128-4625
  Bank of Ayudhya Public Company Limited
  Security Services Operations Department,
  AA Floor, 1222 Rama III Road, Bang Phongphang,
  Yan Nawa, Bangkok 10120, Thailand
  Telephone: 66 (0) 2296-2000 ext. 50604
  Fax: 66 (0) 2683-1302
- Legal Consultant for Debenture Issuance and Sales Offering
  Allen & Overy (Thailand) Company Limited
  23rd Floor, Sindhorn Tower III, 130-132 Wireless Road,
  Lumpini, Pathumwan, Bangkok 10330, Thailand
  Telephone: 66 (0) 2263-7600
  Fax: 66 (0) 2263-7699

Financial Highlights

		2019	2020	2021
Statement of Income	**(THB million)**			
Sales and Service Revenue		2,219,739	1,615,665	2,258,818
Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA)		288,972	225,672	427,956
Profit attribute to Equity Holders of the Company		92,951	37,766	108,363
Statement of Financial Position	**(THB million)**			
Total Assets		2,486,965	2,544,183	3,078,019
Total Liabilities		1,185,925	1,258,338	1,605,079
Non-controlling Interests of the Subsidiaries		422,436	403,805	466,244
Equity Attributable to Owners of the Company		878,604	882,040	1,006,696
Shares or Information about Common Shares				
Issued and Paid up Share Capital	(Million Share)	28,563	28,563	28,563
Book Value per Share	(THB)	30.76	30.88	35.24
Earnings per Share	(THB)	3.20	1.32	3.79
Dividend per Share	(THB)	2.00	1.00	2.00
Dividend Payout Ratio	(%)	62.5	75.8	52.8
Share Price at the End of the Period	(THB)	44.00	42.50	38.00
Average Share Price for Full Year	(THB)	46.50	37.50	38.97

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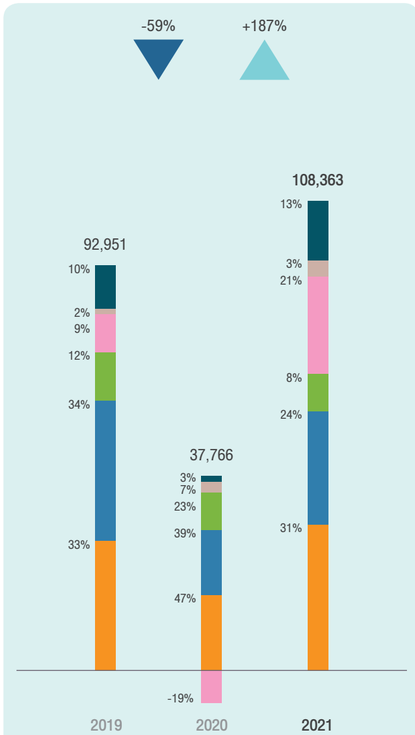
Financial Highlights

Sales and Service Revenue

THB **2,258,818** million

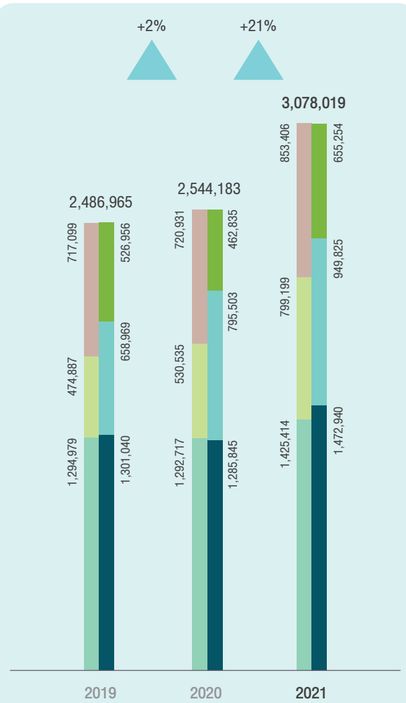
Net Income

THB **108,363** million



Statement of Financial Position

THB **3,078,019** million



Financial Ratios

Net Profit to Total Sales Revenue (%)	6.73
Return on Equity (%)	11.47
Return on Total Assets (%)	5.41
Debt to Equity (Times)	0.64
Net Debt2/ to Equity (Times)	0.40
Net Debt2/ to EBITDA (Times)	1.37
Interest Coverage (Times)	12.54

Remarks:
1/ Others such as coal business
2/ Net Debt = Interest Bearing Debt - Cash and Cash Equivalents - Short-Term Investments in Financial Assets.

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Milestone Achievement

Enhance the Competitiveness of Today's businesses

PTT supplied natural gas to sufficiently meet national demand by signing a 10-year (2021 - 2031) gas purchase agreement with the Electricity Generating Authority of Thailand (EGAT) for the Nam Phong Power Plant, valued over THB 53 billion. The new contract will be in line with the existing one ending on September 30, 2021 to support the current power generation of the Nam Phong Power Plant Blocks 1 and 2, including the Nam Phong Power Plant Replacement Project in Khon Kaen with a 650-megawatt capacity and scheduled commercial operation in 2025 according to Thailand's Power Development Plan (PDP) 2018 - 2037 to maintain power security in the Northeast and optimize the country's natural gas resources from the Sinphuhorm field.

The Sale and Purchase Contract of Oman Crude was signed between PTT and PTTEP Oman E&P Corporation and PTTEP MENA Ltd. for the 5 million barrels of Oman crude oil delivery from PTTEP from January - June 2022. This will provide further international trading opportunities, foster energy security, and generate revenue to Thailand.

PTT is prepared to become ASEAN Regional LNG Hub through the implementation of such projects as the first LNG Reloading Cargo to Japan, the successful export of LNG to Cambodia, and China, including the collaboration with EGAT to invest in the construction of the 2nd LNG Receiving Terminal Project in Nong Fab, Rayong, with a size of 7.5 million tons per annum (MTPA). PTT also established a team to study the possibility of a joint investment with EGAT in the Southern LNG Receiving Terminal project according to Thailand's PDP 2018 - 2037 to ensure energy security for the country.

ptt International Trading USA Inc

ptt MEA

PTT has officially operated the office of PTT International Trading USA Inc. (PTTT USA) in Houston, United States of America, and established PTT MEA Ltd. (PTTMEA) in the United Arab Emirates, increasing PTT's competitiveness and completing its trading network presence worldwide. PTT's capability will be raised to 24/7 monitor to handle the possible fluctuation of the global market, provide trading opportunities across regions, when demand and supply are imbalance.

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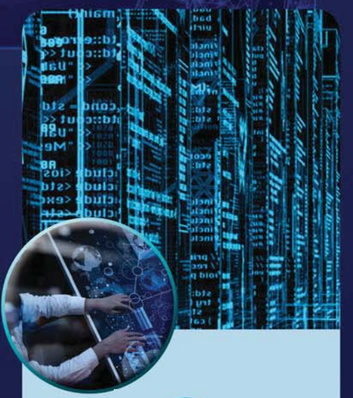
Expand investment in new potential businesses in line with the new vision

- **PTT expanded investment in life science business** by acquiring approximately 37% of the total issued capital of Lotus Pharmaceutical Co., Ltd. (LOTUS), a Taiwanese leading medicine manufacturer, by Innobic (Asia) Co., Ltd. (Innobic (Asia)) a wholly owned subsidiary of PTT. Innobic (Asia) has thus stepped up to be a major shareholder in LOTUS to create strong growth in new business for PTT Group as well as increase opportunities for patients in Thailand and the ASEAN to reach higher quality medicines.
- **PTT through Innobic (Asia) established a joint venture company with Nove Foods**, a subsidiary of NR Instant Produce Plc. (NRF), to be a leader in the fully integrated production and distribution of plant-based protein products, thereby pushing Thailand to be a global center of alternative protein food production.
- **Innopolymed Co., Ltd. (Innopolymed)**, a joint venture between IRPC and Innobic (Asia) was established to produce non-woven fabric from melt blown process, which are raw materials for the filtration in medical masks, N95 respirators, gowns, and air filters, which is an opportunity to enter the medical device industry to reduce imported medical supplies and leverage the country's medical device production competitiveness to international standard.

PTT established ARUN PLUS Co., Ltd. (ARUN PLUS) to operate a fully integrated EV Value Chain business. The Board of Directors of ARUN PLUS approved **the setting up of EVME PLUS Co., Ltd. (EVME PLUS)**, a wholly owned subsidiary of ARUN PLUS, to promote and create an EV ecosystem for the widespread use of EVs in Thailand, which includes EV rental services, information services for the charging and maintenance stations, etc.

PTT signed a Memorandum of Understanding with Hon Hai Precision Industry Co., Ltd. or Foxconn Group from Taiwan to study the setting up of an end-to-end production platform of electric vehicles (EV). The collaboration includes investment in EV industry in Thailand to provide EV design, manufacturing services and EV parts.

Global Renewable Power Co., Ltd. (GRP) invested 90% stake in Sheng Yang Energy's power plant business, which operates solar power generation in Taiwan with 55.8-megawatt capacity. Global Power Synergy Plc. (GPSC) investments **included a 25% stake in the Changfang & Xidao offshore wind power projects in Taiwan** with a capacity of 595 megawatts **and the acquisition of a 41.6% equity capital increase in Avaada Energy Private Ltd. (Avaada), a leading renewable energy operator in India** with 4,560-megawatt capacity to create opportunities and expand investments according to the business strategy to continuously grow in renewable energy.



MEKHA TECH

PTT established Mekha Technology Co., Ltd. (Mekha Tech) to invest in Public Cloud service business such as data storage & processing, and data management for various organizations, including PTT Group.

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Awards and Recognition

PTT focuses on operating sustainable business in all sectors, aiming for a *three-dimensional* balance:

SOCIAL
social management using PTT Group's expertise, innovation, and collaboration in creating model communities of wisdom and expanding nationwide in support of the well-being of people and communities in a sustainable manner

ENVIRONMENTAL
environmental management focusing on striking a balance between business growth and efficient resource consumption

GOVERNANCE
conducting business under good governance principles.

In 2021, PTT garnered *54 domestic and international awards*, prestigious rankings, and certifications from a total of *23 entities*.

Environmental

Rayong Gas Separation Plant received ASEAN-OSHNET Excellence Award for its outstanding occupational safety and health operation.
Every 2 years, the Labor Safety Division, Ministry of Labor, would select only 1 enterprise with outstanding safety and occupational health performance to represent Thailand in the ASEAN-level outstanding workplace model contest.

- **Awarded:** July 27, 2021
- **Awarded by:** ASEAN Occupational Safety and Health Network

PTT received the Outstanding Low Carbon and Sustainable Business Index (LCSi) Project Award for the 3rd consecutive year.

- **Awarded:** October 2021
- **Awarded by:** Thailand Greenhouse Gas Management Organization (Public Organization)

Rayong Gas Separation Plant won 3 awards for efficiency enhancement of industrial waste management:

1. 3Rs Award (Good Waste Management according to 3Rs Principles)
2. Zero Waste Achievement Award
3. 3Rs+ Award at the silver level for effective 3 Rs program in terms of creativity, economic return, and waste management efficiency.

- **Awarded:** October 2021
- **Awarded by:** Department of Industrial Works

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Environmental

PTT Reforestation and Ecology Institute won 3 awards from the 13th Thailand Tourism Award (Kinnari Award) in the natural attraction for learning and green area extension category:

1. Two Thailand Tourism Gold Awards (Excellence) in the learning attraction category for PTT Metro Forest Learning Center, Bangkok and Sirinart Rajini Mangrove Ecosystem Learning Center, Prachuap Khiri Khan,
2. Thailand Tourism Award (Outstanding) in the natural attraction category for Wangchan Forest Learning Center, Rayong.

- **Awarded:** October 11, 2021
- **Awarded by:** Tourism Authority of Thailand

Rayong Gas Separation Plant and Khanom Gas Separation Plant received the Green Industry Award, Level 5, Green Network.

- **Awarded:** November 29, 2021
- **Awarded by:** Ministry of Industry

Wangchan Valley is one of 15 projects certified as Smart City Development Zone according to the 5 criteria for Smart City Development of the Smart City Development Steering Committee:

1 Clearly defined areas and goals,
2. Guidelines for urban infrastructure development,
3. A secure city data storage and management system,
4. Smart city services according to 7 aspects, and
5. Sustainable management.

- **Awarded:** December 24, 2021
- **Awarded by:** Smart City Development Steering Committee, Smart City Thailand Office

Social

PTT won the Outstanding Role Model Organization Human Rights Award 2021 in the State Enterprise sector.

- **Awarded:** September 29, 2021
- **Awarded by:** Rights and Liberties Protection Department, Ministry of Justice

Nation-Building Institute
Corporate Nation-Building Award
(Private sector)
2021
Presented to
PTT Public Company Limited (Thailand)
In Recognition of
Your Valued Contributions to Nation-Building
8 September 2021
Prof. Dr. Kriengsak Chareonwongsak
Chairman of NBI International (NBII)
Dato' Dr. Jessie Tang
Chairman of NBI Malaysia

PTT received the Corporate Nation-Building Award in the Corporate Nation Building (Private) category at the 5th International Conference on Nation-Building: Strategic Recovery Innovation from Crisis and Nation Building.

- **Awarded:** October 2021
- **Awarded by:** Nation-Building Institute

PTT received the outstanding Thailand Energy Award for off-grid renewable energy from the project "Biogas Production and Distribution System from Community Pig Farms."

- **Awarded:** October 2021
- **Awarded by:** Department of Alternative Energy Development and Efficiency, Ministry of Energy

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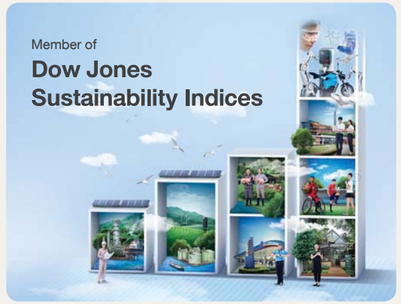
Governance

S&P Global Sustainability Award 2021 in Gold Class, with the highest score being the leader in the Oil & Gas Upstream & Integrated industry

- **Awarded:** February 2021
- **Awarded by:** S&P Global



PTT received a certificate of a model moral organization from Mrs. Yupha Taweewattanakitborvon, Permanent Secretary, Ministry of Culture, as PTT places a high value on the promotion and growth of morals inside the organization.

- **Awarded:** February 23, 2021
- **Awarded by:** Ministry of Culture

PTT won the Distinguished Issuer Award at the ThaiBMA Best Bond Awards 2020, an award given to issuers with an outstanding role in the private bond market development by continuously issuing debt securities and recognized by a wide range of investors for a long time.

- **Awarded:** April 1, 2021
- **Awarded by:** Thai Bond Market Association

PTT received 2 awards for excellent corporate governance in Asia at the 16th Asian ESG Award 2021 organized by Corporate Governance Asia Magazine:

1. Asian Corporate Director Award: Mr. Auttapol Rerkpiboon, President & CEO,
2. Asian's Icon on ESG Award for listed companies with exemplified sustainable business practices.

- **Awarded:** June 2021
- **Awarded by:** Corporate Governance Asia Magazine

PTT is the only Thai company on the FORTUNE 500 list, with the 206th ranking.

- **Awarded:** August 2021
- **Awarded by:** FORTUNE GLOBAL 500 Magazine

The Gas Compressor Project of the Wang Noi-Kaeng Khoi gas transmission system was assessed "Very good" for the Integrity Pact 2020.

- **Awarded:** October 2021
- **Awarded by:** The Comptroller General's Department, Ministry of Finance

PTT received 4 ASEAN-level awards from the 11th Institutional Investor Corporate Awards 2021:

1. The Strongest Adherence to Corporate Governance Award
2. Most Consistent Dividend Policy Award
3. Most Organized Investor Relations Award
4. Best Annual Report in Thailand Award

- **Awarded:** September 2021
- **Awarded by:** Alpha Southeast Asia Magazine

SET AWARDS 2021

PTT received 3 SET Awards 2021 and was listed on the Thailand Sustainability Investment (THSI) 2021.
This illustrates PTT's dedication to incorporating sustainability into all aspects of its operations, aiming to foster innovation for the betterment of Thai people's lives while adhering to corporate governance principles.

1. Sustainability Awards of Honor,
2. Best Innovative Company Awards
3. Outstanding Investor Relations Awards

- **Awarded:** November 3, 2021
- **Awarded by:** The Stock Exchange of Thailand in collaboration with Money and Banking Magazine

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Governance

PTT received Excellent CG Scoring or scoring of 5 for the 13th consecutive year
and is one of the Top Quartile of listed companies with market value of not less than THB 10,000 million under the Corporate Governance Report of Thai Listed Companies (CGR). This reflects the evolution of strong corporate governance norms, such as transparent disclosure of relevant information, consideration of the impact on the economy, society, environment, and all stakeholders, and company operations based on corporate sustainability.

- **Awarded:**
  November 8, 2021
- **Awarded by:**
  The Stock Exchange of Thailand and the Thai Institute of Directors Association (IOD)

PTT was selected as a member of Dow Jones Sustainability Indices (DJSI) for the 10th consecutive year in the World Index group and Emerging Market Index group.
This achievement reflects the international recognition of PTT's commitment to conducting business under sustainable development guidelines and good corporate governance principles, taking into account all stakeholders and human rights principles, as well as social development and upgrading Thai people's quality of life with innovation and technology that meets future lifestyles, ready to move towards a low-carbon society through environmental investment, clean energy business development e.g. renewable energy, energy storage & system, EV Value Chain and promoting green area development for carbon sequestration under the new vision "Powering Life with Future Energy and Beyond."

- **Awarded:**
  November 13, 2021
- **Awarded by:**
  S&P Global

PTT received Thailand Top Company Awards 2021 in the energy industry category.
The Award was organized to honor the top Thai business organizations and reward those with outstanding performance and excellence in each area for the year 2021 under the concept of "Victory in Uncertainties."

- **Awarded:**
  November 18, 2021
- **Awarded by:**
  Business Plus Magazine in collaboration with the University of the Thai Chamber of Commerce

PTT received 6 Asian Excellence Awards 2021 (11th Asian Excellence Award),
an international award given to individuals or organizations that sustainably conduct business with good governance, ready to provide excellent community, society, and environmental care.

Individual awards:
1. Asia's Best CEO Award:
   Mr. Auttapol Rerkpiboon,
   President and CEO,
2. Asia's Best CFO Award:
   Miss Pannalin Mahawongtikul,
   Chief Financial Officer
3. Best Investor Relations Professional Award:
   Mr. Tanapon Prapapan,
   Investor Relations Vice President.

Organizational awards:
1. Asia's Best CSR Award,
2. Best Investor Relations Company Award,
3. Best Environmental Responsibility Award.

- **Awarded:**
  November 24, 2021
- **Awarded by:**
  Corporate Governance Asia Magazine

PTT received 3 Thailand Corporate Excellence Awards 2021, reaffirming its management excellence.
General Prayut Chan-o-cha, Prime Minister, Awarded the royal award of Her Royal Highness Princess Maha Chakri Sirindhorn to organizations with excellent management or Thailand Corporate Excellence Awards 2021. PTT received 3 awards, namely:
1. Marketing Excellence Award,
2. Finance Management Excellence Award,
3. Human Resource Management Excellence Award.

- **Awarded:**
  November 24, 2021
- **Awarded by:**
  Thailand Management Association (TMA) in collaboration with Sasin Graduate Institute of Business Administration of Chulalongkorn University

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Governance

Rayong Gas Separation Plant won the Outstanding Industry Award in the Energy Management Category in "The Prime Minister's Industry Awards 2021", recognizing excellence in plant management via the development of a Data-driven and Advanced Analytics and Digitalization energy management system.

- **Awarded:** December 13, 2021
- **Awarded by:** Ministry of Industry

PTT received 2 Best Investor Relations Awards from IR Magazine Awards – South East Asia 2021:

1. Corporate Award for Best Investor Relations in the Energy Sector for the 2nd consecutive year,
2. Best Investor Relations Officer (Large Cap) Award: Mr. Tanapon Prapapan, Investor Relations Vice President.

- **Awarded:** December 7, 2021
- **Awarded by:** IR Magazine

The 10th NACC Integrity Award – Commendation Award
PTT was recognized as an organization that is adhering to and managed with good corporate governance policy, transparency, and auditability, while committed to social, community, and environmental care.

- **Awarded:** December 23, 2021
- **Awarded by:** Office of the National Anti-Corruption Commission (NACC)

PTT's 2020 representative, PIC Project of EUREKA Group from Process Engineering and Optimization Division, Production Planning & Technical Management Department, received a plaque for Best Innovation Project 2020 for Debottlenecking Feed Gas Capacity of GSP#6 from 840 to 880 MMSCFD, adding value of THB 348 million to the organization.

- **Awarded:** December 2021
- **Awarded by:** Department of Industrial Promotion, Ministry of Industry

PTT won the Silver Award at the Thailand HR Innovation Award 2021 from its Smart Intelligence Center Project.

- **Awarded:** December 2021
- **Awarded by:** National Productivity Institute, Personnel Management Association of Thailand and the Faculty of Human Resource Development, National Institute of Development Administration (NIDA)

PTT has been continuously recertified as a member of the Thai Private Sector Collective Action Against Corruption: CAC) for the 3rd time from the "Thailand 11th National Conference on Collective Action Against Corruption", uniting transparent business power against corruption. PTT adheres to excellent corporate governance principles, committed to transparent operations with work processes to combat fraud and corruption at every level, with an emphasis on the acceptability of company operations with good governance.

- **Awarded:** December 2021
- **Awarded by:** Thai Private Sector Collective Action Against Corruption

PTT was honored with 7 State Enterprise Awards (SOE Awards) in 2021 for its contribution to navigating the country through crisis with efficient management and good governance adherence, fostering national capability and improving people's quality of life via innovation and creativity, as well as a commitment to environmental sustainability stewardship:

1. Excellent State Enterprise Award 2021
2. Outstanding Board of Directors Award (Honorable Acclaim)
3. Outstanding Organizational Management Award
4. Outstanding Information Disclosure and Transparency Award
5. Outstanding Social and Environmental Implementation Award
6. Outstanding Creativity and Innovation Award (Creativity Category)
7. Outstanding Creativity and Innovation Award (Innovation Category)

- **Awarded:** January 31, 2022
- **Awarded by:** State Enterprise Policy Office (SEPO)

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PTT's vision has been transformed from "Thai Premier Multinational Energy Company" to "Powering Life with Future Energy and Beyond."

Message from the Board of Directors

Despite the persistent challenge of the COVID-19 pandemic, the world economy continued to recover in 2021 as a consequence of improved vaccine distribution and treatment of the infectious, massive fiscal stimulus measures, particularly in developed countries, as well as society, industry, and consumer behavior, which have gradually adapted to the New Normal. The global economy has grown by 5.9% since the 2020 recession at minus 3.1%, and the Thai economy expanded by 1.6% after contracting by minus 6.2% in 2020. As oil demand began to revive in response to the global economy and tight oil supply conditions, the average Dubai crude oil price soared to USD 69.2 per barrel from USD 42.2 per barrel in 2020, while the price spreads of petroleum products and petrochemicals were also on the rise.

To conform to the context of the energy transition, the trend of lowering greenhouse gas emissions to zero, and the leaping technological advancement including changing social and consumer behaviors, PTT's vision has been transformed from "Thai Premier Multinational Energy Company" to "Powering Life with Future Energy and Beyond." The new vision defines the organization's Purpose, which is to grow by doing business while improving people's quality of life, culture, way of life, society, and environment, as well as its Strategic Positioning by moving towards the energy business of the future and growing in new businesses beyond energy.

Scale Investment Portfolio towards the Energy Business of the Future and Grow in New Businesses beyond Energy

Based on our vision and strategic direction, PTT's long-term ambition is to generate at least 30% of profit from future energy and non-energy businesses by 2030. Coming to future energy investment, PTT focuses on the clean energy ecosystem, which encompasses renewable power generation, energy storage technology, electric vehicle business, and new forms of consumer energy consumption. Global Power Synergy Public Company Limited (GPSC), PTT Group's power flagship, has invested in wind and solar power plants in Taiwan, as well as a solar company in India, and opened Southeast Asia's first semi-solid energy storage plant. PTT has a joint venture agreement with Foxconn Group through ARUN PLUS Company Limited to develop a fully integrated electric vehicle production platform technology in the country and is working with Hozon New Energy Automobile Company Limited to explore the possibilities of expanding the complete range of electric vehicle commercial opportunities, including relocating the EV manufacturing base to Thailand. There is also a commitment to expand charging stations both inside and outside of service stations, as well as to build a comprehensive ecosystem through EVME PLUS Company Limited to accommodate and encourage the use of electric cars in the country.

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PTT Group has also established a net zero greenhouse gas emissions working group, which is pushing for cutting as much greenhouse gas emissions as possible both domestically and internationally, ready to drive clean energy for a sustainable future.

On top of the energy sector, PTT has concentrated on investment in the life science industry through Innobic (Asia) Company Limited to become a major shareholder with a 37% stake in Lotus Pharmaceutical Company Limited, which has a global network of pharmaceutical trading and patent businesses. PTT has also partnered with Nove Foods to manage a plant-based protein food business for healthy food option expansion and has signed an agreement with Plant & Bean (UK) to set up an alternative protein manufacturing plant in Thailand. PTT established Innopolymed Company Limited in cooperation with IRPC Public Company Limited (IRPC) to create a medical supply factory. In the mobility and lifestyle sector, PTT Oil and Retail Business Public Company Limited (OR) has been raising funds and trading on The Stock Exchange of Thailand to invest in the expansion of retail, food, and logistics service businesses, as well as moving toward a business that fits consumers' future lifestyle needs. PTT Global Chemical Public Company Limited (GC), on the other hand, acquired Allnex in the High Value Business to develop its coating resins business.

Enhance the Competitiveness of Today's Businesses by Fostering Growth alongside Good Governance

As natural gas plays a vital role as transition energy, PTT grows its liquefied natural gas (LNG) business by expanding the LNG trading market in Asia. The first LNG reloading cargo was exported to Japan, then, Cambodia and China. PTT International Trading USA Inc. and PTT MEA Ltd. were established in the United States and the United Arab Emirates, respectively, to enhance global trading network. Other notable investments of PTT Group include PTT Exploration and Production Public Company Limited (PTTEP)'s investment in the natural gas field in the Oman Block 61 project, GC's increased olefins production capacity in the Olefins Reconfiguration Project (ORP), Thai Oil Public Company Limited (TOP) in Chandra Asri, an Indonesian petrochemical company, and IRPC in the Ultra Clean Fuel project to improve refinery efficiency and diesel fuel quality.

Driving Thai Society towards a Low-carbon Society

PTT also aims to be a part in leading Thailand towards a low-carbon society to address the global warming problem by setting a goal to reduce greenhouse gas emissions from PTT Group's domestic and international business operations by 15% within 10 years (2020 - 2030), in line with government policy, which targets for Thailand to achieve carbon neutrality by 2050 and net zero greenhouse gas emissions by 2065 to aid in the control of global temperature rise below 2°C and to help solve climate change problems caused by rising global temperatures leading to regularly severe natural disasters. Three basic operating guidelines include lowering greenhouse gas emissions to the greatest extent possible, investing in clean energy and new businesses, and enhancing greenhouse gas sequestration from the atmosphere and sequestrating greenhouse gases through natural processes. PTT Group will continue to plant terrestrial and mangrove forests in addition to the 1.1 million rai of its continued reforestation and forest stewardship in 54 provinces since 1994, helping to absorb more than 2.14 million tons of CO_2 equivalent per year. PTT Group has also established a net zero greenhouse gas emissions working group, which is pushing for cutting as much greenhouse gas emissions as possible both domestically and internationally, ready to drive clean energy for a sustainable future.

Contributing to Thailand's Crisis Response

PTT is determined to be the driving force in every life according to our organizational purpose. During the COVID-19 pandemic in Thailand, PTT Group has played a role alongside Thai people through the crisis by assisting through the "Giving Breath Project" in establishing an end-to-end screening unit and field hospital, supporting field hospitals, providing medical equipment, ventilators, and liquid oxygen as well as procuring and importing vital medicines during the crisis by donating 12,000 bottles of remdesivir and 1.2 million tablets of favipiravir to the government, supporting alcohol procurement, including developing, manufacturing, procuring anti-epidemic equipment and COVID-19 screening kits, and providing survival bags, essential consumables, and products from community enterprises to people and medical healthcare personnel. During the crisis, PTT supported the lowering of people's energy expenses in the NGV and LPG sectors, with a total value of about THB 1.8 billion. PTT also stimulated the economy by creating jobs through the Restart Thailand Project for the 2nd year in a row, hiring a total of 25,489 workers and new graduates to support the Smile Community Project, and PTT Group's investment plans and business expansion, as well as boosting tourism by encouraging employees to travel in the country through the "Refresh & Energize for the New Normal Project."

Under a committed operation amid the crisis and circumstances affecting the business, PTT's total revenue was THB 2.3 trillion in 2021, with a net profit of THB 108,363 million, or 5% of total revenue, of which PTT's businesses accounted for 31% and PTT Group 69%. Strategic implementation within the framework of sustainability, transparency, and auditability governance has earned PTT the Outstanding State Enterprise Award 2021 and 7 other SOE Awards from the State Enterprise Policy Office, a membership of the Dow Jones Sustainability Indices (DJSI) for the 10th consecutive year, the S&P Global Sustainability Award in Gold Class, Excellent Corporate Governance Scoring for the 13th consecutive year in the Corporate Governance Report of Thai Listed Company (CGR), and Commendation Award from the Office of the National Anti-Corruption Commission (NACC), among more than 54 other awards from 23 institutions.

On behalf of the PTT Board of Directors and management, we would like to thank all groups of stakeholders for their continued trust and support of PTT's aspiration to be "Powering Life with Future Energy and Beyond" as stipulated in our vision.

Professor Dr. Thosaporn Sirisumphand
Chairman

Mr. Auttapol Rerkpiboon
President and CEO

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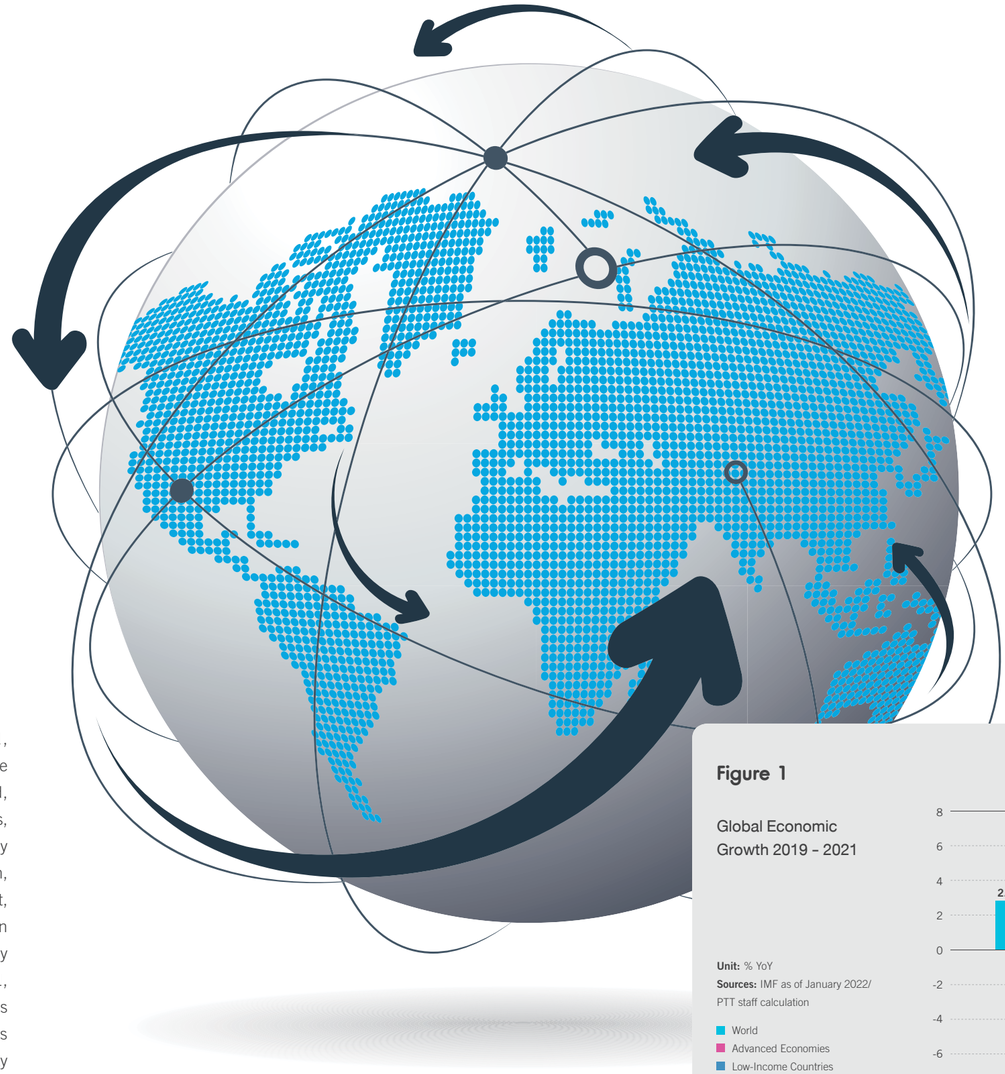
Economic, Petroleum and Petrochemical Review and Outlook



1. 2021 in Review

1.1 World Economy

Overall, the world economy rebounded in 2021, with activities gradually entering a new normal after the COVID-19 pandemic eased, though has not yet ended, thanks to accelerated vaccination efforts in many countries, massive government stimulus measures, and monetary accommodation. Meanwhile, global supply chain disruption, high commodity prices, and the spread of Delta variant, as well as concerns about the transmissibility of Omicron variant which was designated a new variant of concern by the World Health Organization (WHO) on November 26, 2021, weighed down growth in H2/2021. However, the recovery has been uneven across countries, with advanced economies on firmer footing than low-income countries and commodity exporters. The International Monetary Fund (IMF) in January 2022 estimated the global economic growth for 2021 at 5.9% versus 2020 contraction of 3.1%. (Figure 1)

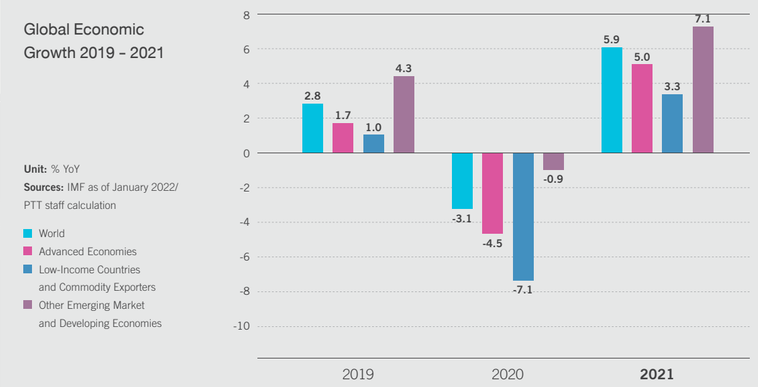
1.2 Global Petroleum and Petrochemical Industries

World oil demand in 2021 grew by 5.7 million barrels per day on the back of pandemic recovery, as well as gas-to-oil switching due to high natural gas prices particularly in Q4/2021. IHS Markit in January 2022 estimated world oil demand in 2021 at 96.8 million barrels per day. (Figure 2)

Rising world oil demand – together with tight crude oil supply due to (1) COVID-19 pushing some oil companies into bankruptcy (2) OPEC+ strict supply discipline amid demand worries (3) investment in the oil industry stalling under an increased focus on energy transition and (4) extreme weather and natural disasters, particularly the impact of Hurricane Ida on US production in late August to mid-September 2021 – resulted in the Dubai crude oil price averaging USD 69.4 per barrel in 2021, up from an average of USD 42.3 per barrel in 2020. (Figure 3)

Figure 1

Global Economic Growth 2019 - 2021



Unit: % YoY
Sources: IMF as of January 2022/ PTT staff calculation

- World
- Advanced Economies
- Low-Income Countries and Commodity Exporters
- Other Emerging Market and Developing Economies

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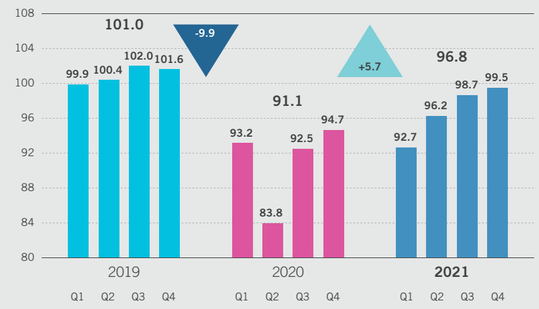
Figure 2

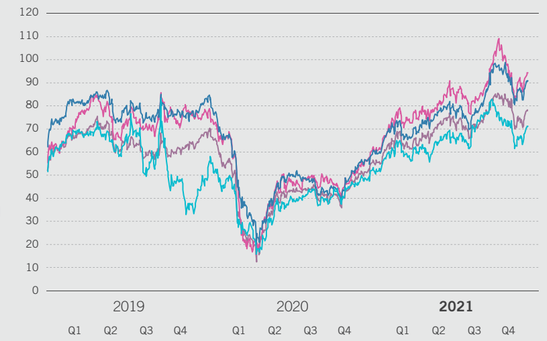
World Oil Demand
2019 - 2021



Unit: Million Barrels/Day
Source: IHS as of January 2022

Figure 3

Dubai and Petroleum
Products Prices
2019 - 2021



Unit: USD/Barrel
Source: Reuters

	2019	2020	2021
Dubai	63.5	42.3	69.4
Gasoline 95 Octane	72.6	46.7	80.5
Diesel	77.2	48.4	76.1
Fuel Oil 3.5%S	58.6	39.3	64.5

As for the prices of refined petroleum products in 2021, gasoline 95 averaged USD 80.5 per barrel, climbing in tandem with crude oil prices, and stronger demand as lockdown measures were eased. While export supply from China decreased to ensure sufficient domestic consumption, following China's imposition of consumption taxes on imported mixed aromatics used as a component of gasoline; and Hurricane Ida wreaked havoc on the US supply. All these led to a significant increase in gasoline crack spreads in 2021. Diesel price in 2021 averaged USD 76.1 per barrel, an increase in line with crude oil prices and increased demand following the economic recovery, as well as a switch to diesel for power generation amid high natural gas prices particularly in Q4/2021. Whereas, supply especially from refinery yield shift in South Korea and China away from jet fuel continued to limit the increase in diesel crack spreads in 2021. High sulfur fuel oil 3.5%S (HSFO 3.5%S) price in 2021 averaged USD 64.5 per barrel, rising in tandem with crude oil prices. While demand for power generation in South Asia and the Middle East particularly during the summer, and the impact of high natural gas and coal prices helped limit the fall in HSFO 3.5%S crack spreads in 2021.

The Singapore cracking margin against Dubai crude in 2021 averaged USD 3.5 per barrel versus USD 0.4 per barrel in 2020.

Asian petrochemical markets overall saw higher prices in 2021, owing to rising crude oil and naphtha prices, as well as increased demand following the economic recovery. The price of high density polyethylene (HDPE) was also supported by tight supply in the US due to severe blizzards. As a result, in March 2021, the highest HDPE price since 2018 was recorded. For the year 2021, HDPE price averaged USD 1,182 per ton. As for paraxylene (PX), factors supporting the price in 2021 also included increased demand from new purified terephthalic acid (PTA) capacity. While, in Q4/2021, PX price was held back by China energy crisis and power rationing, particularly in areas where PX-downstream industries were located, as well as new PX capacity in China. For the year of 2021, PX price averaged USD 859 per ton. (Figure 4)

1.3 Thai Economy

The Thai economy saw a modest recovery in 2021. This was due to the expansion of merchandise exports following a recovery in global demand, together with the support from the government's fiscal measures to heal and stimulate the economy (government spending under the THB-1-trillion-loan royal decree and partly under the THB-500-billion-loan royal decree) and accommodative monetary policy. While Delta outbreak led to regional lockdowns during July - August 2021 before gradually reopening and accepting tourists from low-risk countries through the Test & Go scheme from November 1, 2021; and the first local transmission of Omicron was confirmed in December 2021. The Office of the National Economic and Social Development Council (NESDC) reported the growth rate of the Thai economy in 2021 at 1.6% versus 2020 contraction of -6.2%. The Thai baht in 2021 averaged THB 32.0 per USD, weakened by the prolonged COVID-19 outbreak in the country, despite the USD depreciation due to the massive US economic stimulus measures. (Figure 5)

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Figure 4

Prices of Petrochemical Products in Asia Market 2019 - 2021

Unit: USD/Ton
Sources: ICIS/Platts

	2019	2020	2021
High Density Polyethylene	991	879	1,182
Paraxylene	901	577	859
Naphtha	512	362	635

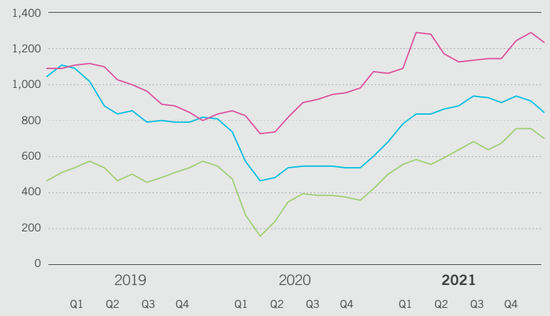


Figure 5

Thai Economic Growth 2019 - 2021

Sources: Office of the National Economic and Social Development Council (NESDC)/ Bank of Thailand (BOT)

	2019	2020	2021
GDP (% YoY)	2.3	-6.2	1.6
Exchange Rate (Mid-Rate, THB/USD)	31.0	31.3	32.0

1.4 Thailand Petroleum Industry

Consumption of commercial primary energy in Thailand (excluding renewable energy) in 2021 averaged 2.0 million barrels of oil equivalent per day (MBOED), up 0.4% from 2020 (Figure 6). Specifically, oil consumption decreased 5.5%, while natural gas consumption increased 0.6%.

Consumption of refined petroleum products in Thailand in 2021 decreased 5.6% (Figure 7), with consumption of gasoline down 8.1%, diesel down 3.8%, and LPG down 0.5%. Due to restrictions on travel and social activities, all three product groups experienced a significant contraction in Q3/2021. Jet fuel consumption in 2021 decreased 35.3%, as the remaining COVID-19 restrictions continued to pose a barrier to tourism recovery, despite the gradual reopening of airspace in H2/2021. Whereas, fuel oil consumption increased 15.3%, following exports recovery.

Figure 6

Thailand's Primary Commercial Energy Consumption 2019 - 2021

Unit: MBOED
Source: Energy Policy and Planning Office

- Hydro/ Imported Power
- Coal/ Lignite
- Oil
- Natural Gas

Remark:
Excluding renewables energy

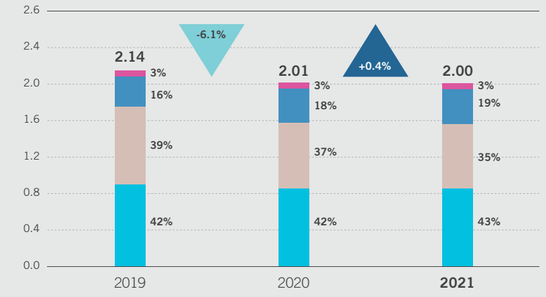


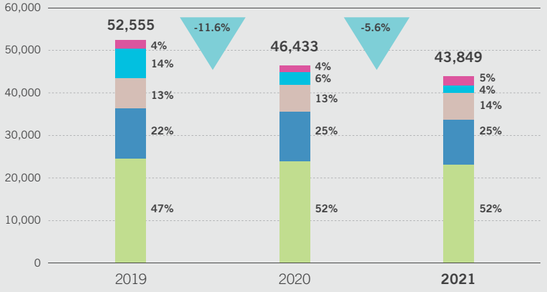
Figure 7

Thailand's Refined Petroleum Product Consumption 2019 - 2021

Unit: Million liters
Source: Department of Energy Business

- Fuel Oil
- Jet/ IK
- LPG*
- Gasoline
- Diesel

Remark:
** Excluding LPG used as Feedstock in Petrochemical Industries*



As for Thailand's petroleum balance in 2021 (Figure 8), petroleum procurement totaled 2,066.2 thousand barrels per day (KBD), up 11.9% from 2020. Procurement of oil and natural gas accounted for 52% and 48%, respectively. Out of the total, 89% of crude oil and 50% of natural gas were imported. Domestic consumption totaled 1,602.4 KBD, down 1.6% from 2020, with 52% of which being refined oil products and 48% natural gas. Whereas, exports of petroleum products totaled 219.2 KBD, up 4.1% from 2020.

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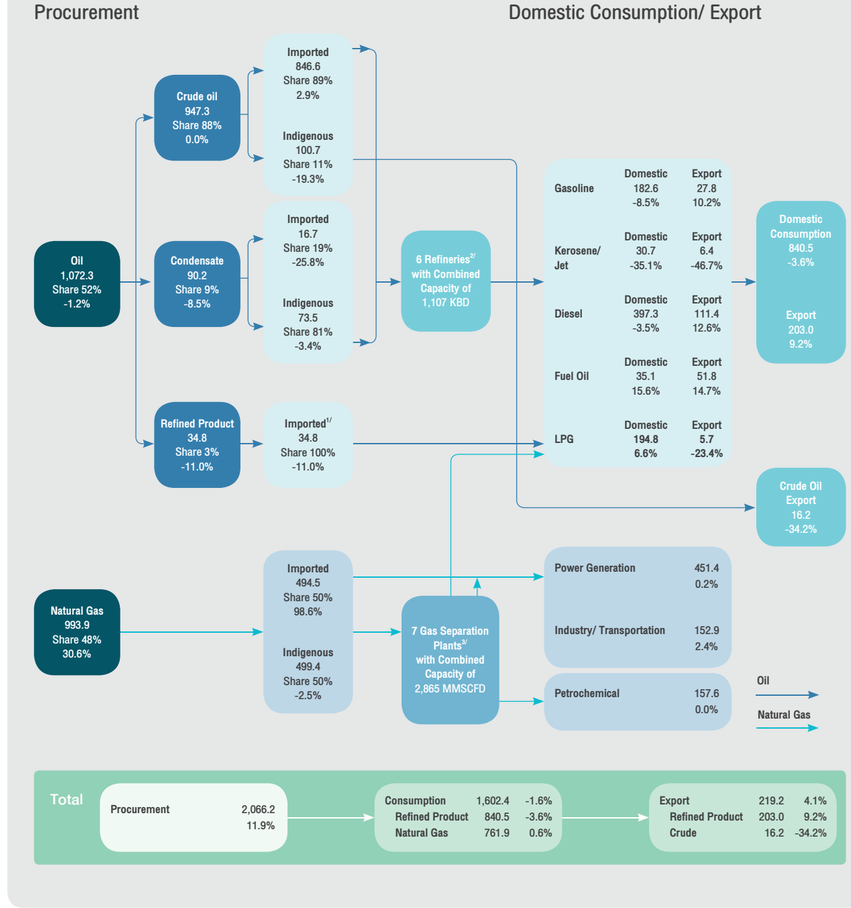
Figure 8

Thailand Petroleum
Balance 2021

Unit: KBD



Source: *Energy Policy and Planning Office, Department of Energy Business, Department of Mineral Fuels, and PTT*
Remarks:
1/ Including LPG
2/ Capacity includes those of BCP, ESSO, IRPC, PTTGC, SPRC, THAIOIL and excludes PTTGC's condensate splitters & Fang refinery.
3/ Capacity includes those of PTT/ GSP 1 - 6, PTT/ESP and PTTEP Siam/ Phalang Phet. The Petroleum Procurement and Domestic Consumption/ Export exclude bitumen.

2. 2022 Outlook

2.1 Global Economic Outlook

Global economic growth is expected to moderate in 2022 as a result of a higher base, slackening pent-up demand, less accommodative fiscal and monetary policy especially in the US amid accelerating inflation and high commodity prices, and China's self-inflicted slowdown partly due to measures by Beijing to reign in real estate lending. While concerns about the transmissibility of Omicron variant and a surge in COVID-19 cases after 2022 New Year celebrations have led to tougher enforcement of disease control measures in many countries, as well as labor shortages and protracted global supply chain disruption, all these a potential drag on growth in H1/2022. However, a gradual easing of the pandemic is expected in H2/2022, amid improving vaccination rates and more effective therapies. The IMF in January 2022 forecasted the global economic growth for 2022 at 4.4%.

2.2 Global Petroleum and Petrochemical Industry Outlook

World oil demand in 2022, according to IHS Markit in January 2022, is projected to increase 4.0 million barrels per day to 100.8 million barrels per day, following global economic recovery. An increase in world oil demand, together with the still tight crude oil supply particularly due to OPEC+ discipline, as well as geopolitical risks, will be factors supporting crude oil prices in 2022. Though additional Iranian supplies, should US sanctions against Tehran be lifted, could help soothe the market. The Dubai crude oil price is expected to average USD 80 - 90 per barrel in 2022, while the Singapore cracking margin against Dubai crude oil is expected to average USD 5.5 - 6.5 per barrel.

Petrochemical prices in 2022 are projected to trade slightly higher than in 2021, amid high crude and naphtha costs, as well as rising demand following the economic recovery. Whereas, new supply is expected to steadily come online. However, risks remain on issues of protracted global supply chain disruption; the impact of China energy policy on operating rates of both olefins- and aromatics-downstream industries; and high inventories which could add to downward price pressure. HDPE price in 2022 is expected to average USD 1,250 - 1,300 per ton, and PX price USD 1,000 - 1,050 per ton.

2.3 Thailand Economic Outlook

Thailand economic recovery is expected to gather pace in 2022, where continued progress with vaccination and a shift in public health strategies to "learning to live with COVID-19" should help boost household and business spending. While border reopening and the resumption of Test & Go scheme beginning February 1, 2022 (after being suspended in late 2021), as well as discussions of guidelines for declaring COVID-19 "endemic," should give positive signs to the tourism industry. Merchandise exports should continue to grow following global economic recovery, and benefit from the Regional Comprehensive Economic Partnership (RCEP) coming into force on January 1, 2022. Meanwhile, government stimulus measures should continue to help boost purchasing power. However, a prolonged Omicron outbreak, chronic cost-push inflation, tighter global financial conditions, and rising domestic political stress could pose a drag on growth. The NESDC in February 2022 forecasted the growth rate of the Thai economy in 2022 at 3.5 - 4.5%. As for the Thai baht, analysts foresee a further depreciation in 2022, on the back of the USD appreciation following monetary policy normalization in the US, with exchange rate between the Thai baht and US dollar averaging THB 33.3 per USD.

2.4 Thailand Petroleum Industry Outlook

Commercial primary energy consumption in Thailand (excluding renewable energy) is expected to rise in 2022, though still below pre-pandemic levels, as activities gradually enter a new normal amid more widespread vaccine access and households and businesses continue to adapt to pandemic life.

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Section 1

Business Operations and Performance

Rapid and unceasing resilience, confidently taking bold steps into new opportunities and ventures
Preparing for today's and tomorrow's global changes to drive Thailand's sustainable growth

1. Structure and Business Operations of PTT Group

1.1 Business Policy and Overview

Background

Petroleum Authority of Thailand (PTT) was established on December 29, 1978 according to the Petroleum of Thailand Act B.E. 2521 principally to operate petroleum and related businesses. However, amidst intense competition environment, Government recognized the necessity of private sector's participation in energy business. The Cabinet resolution on August 21, 2001 approved a corporatization plan of the Petroleum Authority of Thailand, and on September 25, 2001 approved the corporatization under the State Enterprise Corporatization Act B.E. 2542 to establish PTT Plc. by converting capital of the Petroleum Authority of Thailand into capital stock. It is mandated the state holds at least 51% share in PTT and for PTT to remain the national oil company. After the Civil administration reform, PTT was placed under the supervision of Ministry of Energy.

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On October 1, 2001, the Petroleum Authority of Thailand became PTT Plc. under the State Enterprise Corporatization Act with initial registered capital of THB 20,000 million divided into 2,000 million ordinary shares at par value of THB 10, with the Ministry of Finance as the sole shareholder.[1/] Subsequently shares were offered to the public and institutional investors and then traded in The Stock Exchange of Thailand on December 6, 2001. The Finance Ministry remained a majority shareholder, and PTT's status remains that of a state enterprise regulated by the Energy Ministry to this day. (On April 24, 2018 PTT changed the par value from THB 10 to THB 1, resulting in total number of 28,562.9 million shares, and registered capital of THB 28,562.9 million. From its corporatization date, PTT received transfer of businesses, rights, debts, liabilities, assets and staff from Petroleum Authority of Thailand to enable PTT to operate seamlessly and efficiently. Through the State Enterprise Corporatization Act, a Royal Decree was gazette determining that PTT Plc. maintains the authority, rights and benefits entitled to the Petroleum Authority of Thailand under the Petroleum Authority of Thailand Act B.E. 2521, with the provision that such authority, rights and benefits entitlement ends upon PTT's state enterprise status is dissolved according to the Budget Procedures Act. A separate Royal Decree was gazetted on timeframe of revocation of the Petroleum Authority of Thailand Act B.E. 2544 resulting in the end of the law. Then on February 16, 2007, a Royal Decree was gazetted to determine the authority, rights and benefits of PTT Plc. (Second Edition) in B.E. 2550. Substantively this Decree withheld or limited certain authority, rights and benefits entitled to PTT under the Petroleum Authority of Thailand Act, and determine the authority, rights and benefits of PTT such as exploration demarcation of petroleum transmission pipeline zone, planning of petroleum transmission pipeline, southward, northward, or passing through lands owned by any individuals, etc., according to the PAT act to fall under the supervision of a committee regulating the company.

As the Energy Business Act B.E. 2550 came into force on December 11, 2007 PTT as energy operator is regulated by the Energy Regulatory committee, with PTT licenses to operate in natural gas business. Licenses held by PTT include: licenses for natural gas transmission through gas pipeline, natural gas supply and marketing, natural gas retail sale through distribution pipeline network and the power business which consisted of power generation for its own consumption at Gas Separation Plants in Rayong and Khanom, and at natural gas control stations.

Expanding business into fully integrated player of LNG Value Chain and invest in renewable energy and energy technology such as Energy Storage System: ESS and Smart Energy Platform

1/ *PTT is exempted under the State Enterprise Corporatization Act B.E. 2542, from enforcement of provisions in the Public Company Act, on status and corporatization.*

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PTT is committed to be an organization that generates economic growth, enhancing Thailand's competitiveness to develop the society and people's well-being. With innovations and technology, we are the driving force in transitioning people, society, community and environment forward.

1.1.1 Vision, Strategy and Business Direction of PTT Group

PTT is committed to be an organization that generates economic growth, enhancing Thailand's competitiveness to develop the society and people's well-being. With innovations and technology, we are the driving force in transitioning people, society, community and environment forward, in line with our vision of "Powering Life with Future Energy and Beyond." Our mission is to respond to all stakeholders in a balanced way, the country, society, shareholders, clients, business partners and our workforce. We promote the organizational values of SPIRIT: S for Synergy; P for Performance Excellence; I for Innovation, R for Responsibility for Society, I for Integrity & Ethics, T for Trust & Respect. PTT is driven to achieve the following three goals by 2030:

1. **New Growth:** new energy and new business must generate more than 30% of profits in 2030.
2. **Business Growth:** an investment of at least 9 million ton per year in LNG Portfolio; 8 GW of conventional power 12 GW of renewables in Thailand and beyond.
3. **Clean Growth:** 15% GHG emissions reduction compared to 2020, Carbon Neutrality of PTT by 2040 and Net Zero emission by PTT in 2050, Carbon Neutrality of PTT Group by 2050 and Net Zero by PTT Group in 2060.

In attaining goals outlined in the vision, PTT has laid the foundation titled "PTT by PTT" which guides every aspect of business, through a business approach of forging Partnership and Platform, where business means more than production and distribution. PTT shall build and collaborate with partners with expertise from overseas, alongside collaboration with Thai state enterprises, public sector, entrepreneurs and SMEs to blend technology with knowhow, innovation and digitalization in every aspect of work, "Technology for All". We conduct business in transparency and towards sustainability. Transparency and Sustainability, in consideration of Environment, Social and Governance including actions to reduce GHG emission including carbon sink through forestation schemes, investment in clean energy business.

As short-term measures to strengthen existing business, while creating long-term growth opportunities, PTT has consistently implemented work along the line of 4R principles namely:

1. **Resilience** - for agility of business, workforce's safety, assessment of organizational health, trimming non-essential expenses, prioritization of investment projects from upstream all the way to downstream, and maintenance of liquidity.
2. **Restart** - preparedness to lead business, workforce, clients and partners for swiftest return to normalcy and ensuring competitiveness.
3. **Reimagination** - gearing up for business design for impending Next Normal for both core business and New S-Curve through the following strategies:

1) Reimagine Upstream: This strategy focuses on exploration and production of natural gas domestically and internationally, unleashing growth opportunity in the region through undertaking such as LNG Value Chain, Regional Gas to Power, aspiring to be fully integrated player in gas and LNG Value Chain and exploring overseas investment opportunities, while phasing out and exiting the coal business.

2) Reinforce Downstream: The strategy involves shifting from Hydrocarbon-Based position to accommodate global trends towards renewables and clean energy, by adopting technology to reinforce the supply chain and adjust the investment portfolio to increasing weighting of non-refinery business.

3) Reignite New Business at Scale: Accelerate and diversify new business models to replace the share of growth in hydrocarbon value chain, in the areas of

- Future Energy: Renewable power generation; Energy Storage and Systems; EV Chain; exploring potential new energy source such as hydrogen.
- Beyond Energy: Life science such as pharmaceutical, nutrition, medical device and diagnosis; high value business, mobility and lifestyles, logistics and infrastructure; AI, Robotics and Digitalization, and seeking for other potential investment opportunity.

4. **Reform:** Restructuring or new business approaches to align with future trends, with the resilience to handle of any unforeseen challenges.

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1.1.2 Major Development of the Past Three Years

2019

March

March 25, 2019: PTT's Board approved PTTGM's establishment of Global Management Holding Co., Ltd. (GMH) and Siam Management Holding Co., Ltd. (SMH) with a registered capital of up to THB 36 million and THB 18 million respectively, with directly and indirectly 100.0% owned by PTTGM. The objectives of these company establishment are to support PTT's future investment including but not limited to investment in New S-Curve businesses.

April

April 11, 2019: PTT's 2019 AGM approved dividend payment for its performance in 2018 at THB 2 per share (48.2% of consolidated financial statements' net profit). PTT paid out interim dividends for 1H2018 at THB 0.80 a share, leaving THB 1.20 a share for 2H2018, which was paid out on April 30, 2019.

April 19, 2019: Committee on Energy Policy Administration (CEPA) decided to raise the NGV price for public vehicles by THB 1 per kg every 4 months, beginning on May 16, 2019, then September 16, 2019, and finally January 16, 2020, until the rise becomes THB 3 per kg.

April 30, 2019: PTT Green Energy Co., Ltd. (PTTGE SG) (a wholly owned subsidiary of PTT in the Republic of Singapore) to dispose its entire investment of 77.56% of the total issued shares in Chancellor Oil Pte. Ltd. (CO) (a company incorporated in the Republic of Singapore, operating palm oil business and producing palm oil through PT First Borneo Plantations (PT FBP)), as well as to sell and novate all loans of PTTGE SG given to Premier Palmoil Energy Pte. Ltd. (Premier) as a buyer. This divestment aligned with PTT Group's restructuring policy, thus eliminating PTT's investment in palm oil business. On November 14, 2019, PTT completely dissolved Sabran Brothers Pte. Ltd. (previously wholly owned by PTTGE SG) to align with PTT Group's restructuring policy; the action had no impact on PTT's businesses.

August

August 19, 2019: Sakari Resources Ltd. (SAR), the 95.82% owned by PTTGM (a wholly owned subsidiary of PTT) invested in all common shares in PT Sentika Mitra Persada (SMP) and PT Multiara Kapuas (MK), whose registered capital was Indonesian Rupiah 57.804 billion and 21.883 billion respectively, both of these companies held licenses for the coal business in Indonesia. The investment worth a total of about USD 11.7 million. Such investment was to maintain coal reserves for the SAR group in the face of depleting coal reserves currently and to increase the potential to improve coal quality at current mines to meet the needs of the group's customers.

September

September 27, 2019: PTT's Board approved interim dividend payment for 1H2019 at THB 0.90 a share, or 47.0% of consolidated financial statements' net profit, which was paid out on October 25, 2019.

October

October 1, 2019: PTT Tank Terminal Co., Ltd. (PTT TANK), a wholly owned subsidiary of PTT, and Gulf Energy Development Plc. (GULF) had registered to establish a new joint venture company under the name of Gulf MTP LNG Terminal Co., Ltd. with the initial registered capital of THB 3,500 million. PTT TANK and GULF hold 30.0% and 70.0% stakeholding, respectively, in Gulf MTP LNG Terminal Co., Ltd. following the resolution of PTT's Board of Directors at the meeting on June 20, 2019. The company's objective is to conduct LNG Value Chain related business and logistic to support other future investments that consistent with PTT's strategy, as well as creating business alliances to increase business opportunities both domestically and internationally. On October 1, 2019, Gulf MTP LNG Terminal Co., Ltd. entered into a Public Private Partnership (PPP) contract with Industrial Estate Authority of Thailand for development of Map Ta Phut seaport phase III (Section 1) with the joint investment including land reclamation with the investment cost of approximately THB 12.900 billion, and the right of construction of LNG terminal phase 1 with the capacity of not less than 5 MTA for the approximately amount of THB 28 billion. Therefore, the total investment of the project shall be approximately THB 40.900 billion.

November

November 14, 2019: PTT's Board approved the establishment of a joint-venture company with Mitsui with a registered capital of up to THB 200 million, where PTT's equity was up to 50.0% stakeholding, to engage in the robotics & AI service enable business.

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2020

January

January 16, 2020: PTT's Board passed a resolution to establish PTT International Trading USA Inc. (PTTT USA), a wholly owned subsidiary of PTT, in the USA with an initial registered capital of USD 5,000. The objective of the PTTT USA's establishment is to operate the international trading business, strengthen the national energy security as well as expand PTT trading network globally. In this regards, PTTT USA has completed its registration on April 2, 2020.

January 16, 2020: PTT's Board approved the five-year (Year 2020 - 2024) investment plan of PTT and its wholly owned subsidiaries in an aggregate amount of THB 180,814 million. The investment plans focus on core businesses mainly in Gas business group such as expansion of Liquefied Natural Gas (LNG) receiving terminal capacity and the expansion in oil and retail businesses domestically and internationally. Additionally, PTT has set provisional capital expenditure for the next 5 years amounting to THB 203,583 million to enhance value added and synergy among PTT Group from core businesses' expertise as well as new investments in energy businesses in accordance with national development plan, technology disruption, consumer behaviors and clean energy trends.

February

February 25, 2020: PTT conducted a test on LNG transmission using a new model called "ISO-Container", a gas transportation mode by truck and marine vessel to China. The test is cooperation with Liaoning Yuzhuo Energy to study the feasibility of exporting LNG from Laem Chabang Deepsea Port in Chon Buri to China to promote Thailand to become a regional LNG hub.

February 27, 2020: PTT announced the deregistration of Sakari Royal Ltd., a subsidiary of Sakari Resources Ltd. (SAR). SAR is a subsidiary of PTT Global Management Ltd. (PTTGM) and PTTGM is a wholly-owned subsidiary of PTT. Sakari Royal Ltd. was established for investment in coal mining development project in Cambodia. However, after the exploration of the coal development project, the project was not feasible to further invest. To align with PTT's strategy in closing down non-operating companies, the deregistration of Sakari Royal Ltd. did not affect to PTT's business operation.

February 27, 2020: PTT entered into an LNG sale and purchase agreement with five companies: Thai Special Gas Co., Ltd., LNG Link Co., Ltd., Cryo Thai Co., Ltd., Scan Inter Plc. and The Gas Carrier Co., Ltd. Transport will rely on semi-trailers or ISO container vehicles to receive LNG from the receiving terminal at Map Ta Phut Sub-district, Rayong, and transport it to gas customers in the domestic industrial sector. It would also increase opportunities to expand LNG users to ASEAN as a part of driving Thailand to become a regional LNG hub in line with the National Energy Reformation Plan.

February 28, 2020: PTT established PTT Raise Co., Ltd. (PTT RAISE) to provide robotics & AI solutions service. The company is a joint venture of PTT and Mitsui & Co., Ltd. in which PTT had 50.0% interest via PTTGM.

March

March 3, 2020: PTT registered Alpha Com Co., Ltd. (Alpha Com), a subsidiary of Siam Management Holding Co., Ltd. (SMH), a subsidiary of PTTGM (a PTT subsidiary). The company was established to support various investments of PTT and PTT Group in new businesses under the New S-Curve strategy, with an initial registered capital of THB 3 million. Alpha Com thus became a PTT subsidiary after the registration was completed.

March 6, 2020: PTT and Banpu Plc. signed an MOU for business cooperation on the study of natural gas and LNG businesses opportunities. The cooperation will bring out the expertise or strength of each party to run a business with a study timeframe of 1 - 2 years. The first Steering Committee meeting was convened on March 17, 2020 to define a joint operation direction.

March 19, 2020: CEPA reviewed the LPG price that the Ex-Refinery LPG prices has revised down from THB 17.1795 per kg. To THB 14.3758 per kg. Therefore, the retail price of a standard 15 kg LPG cylinder reduced from THB 363 per cylinder to THB 318 per cylinder, decreasing by THB 45 per cylinder for 3 months during March 24, 2020 to June 23, 2020 in order to alleviate public suffering from the economic situation and impact of COVID-19. Consequently, on June 17, 2020, CEPA decided to extend the reduction of LPG price for another 3 months. Therefore, the wholesale price is capped at THB 14.3758 per kg. until the end of December 31, 2020. However, the price adjustment has not any impact on PTT's performance due to LPG domestic selling prices of GSP be referenced to import parity. If the selling prices is higher or lower than GSP cost; PTT's GSP margin has been limited to USD ±1 per ton more or less than GSP's cost. The difference of USD 1 per ton from GSP's cost will be subsidized from or consigned to LPG fund.

March 25, 2020: CEPA has decided to reduce the retail price of the natural gas vehicle (NGV) to alleviate public suffering from the economic situation and impact from COVID-19. Therefore, NGV prices for public transportation reduced at THB 3 per kg, from THB 13.62 per kg to THB 10.62 per kg, for 3 months during April 1, 2020 to June 30, 2020. Later, on June 18, 2020, PTT's Board approved to extend the reduction of NGV prices for public transportation to remain at THB 10.62 per kg for another one month during July 1 - 31, 2020 and propose to the government to consider alternative ways of support, such as requesting public service subsidies. However, PTT's Board approved the extension of NGV price reduction for public transportation at THB 13.62 per kg up to December 31, 2020 or whenever the price is lower than THB 13.62.

March 30, 2020: PTT's Board has approved a resolution for the interim dividend payment for the 2H2019 performance instead of the annual dividend payment at the rate of THB 1.10 per share, which was paid on April 24, 2020. Besides, PTT paid interim dividend for the first half of 2019 (1H2019) performance at the rate of THB 0.90 per share. Therefore, the total dividend payment for 2019 performance is THB 2.00 per share, and no annual dividend payment for 2019 performance is to be further proposed by the Board.

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2020

May

May 12, 2020: PTT in cooperation with EGAT signed an MOU on a feasibility study on the investment and development of infrastructure to support LNG import, or LNG receiving facilities in the South. The study was in order to support the government policy and strategy on the power development plan (PDP 2018), of which consisted of the Khanom Power Plant of Electricity Generating Plc. with a capacity of 930 MW, Surat Thani Power Plant Units 1 - 2 with a combined capacity of 1,400 MW (to supply electricity to the grid (COD) in 2027 and 2029) and New Power Plant (COD in 2035) with a capacity of 700 MW. The joint feasibility study on LNG receiving facilities aimed to support the import of LNG and ensure energy security in the future.

May 15, 2020: PTT signed a commercial partnership agreement with Sharge for EV charger service outside service stations. The debut of the service was at True Digital Park (July 10, 2020), followed by the second service outlet at BITEC Bangna (July 30, 2020).

May 28, 2020: PTT's Board reviewed and approved the revision of an investment plan for 2020 of PTT and its wholly owned subsidiaries from THB 69.31 billion to THB 53.9 billion. The revision of 2020 investment plan are mainly in PTT and its wholly owned subsidiaries, which primarily reduced the projects that have not been started. However, the investment in projects under construction such as the 5th transmission pipeline, RA#6 - Ratchaburi pipeline, the 2nd Liquefied Natural Gas (LNG) receiving terminal, etc. are still proceeding as planned. The revision is for the year 2020 investment plan only according to the "Decrease-Discard-Defer" policy to mitigate the impact of COVID-19 pandemic and oil price war.

June

June 19, 2020: PTT signed a Gas Sales Agreement (Global DCQ) with EGAT to strengthen national energy security. The agreement covered the distribution of natural gas to five EGAT plants, namely Bangpakong Power Plant, North Bangkok Power Plant, South Bangkok Power Plant, Wang Noi Power Plant, and Chana Power Plant, with a 10-year term starting from July 1, 2020 to the end of July 2030, in order to ensure energy security.

June 24, 2020: PTT's Board approved the extension of LPG price discount for low-income people, shops, street vendors, and food stalls that are eligible for the state welfare card at THB 100 per person per month until December 2020.

July

PTT completed fund raising from the issuance of debentures in an approximated total amount of THB 57 billion. These debentures issuance are under the 2020 PTT MTN Program worth THB 64 billion which approved by SEC together with the Global Medium Term Note Program to be issued in the US currency worth up to USD 2 billion, details as follows:

July 2, 2020: PTT issued the unsubordinated and unsecured debentures No. 1/2020 in an amount of THB 20 billion at a fixed interest rate of 1.21% - 3.74% per annum with a tenor of 2 - 25 years to the institutional investors and/or high net worth investors.

July 16, 2020: PTT Treasury Center Co., Ltd. (PTT TCC), a wholly-owned subsidiary of PTT, issued USD Senior Unsecured Notes to offshore investors in an amount of USD 700 million for the tenor of 50 years at the fixed interest rate of 3.70% per annum with unconditional and irrevocable guaranteed by PTT. The net proceeds from the issuance of the Notes will be used to on-lend to PTT by PTT TCC.

July 24, 2020: PTT issued the unsubordinated and unsecured green debenture No. 1/2020 in an amount of THB 2 billion with a tenor of 3 years, and at a fixed interest rate of 2.25% per annum. PTT also issued the unsubordinated and unsecured debenture No. 2/2020 in an amount of THB 13 billion with a tenor of 7 years at a fixed interest rate of 2.85% per annum to the general public.

August

August 11, 2020: Alpha Com Co., Ltd. (Alpha Com) was a subsidiary of PTT approved the establishment of Swap and Go Co., Ltd. (Swap and Go) with the registered capital not exceeding THB 30 million (An initial registered capital not exceeding THB 1 million). The objective of the company establishment is to invest in Battery business for Electric Motor vehicles in according to PTT's investment strategies in New S-Curve.

August 20, 2020: PTT's Board approved the shareholding restructure in power business. The restructure consists of the PTT purchase in TOP's entire shareholding in GPSC's common shares, and the Entire Business Transfer of Thaioil Power Co., Ltd. (TP) (TP is a subsidiary of PTT and TOP with the stakholding of 26.0% and 74.0%, respectively) from PTT to TOP.

September

September 17, 2020: PTT's Board approved the interim dividend payment for 1H2020 performance to shareholders at the rate of THB 0.18 per share, or 50.0% of the net profit of consolidated financial statements. The total dividend paid was THB 5.142 billion. The record date for eligible shareholders was October 1, 2020 and the payment date was October 16, 2020.

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October

October 6, 2020: PTT Group initiated a pilot project on the installation of a 100-KW floating solar generation system in Rayong, located along the coast, therefore a suitable site. The floating solar panels were made of special-grade polymers that were safe for the environment and marine lives but could reduce barnacles. GPSC, PTT Group's power flagship, commissioned CHHP, a GPSC subsidiary, to design and install the system. The electricity generated in the initial phase will be used by office buildings and will be a model for further R&D of new energy business models.

October 12, 2020: PTT signed an MOU for collaboration with the Port Authority of Thailand in studying the efficiency enhancement of container transport in the Laem Chabang Port and the EEC zone, which is the national logistics strategic point. In addition, the project was expected to reduce road impacts from heavy traffic as well as reducing carbon emission along the Map Ta Phut - Laem Chabang route.

October 27, 2020: PTT Group signed an MOU on Project One to boost competitiveness and sustainable growth. Project One employed an asset-backed trading model by synergizing the expertise and diverse assets of each company. This would create added value for PTT Group, leading to sustainable business growth and strengthening of Thailand's energy security and national competitiveness.

2020

November 3, 2020: HRH Princess Maha Chakri Sirindhon graciously presided over the inauguration of the Intelligence Operation Center (IOC), located on the Eastern Economic Corridor of Innovation Area (EECi), Wangchan Valley, Rayong.

November 18, 2020: PTT's Board approved the purchase of about 4.655 million shares in Global Renewable Power Co., Ltd. (GRP), a wholly owned subsidiary of GPSC, which accounted for 50.0% of the total shares, by PTT Global Management Co., Ltd. (PTTGM), a PTT subsidiary. The deal was worth THB 693 million and was another step in promoting greater cooperation under the stakeholder-centric Powering Thailand's Transformation initiative and forming an operational network among PTT Group. This is in line with PTT Group's strategy in being the leader in the renewable energy or clean energy business. It also supported PTT Group's goal in reaching the renewable power generation capacity of 8,000 MW by 2030. In addition, the cooperation will synergize the forces of experienced and skilled personnel in renewable energy from PTT and GPSC, which will increase efficiency and enhance the competitiveness, which would ultimately lead to sustainable development of energy.

November

December

December 15, 2020: PTT signed a Gas Product Sale and Purchase Agreement with SCG Chemical Co., Ltd. for petrochemical feedstock to maximize the benefit of natural resources, increase business opportunities, competitive edge, and strengthen business partnership of the two organizations.

December 16, 2020: PTT and Thailand Greenhouse Gas Management Organization (Public Organization) jointly signed an MOU on the cooperation to reduce GHG emissions and sequestration. The cooperation aimed to enhance the effectiveness of cooperation to certify the carbon credit of Thailand through the integration of expertise and knowledge of these two organizations and technical exchange on innovation and technology to drive actions in accordance with the policy on climate change, both domestically and internationally.

December 17, 2020: PTT's Board approved the five-year (Year 2021 - 2025) investment plan of PTT and its wholly owned subsidiaries in an aggregate amount of THB 179,072 million. PTT's investment plan still focus in core businesses mainly in Gas business group i.e. the Gas Separation Plant (GSP) unit 7 to replace GSP unit 1, the 5th pipeline, the Liquefied Natural Gas (LNG) receiving terminal 2 (Nong Fab), and Map Ta Phut Industrial Port Development Phase 3.

Additionally, PTT has set provisional capital expenditure for the next 5 years amounting to THB 331,524 million to create value added and synergy among PTT Group from core businesses' expertise i.e. the Southern LNG terminal project and gas pipeline project which are subjected to the Power Development Plan 2018 (PDP 2018), the investment in LNG Value Chain both in Thailand and overseas, the Gas to Power project, and the investment in the potential growth businesses which are aligned with the change of new normal and New Ecosystem Business Model in accordance with government policy and global trends i.e. Electricity Value Chain project, the investment in Life Science (Pharmaceutical, Nutrition, and Medical device). Furthermore, the provisional capital expenditure include investment in renewable energy and clean energy to achieve PTT Group's renewable energy power plant target of 8,000 megawatts within year 2030 according to our strategic plan to be a leader in renewable energy business.

December 17, 2020: PTT's Board passed a resolution to dissolve 3 subsidiaries in coal business which are subsidiaries of SAR (SAR is a subsidiary of PTTGM and PTTGM is a wholly-owned subsidiary of PTT) including Reyka Wahana Digdjaya Pte. Ltd., Sakari Energy Pte. Ltd., and PT. Tri Tunggal Lestari Bersama. This is aligned with PTT's strategy in closing down the dormant companies, which are expected to be completed within 2022.

December 22, 2020: PTT established Innobic LL Holding Co., Ltd. (INBL) (wholly owned by Innobic (Asia), a PTT subsidiary). The objective is to be one of PTT's arm length for investment in international pharmaceutical business to align with PTT's new business strategy and to enhance PTT's capabilities in Life Science business with a registered capital approximated THB 2 billion.

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2021

January

January 1, 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.

January 8, 2021: Mekha Technology Co., Ltd. (Mekha Tech) was established by Alpha Com Co., Ltd. (Alpha Com) which is a wholly owned subsidiary of PTT with the registered capital of THB 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.

February

February 18, 2021: Alpha Com has completed the establishment of On-I on Solutions Co., Ltd. (ON-I ON) (Later changed the name to ARUN PLUS Co., Ltd. (ARUN PLUS), a wholly owned subsidiary of Alpha Com, with the registered capital of THB 30 million later increased its registered capital to THB 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.

February 21, 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.

February 25, 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 compliant with the Cabinet's Resolution on December 18, 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

March 8, 2021: PTT has completed the deregistration of PTT International Trading DMCC (PTTT DMCC), a wholly owned subsidiary of PTTT. PTTT 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 PTTT DMCC reduced its commercial operation and focused only on taking care of the relationship with the business partners. The resolution of PTTT DMCC's deregistration is aligned with PTT's strategy in closing down the dormant companies and did not affect PTT's business operation.

March 18, 2021: PTT passed the resolution of the establishment of Innopolymed Co., Ltd. (Innopolymed), which is a joint venture between Innobic (Asia) Co., Ltd. (Innobic (Asia)) (wholly owned subsidiary of PTT) and IRPC, with a registered capital of THB 260 million. Innopolymed Co., Ltd. is 40.0% stake held by Innobic (Asia) and 60.0% 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.

April

April 9, 2021: The annual general meeting of shareholders approved the dividend payment from 2020 performance which will be paid at THB 1.00 per share to the shareholders of totalling 28,562,996,250 shares in an approximated amount of THB 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 THB 0.18 per share. PTT also paid the dividend from the second half of 2020 performance at THB 0.82 per share on April 30, 2021.

April 16, 2021: Board of Directors of PTT and Lotus Pharmaceutical Co., Ltd. (LOTUS), the Taiwan listed company on TWSE, approved the investment in LOTUS' newly issued shares by Innobic LL Holding Co., Ltd. (INBL), 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, INBL has a stakeholding in LOTUS at 6.66% of the total registered and paid-up capital. On November 26, 2021, PTT's Board of Directors Innobic (Asia) to join with Aztiq HK Ltd., the affiliate of Aztiq Investment Group to acquire all stakes in Alvogen Emerging Markets Holdings Ltd., a major shareholder of LOTUS and also holds 100% stake in Alvogen Malta (Out-Licensing) Holding Ltd., who owns 100% of the company so called Adalvo Ltd. (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 (Asia) will then has an indirect shareholding in LOTUS 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.

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April (Continued)

April 19, 2021: Energy Complex Co., Ltd. (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 Plc. in order to support PTT Group's business expansion at THB 1,810 million.

April 22, 2021: PTT's Board of Directors Meeting approved the shareholding restructure of PTT's power business. PTT and Siam Management Holding Co., Ltd. (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 THB 70 per share or total approximately THB 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 GSPC's common shares was signed in May 2021 and the transfer of the shares in GPSC to relevant parties was completed on June 8, 2021.

2021

May 20, 2021: PTT's Board of Directors has approved on the following;

- Approved Innobic (Asia) to establish a new joint venture company with Nove Foods Co., Ltd. (a subsidiary of NR Instant Produce Plc.: NRF) with the registered capital not in excess of THB 300 million. Innobic (Asia) and Nove Foods Co., Ltd. will equally hold 50.0% 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 August 25, 2021 and start its commercial operation within the first quarter of 2023.
- Approved the establishment of T-ECOSYS Co., Ltd. (T-ECOSYS), a subsidiary of PTT which is 100% owned by SMH, with a registered capital of THB 350 million. The objective is to operate the industrial digital platform business under the coorperation 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.

May

June

June 17, 2021: PTT's Board of Directors has approved on the following;

- Approved the revision of PTT and its wholly owned subsidiaries investment plan for year 2021 from THB 52,931 million to THB 67,504 million. The revision is mainly in Technology & Engineering business particularly from the shareholding restructure of power business and adjustment of investment in wholly owned subsidiaries to reflect the current environment while the investment in other projects still proceed as planned i.e. Gas Separation Plant (GSP) unit 7 to replace GSP unit 1, 5th pipeline, and the investment through its wholly owned subsidiaries i.e. Liquefied Natural Gas (LNG) receiving terminal 2 (Nong Fab), Map Ta Phut Industrial Port Development Phase 3 as well as investments in electric vehicle value chain and Life Science business (Pharmaceutical, Nutrition, and medical device and diagnosis).
- 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 THB 100 per person per month for another 6 months starting from July 1, 2021 to December 31, 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 March 31, 2022.

June 23, 2021: the Supreme Court judgment of the Dispute between PTT and RPCG Plc. (RPCG) reported as follows;

- Dispute of the Thai Abitration 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 THB 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 THB 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 THB 600 million. Subsequently, on November 26, 2021, RPCG paid the remaining obligation to PTT completely according to the Supreme Court's judgment.

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July

July 22, 2021: On-I on Solutions Co., Ltd. (ON-I ON), a wholly owned subsidiary of PTT, has registered to change the company name to ARUN PLUS Co., Ltd. (ARUN PLUS) and increase the registered capital to THB 5,000 million (initial registered capital is THB 30 million). ARUN PLUS 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. ARUN PLUS has established EVME PLUS Co., Ltd. (EVME PLUS) which is 100.0% owned by ARUN PLUS, with the registered capital of THB 1,000 million and initial paid-up capital of THB 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.

July 27, 2021: Global Renewable Power One Co., Ltd. (GRP 1) (a wholly owned subsidiary of Global Renewable Power Co., Ltd. (GRP) 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 THB 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.

August

August 6, 2021: PTT has issued unsubordinated and unsecured debentures No. 1/2021 for the total amount of THB 47,000 million at interest rate of compound THOR+0.18% to 2.37% 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 THB 130,000 million Medium-Term Note Program (MTN Program) 2020.

August 23, 2021: PTT Global LNG Co., Ltd. (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 Ltd. (BGP LNG JV) with the subscription price at par value of THB 100 per share, totaling THB 25,000,000. As a result, PTTGL and B.Grimm Power Plc. (BGRIM) 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

September 14, 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 Co., Ltd. (Foxconn) and established the joint venture company, Horizon Plus Co., Ltd. (Horizon Plus), on February 3, 2022 with the registered capital not in excess of THB 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.

September 16, 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 THB 1.20 per share, totaling approximately THB 34,276 million, or 60.0% of the consolidated net income.

September 18, 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.

September 20, 2021: CEPA reviewed the LPG price that the Ex-Refinery LPG prices has extended at THB 14.3758 per kg. Therefore, the retail price of a standard 15 kg LPG cylinder is THB 318 per cylinder. CEPA decided to extend the reduction of LPG price for another 3 months until December 31, 2021.

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October

October 5, 2021: PTT's Board of Directors has approved SMH (PTT's 100% owned subsidiary to establish PTT and TGES Optec Co., Ltd. (OPTEC), 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 THB 60 million. SMH and TGES will hold 51% and 49% shareholdings, respectively in this joint investment. The registration was completed on November 15, 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.

November 1, 2021: To support on energy prices for Thai people, PTT has capped the NGV retail price for the taxi in Bangkok Metropolitan Area at THB 13.62 per kg from November 1, 2021 to March 15, 2022, and the NGV retail for general cars at THB 15.59 per kg from November 16, 2021 to March 15, 2022.

November 25, 2021: Board of Directors of PTT Tank Terminal Co., Ltd. (PTT TANK), a wholly owned subsidiary of PTT, approved to establish a new joint venture with Gulf Energy Development Plc. (GULF) and CHEC OVERSEA INFRASTRUCTURE HOLDING PTE. LTD (CHEC OVERSEA) under the name of GPC International Terminal Co., Ltd. (GPC) with the registered capital of THB 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.

November 29, 2021: Board of Directors of Alpha Com approved the establishment of ReAcc Co., Ltd. (ReAcc) which is 100% owned by Alpha Com, with the registered capital of THB 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.

November

December

December 2, 2021: PTT's Board of Directors approved PTT Energy Resources Co., Ltd. (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.

December 16, 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 THB 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 THB 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.

Besides, the Milestones of the past three years of each PTT Group's flagship company that listed in SET was disclosed on the website, the details are as follow:

READ MORE *PTT Exploration and Production Plc. (PTTEP)*

READ MORE *Global Power Synergy Plc. (GPSC)*

READ MORE *PTT Global Chemical Plc. (GC)*

READ MORE *Thai Oil Plc. (TOP)*

READ MORE *PTT Oil and Retail Business Plc. (OR)*

READ MORE *IRPC Plc. (IRPC)*

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1.1.3 Use of Proceeds

Details of use of proceeds as of December 31, 2021 are as followed:

Domestic, Unsecured and Unsubordinated Bonds (Enforced under Thai Laws)

PTT utilized the funds derived from the issuance and offer of Thai Baht Bond consisting of: PTTC222A, PTTC227A, PTTC232A, PTTC237A, PTTC239A, PTTC243A, PTTC247A, PTTC248A, PTTC257A, PTTC268A, PTTC277A, PTTC288A, PTTC307A, PTTC318A, PTTC357A, PTTC457A and PTTC10DA fulfilling completely the objectives as stated in the Registration Statement.

Foreigns, Unsecured and Unsubordinated Bonds (Enforced under New York Laws)

PTT utilized the funds derived from offer of USD bond of PTT and PTT Treasury Center Co., Ltd. (PTT TCC) with PTT as guarantor consisting of USD Bond 2005, USD Bond 2012, USD Bond 2019 and USD Bond 2020 fulfilling the objectives completely as stated in the Registration Statement.

1.1.4 Obligations Pledged by the Company in the Registration Statement

Domestic Bonds and Foreign Bonds (Unsecured, Unsubordinated)

PTT has no financial obligation per each tranche of bond as stated in the Registration Statement and other documents pertaining to each tranche. Conditions for exercising of Put and Call Option of each tranche are disclosed in 1.5. Issuance of Other Securities (1.5.2 debt securities).

1.2 Nature of Business

1.2.1 Revenue Structure

Product/ Service	Operated by	% Share-holding	2019 (Audited)		2020 (Audited)		2021 (Audited)	
			THB million	%	THB million	%	THB million	%
1. Gas products	PTT Plc.		339,829.09	15.03	277,111.90	16.80	305,385.59	13.52
	PTT Exploration and Production Plc. (PTTEP)	63.79	14,981.18	0.66	15,118.64	0.92	27,800.94	1.23
	PTT Natural Gas Distribution Co., Ltd. (PTTNGD)	58.00	10,594.01	0.47	7,363.09	0.45	11,652.36	0.52
	Global Power Synergy Plc. (GPSC[1/])	42.53	65.81	-	59.18	-	83.68	-
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	40,706.59	1.80	30,217.20	1.83	29,377.17	1.30
	PTT International Trading London Ltd. (PTTT LDN)	100.00	-	-	4,985.10	0.30	-	-
Total revenue from gas products			**406,176.68**	**17.96**	**334,855.11**	**20.30**	**374,299.74**	**16.57**
2. Oil products	PTT Plc.		208,126.33	9.21	112,465.05	6.82	193,347.75	8.56
	PTT Exploration and Production Plc. (PTTEP)	63.79	17,730.00	0.78	20,844.96	1.26	32,770.63	1.45
	PTT International Trading Pte. Ltd. (PTTT)	100.00	295,588.44	13.07	189,665.70	11.50	317,549.80	14.06
	PTT International Trading London Ltd. (PTTT LDN)	100.00	46,564.97	2.06	14,841.16	0.90	32,275.39	1.43
	PTT Global Chemical Plc. (GC[1/])	45.18	26,439.16	1.17	21,773.24	1.32	23,783.35	1.06
	Thai Oil Plc. (TOP)	45.03	161,166.08	7.13	109,978.56	6.67	163,038.52	7.22
	IRPC Plc. (IRPC)	45.05	116,648.57	5.16	83,407.10	5.05	127,778.85	5.66
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	489,995.09	21.67	361,125.46	21.89	439,076.53	19.44
	PTT International Trading USA Inc. (PTTT USA)	100.00	-	-	-	-	7,284.91	0.32
Total revenue from oil products			**1,362,258.64**	**60.25**	**914,101.23**	**55.41**	**1,336,905.73**	**59.20**
3. Petrochemicals products	PTT Plc.		16,857.93	0.75	10,294.75	0.62	13,245.15	0.59
	PTT Global Chemical Plc. (GC[1/])	45.18	197,309.85	8.73	161,620.06	9.80	259,291.52	11.48
	Thai Oil Plc. (TOP)	45.03	23,010.77	1.02	18,242.08	1.11	30,638.25	1.36
	IRPC Plc. (IRPC)	45.05	57,088.60	2.52	45,617.16	2.77	67,015.46	2.97
	PTT International Trading Pte. Ltd. (PTTT)	100.00	53,466.69	2.36	31,196.80	1.89	67,378.52	2.98
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	516.97	0.02	399.18	0.02	619.37	0.03
	PTT International Trading USA Inc. (PTTT USA)	100.00	-	-	-	-	186.36	0.01
Total revenue from petrochemical products			**348,250.81**	**15.40**	**267,370.03**	**16.21**	**438,374.63**	**19.42**
4. Mining products	PTT Global Management Co., Ltd. (PTTGM)	100.00	15,078.02	0.67	10,202.18	0.62	15,560.46	0.69
Total revenue from mining products			**15,078.02**	**0.67**	**10,202.18**	**0.62**	**15,560.46**	**0.69**
5. Public utilities	Thai Oil Plc. (TOP)	45.03	4,968.71	0.22	4,573.32	0.28	4,841.68	0.22
	IRPC Plc. (IRPC)	45.05	3,427.80	0.15	3,390.96	0.20	3,420.15	0.15
	Global Power Synergy Plc. (GPSC[1/])	42.53	51,679.34	2.29	54,572.97	3.31	57,845.00	2.56
	PTT Tank Terminal Co., Ltd. (PTT TANK)	100.00	45.51	-	51.78	-	45.60	-
	PTT Global Management Co., Ltd. (PTTGM)	100.00	-	-	-	-	628.44	0.03
Total revenue from utilities products			**60,121.36**	**2.66**	**62,589.03**	**3.79**	**66,780.87**	**2.96**
6. Non-oil Business	PTT Plc.		380.89	0.02	141.22	0.01	28.27	-
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	16,891.85	0.75	16,937.84	1.03	17,190.29	0.76
Total revenue from non-oil business			**17,272.74**	**0.77**	**17,079.06**	**1.04**	**17,218.56**	**0.76**

Remarks:
Revenue of PTT's and subsidiaries' represents net revenue derived from external parties
1/ During 2021, PTT changed its shareholders portion in GPSC, OR and GC

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Product/ Service	Operated by	% Share-holding	2019 (Audited)		2020 (Audited)		2021 (Audited)	
			THB million	%	THB million	%	THB million	%
7. Revenue from services	PTT Plc.		19.19	-	231.21	0.01	260.21	0.01
	PTT Exploration and Production Plc. (PTTEP)	63.79	3,618.48	0.16	2,894.69	0.18	2,992.71	0.13
	PTT Global Chemical Plc. (GC[1/])	45.18	2,797.47	0.13	2,676.07	0.16	3,343.08	0.15
	Thai Oil Plc. (TOP)	45.03	289.89	0.01	257.67	0.02	89.73	-
	IRPC Plc. (IRPC)	45.05	524.63	0.02	542.86	0.03	576.45	0.03
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	509.68	0.02	479.68	0.03	391.28	0.02
	PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	20.00	111.24	0.01	110.84	0.01	145.27	0.01
	PTT Tank Terminal Co., Ltd. (PTT TANK)	100.00	676.92	0.03	669.92	0.04	684.86	0.03
	PTT Energy Solutions Co., Ltd. (PTTES)	40.00	16.76	-	9.99	-	3.53	-
	Energy Complex Co., Ltd. (EnCo)	50.00	273.53	0.01	271.94	0.02	282.41	0.01
	Business Services Alliance Co., Ltd. (BSA[2/])	25.00	193.68	0.01	226.13	0.01	210.59	0.01
	Global Power Synergy Plc. (GPSC[1/])	42.53	18.74	-	19.12	-	29.83	-
	PTT LNG Co., Ltd. (PTTLNG)	100.00	60.79	-	63.36	-	288.35	0.01
	PTT Natural Gas Distribution Co., Ltd. (PTTNGD)	58.00	48.22	-	37.28	-	3.27	-
	PTT Global Management Co., Ltd. (PTTGM)	100.00	-	-	-	-	4.68	-
Total revenue from services			**9,159.22**	**0.40**	**8,490.76**	**0.51**	**9,306.25**	**0.41**
8. Other products	PTT Plc.		757.15	0.03	-	-	-	-
	Business Services Alliance Co., Ltd. (BSA[2/])	25.00	9.11	-	0.02	-	0.01	-
	Global Power Synergy Plc. (GPSC[1/])	42.53	7.06	-	-	-	-	-
	PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	20.00	-	-	-	-	0.34	-
	PTT International Trading Pte. Ltd. (PTTT)	100.00	436.73	0.02	493.18	0.03	269.48	-
	IRPC Plc. (IRPC)	45.05	201.89	0.01	482.09	0.03	99.36	0.01
	PTT Oil and Retail Business Plc. (OR[1/])	75.00	9.26	-	-	-	-	-
	PTT Global Management Co., Ltd. (PTTGM)	100.00	-	-	0.64	-	2.52	-
	PTT International Trading London Ltd. (PTTT LDN)	100.00	-	-	1.33	-	-	-
	PTT LNG Co., Ltd. (PTTLNG)	100.00	-	-	-	-	0.54	-
Total revenue from other products			**1,421.20**	**0.06**	**977.26**	**0.06**	**372.25**	**0.01**
Total revenue from products and services			**2,219,738.67**	**98.17**	**1,615,664.66**	**97.94**	**2,258,818.49**	**100.00**
9. Others								
9.1 Other revenue[3/]			19,979.95	0.88	20,578.99	1.25	(3,018.09)	(0.13)
9.2 Gain from foreign exchange			15,312.83	0.68	9,269.53	0.56	(6,468.62)	(0.29)
Total other revenue			**35,292.78**	**1.56**	**29,848.52**	**1.81**	**(9,486.71)**	**(0.42)**
10. Share of profit from investment in joint ventures and associates			**6,007.99**	**0.27**	**4,177.72**	**0.25**	**9,010.12**	**0.40**
Grand total			**2,261,039.44**	**100.00**	**1,649,690.90**	**100.00**	**2,258,341.90**	**100.00**

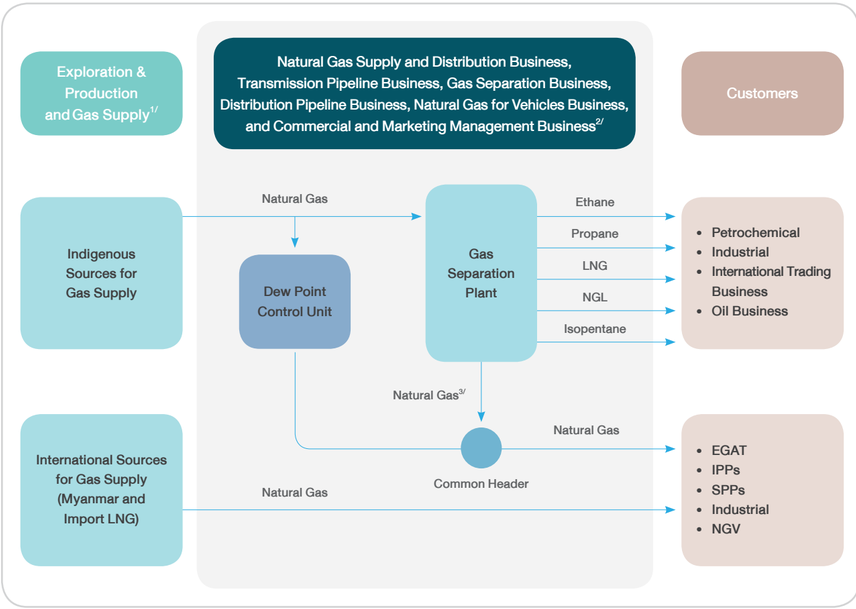
Remarks:
Revenue of PTT's and subsidiaries' represents net revenue derived from external parties.
1/ During 2021, PTT changed its shareholders portion in GPSC, OR and GC.
2/ PTT holds 100.00% of BSA's ordinary shares. Thus, PTT's ownership interest in BSA is 100.00%.
3/ Other revenue includes gain(loss) on derivatives.

1.2.2 Business/ Supply/ Distribution

Upstream Petroleum and Natural Gas Business

Currently, PTT and PTT's affiliates under upstream petroleum and natural gas business are the only fully integrated natural gas operator in Thailand, which covering exploration and production, natural gas supply, import of Liquefied Natural Gas (LNG) and regasification, pipeline transmission, gas separation, distribution, including investment in natural gas-related business in Thailand and internationally, and business development. PTT is Thailand's largest supplier, natural gas pipeline transporter, distributer, and gas separation service operator.

Diagram of PTT Group's Upstream & Gas Business



Remarks:
1/ PTT operates exploration and production through PTTEP. PTT procures natural gas from both indigenous and international sources together with import LNG.
2/ Operated by PTT.
3/ Refers to a portion of natural gas which is left after other products have been separated. It mainly consists of methane.

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The unit handles supply, wholesale and retailing, distribution of products from gas separation plants, as well as investment in businesses that utilize and add value to natural gas via PTT's Affiliates.

PTT-Operated Upstream Business

Natural Gas Unit

The unit handles supply, wholesale and retailing, distribution of products from gas separation plants, as well as investment in businesses that utilize and add value to natural gas via PTT's affiliates. The supply side covers sources in Thailand and neighboring countries, including LNG import to ensure adequate supply for Thailand's ever-increasing demand. On distribution, it supplies power generators: Electricity Generating Authority of Thailand (EGAT), Independent Power Producer (IPP) and Small Power Producer (SPP). For industrial customers, distribution is through PTT-invested transmission pipeline. For transportation sector distribution is to incentivize natural gas as alternative to gasoline and diesel via Natural Gas for Vehicles (NGV) service network. In gas separation business, PTT has invested in gas separation plant to add value to Gulf of Thailand gas for outputs to feed Thailand's petrochemical industry in support of other sectors thereby contributing to national economic growth. LPG is also distributing as fuel to household, industrial and transportation sectors.

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The Natural Gas Unit operates related businesses namely pipeline asset management, gas logistics through transmission pipeline consisting of offshore pipeline system connected to production platforms in Gulf of Thailand, onshore western pipeline system that receives gas from Gulf of Thailand and LNG Receiving Terminal, together with onshore eastern pipeline system that receives gas from Yadana, Yetagun and Zawtika in Myanmar along the Thailand-Myanmar border to feed natural gas to power producers, gas separation plant, NGV and industries. PTT invests in LNG Receiving Terminal through PTT LNG in which PTT holds 100.0% shares to cater LNG vessels, storage, and regasification to accommodate LNG import. PTT LNG allows external party to register intent to connect with LNG terminal from March 30, 2015.

The Energy Regulatory Commission (ERC) is the competent authority according to Energy Business Act B.E. 2550 to determine natural gas tariffs wholesale and retail. PTT divides natural gas business into further four sub business units:

(1) Supply and Marketing Business: sources natural gas from Thailand and international including supply of LNG and regasification to be distributed to clients, with power producers as the biggest user.
(2) Gas Separation Plant: operates and develops gas separation plant, currently a total of six plants.
(3) Distribution Pipeline: operates and develops distribution systems that connect with the Transmission Pipeline, to deliver natural gas to industrial customers.
(4) Natural Gas for Vehicles (NGV) Business: is responsible for expansion of NGV service stations, coverage and promoting gas as alternative transport fuel because it is greener and cheaper than oil, less costly for consumers while mitigating air pollution.

Moreover, as the government's policy to liberalization the natural gas sector phase 2 in order to promote competition in natural gas business, results that some existing clients emerging as business competitors, particularly when LNG price is low which incentivizes entry of New Shipper. Moreover, the new shipper could seek promising opportunities for the LNG market expansion into the international growing market, especially in Asia-Pacific. With these developments, PTT formed a fifth sub business unit:

(1) Commercial and Marketing Management: in charge of commercially supply and distribution of LNG domestically and internationally, and of natural gas-related products and services.

In 2021, PTT's revenue from natural gas sales totals THB 374,300 million, an increase of THB 39,445 million or 11.8% from 2020 sales at THB 334,855 million (More details of PTT's revenue structure and subsidiaries per product specialization are outlined in 1.2.1)

Natural Gas Supply and Marketing Business

Natural Gas Supply

PTT's gas supply is under the charge of Natural Gas Supply and Distribution Business, with over 70% from sources in-country and the rest from Myanmar and LNG import.

Currently PTT is the buyer from gas producers governed by existing 14 contracts. Of the total, 11 are from sources in Thailand namely: Pailin, Bongkot North, Bongkot South,[1/] UNOCAL123[2/], B8/32[3/], Artit, MTJDA Block A-18, MTJDA Block B-17, Nampong, Sinphu-hom[4/], Sirikit (Lankrabue Area) and three contracts with producers outside Thailand - Yadana, Yetagun and Zawtika[5/] in Myanmar.

PTTEP Energy Development (PTTEP ED) (a subsidiary of PTT Exploration and Production) holds exploration and production rights in Block G1/61 (Erawan) and G2/61 (Bongkot) and it signed a Production Sharing Contract (PSC) with the state since February 2019 with minimum contractual capacity of 800 MMSCFD and 700 MMSCFD respectively. PTT is negotiating a trading contract for Block G1/61 which will replace the UNOCAL123 (Erawan) contract due to expire in 2022. It is seeking negotiation for a contract for Block G2/61 to replace the Bongkot North and Bongkot South contract which will expire in 2022 - 2023.

Currently, Seller of Block G1/61 finalized terms of site access to Block G1/61 (Erawan) in December 2021. It is projected that the supply contract with PTT can be signed within the first quarter of 2022. PTT and Seller of Block G2/61 wrapped up the drafting and the G2/61 contract is expected to be signed within the first quarter of 2022. At the same time to manage contractual transition risks which may impact continuity of production, PTT has negotiated additional supply as backup from Gulf of Thailand, and LNG to ensure adequate supply to meet clients' demand, without affecting power generation and energy security.

In addition, PTT secured LNG supply to reinforce security and meet ever-increasing demand. PTT has 4 long-term LNG supply contracts totaling 5.2 million tons per year: 2 million tons per year with Qatar Liquefied Gas Co., Ltd.; 1 million tons per year with Shell Eastern Trading (Pte) Ltd., and with BP Singapore Pte.; and 1.2 million tons per year with Petronas LNG Ltd.

Remarks:

1/ The contract was signed on July 30, 2009 for 320 MMSCFD. Contractual delivery began on June 16, 2012.

2/ Trading commenced on May 5, 2010 starting at 680 MMSCFD, gradually scaling up to 1,010 MMSCFD on November 17, 2011 and up to 1,240 MMSCFD on April 24, 2012. However, the trade volume climbed down to 1,215 MMSCFD from October 1, 2017 on, with the contract/concession expiring on April 23, 2022.

3/ Consisting of Benjamas, Benjamas North, Maliwan, Chamchuree, North Chamchuree, Chabaa, Lanta. From October 1, 2019, volume averages 45 MMSCFD.

4/ Contract expiry date is November 28, 2021 and new Sinphu-hom contract was signed on October 1, 2021 for ten years (October 1, 2021 - March 15, 2031)

5/ Contract was signed on July 30, 2010 for volume of 240 MMSCFD with first delivery on August 5, 2014.

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PTT meets additional demand to these contracts through Spot LNG purchase in view of market situation which fluctuates and in accommodating deregulation. In any case, should Spot LNG price fall, PTT will seek opportunities to secure a proportion of Spot LNG to partially substitute Gulf of Thailand supply to ease production in a bid to optimize and lengthen the lifespan of precious resource.

In any case, a large chunk of PTT's gas supply originates from concessions/ production blocks in-country shown in the volume and proportion of PTT's gas supply 2019 - 2021 in the chart below.

Location/ Concession Block	2019		2020		2021	
	MMSCFD	%	MMSCFD	%	MMSCFD	%
Thailand						
- Pailin	408	8.5	325	7.4	395	8.9
- Bongkot (North/ South)	787	16.4	753	17.2	827	18.7
- UNOCAL 1, 2, 3	1,286	26.8	1,117	25.4	805	18.2
- B 8/32	76	1.6	55	1.3	50	1.1
- Arthit	220	4.6	215	4.9	234	5.3
- MTJDA	462	9.7	351	8.0	423	9.6
- Nampong/ Sinphu-hom	91	1.9	101	2.3	97	2.2
- Sirikit	10	0.2	6	0.1	7	0.2
Total in Thailand	**3,340**	**69.7**	**2,923**	**66.6**	**2,838**	**64.2**
Overseas						
- Yadana	419	8.7	409	9.3	434	9.8
- Yetagun	99	2.1	52	1.2	16	0.4
- Zawtika	218	4.6	233	5.3	243	5.5
- LNG	716	14.9	772	17.6	889	20.1
Total overseas	**1,452**	**30.3**	**1,466**	**33.4**	**1,582**	**35.8**
Total	**4,792**	**100.0**	**4,389**	**100.0**	**4,420**	**100.0**
Average gas buying price (THB/MMBTU)	228.7		205.5		226.2	

Remark:
Natural gas calculated at heat rate of 1,000 BTU per cubic foot.

Key Terms in Gas Supply Contract

Gas supply contracts between PTT and Seller typically cover a duration of 25 - 30 years. The contract parties agree to trade natural gas at agreed delivery points for example at wellhead platform or another agreed location at quality, quantity and pressure as specified in the contract.

The Seller is duty-bound to prepare Contractual Delivery Capacity (CDC) for PTT to dispatch in the range of 105 - 125% of Daily Contract Quantity (DCQ) depending on the contract, whereas PTT must take the daily minimum quantity. PTT also has the right to buy more than CDC contracted volume provided if the Seller is ready to deliver.

However, if in any contractual year PTT is unable to take the Annual Contracted Quantity (ACQ), the Take-or-Pay obligation is applied with the right to receive the paid commodity rolled-over to subsequent years in contract without deadline and without additional cost (make-up gas). In the year when PTT wishes to exercise the right to take the make-up gas volume, this can be executed only after PTT completes its CDC obligation of the year. In reverse, should PTT buy more than CDC in any contract year, PTT can carry forward the surplus to be counted in the CDC portion in subsequent year not exceeding 15 - 20% depending on contract. Right to exercise this right is valid for five years from the starting year of Carry-Forward.

In the event of shortfall where the Seller is unable to deliver PTT dispatch in full, PTT shall pay for the actual quantity received, and be entitled to 20 - 25% discount for the shortfall amount in that month, or subsequent month or subsequent year depending on contracts. Upon end of each contract year, PTT can use the shortfall to reduce the ACQ.

On pricing, the contract shall fix an Initial Base Price as constant, with formula to determine the highest and lowest prices to protect the Buyer and Seller. The gas price formula incorporates the following considerations: High Sulfur Fuel Oil price in Singapore market, exchange rate and key economic indicators such as Thailand's wholesale price index, US oil and gas producers' index among others. Time frame for pricing adjustment varies according to contracts ranging from every 12 months, 6 months, 3 months or monthly. This pricing shall be passed through to clients in power generation sector which are core customers that buy gas from PTT, according to the pricing formula in the NG contract, and hence relatively low risks of pricing volatility for PTT.

All gas supply contracts have force majeure clause which can be invoked by either PTT or the Seller as reason for failing to meet obligation. The clause covers acts of gods faced by contracting party. Some contracts specify cases in which PTT cannot dispatch due to force majeure on parts of PTT clients. This can only be invoked by PTT on single condition that PTT must decrease dispatch across the board among Sellers involved proportionate to the amount decreased.

Gas supply contracts end in the event of one of the following:

(1) Expiry date as stated in the contract
(2) Expiry of concession (gas fields in Thailand)
(3) The natural gas reserve on site runs dry.

Natural Gas Marketing

PTT markets most of its supply to power producers: EGAT, independent power producers, small power producers, through Transmission Pipeline.

Volume of gas supply to different segments (inclusive of that used in PTT's gas separation plant) during 2019 - 2021 is shown in the chart:

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Customer	2019		2020		2021	
	MMSCFD	%	MMSCFD	%	MMSCFD	%
1. EGAT	755	15.7	786	17.8	700	15.8
2. IPP	750	15.6	546	12.4	587	13.2
3. SPP	1,305	27.2	1,281	29.2	1,331	30.0
4. Industry[1/]	971	20.3	872	19.9	910	20.5
5. Gas Separation Plant	1,015	21.2	909	20.7	909	20.5
Total	**4,796**	**100.0**	**4,394**	**100.0**	**4,437**	**100.0**

Source: PTT
Remarks:
Natural Gas volumes calculated at heat value of 1,000 BTU per 1 cubic foot feet and based on calendar days.
1/ Inclusive of gas sold to PTT Natural Gas Distribution Co., Ltd. and NGV

Generally natural gas pricing tariffs to power producer segment consist of two components: gas cost and pipeline tariffs, elaborated herewith.

(1) Gas Cost

Gas cost is the sum of average gas price that PTT buys from Seller and remuneration for supply and marketing.

The supply and marketing remuneration which covers expenses and risks in sourcing natural gas and marketing varies in rates depending on types of clients. At present, supply and marketing remuneration for EGAT and IPPs equals 1.75% of average gas price that PTT buys from Seller. The rate charged on EGAT and IPPs is capped at THB 2.1525 per MMBTU. Small power producers buying less amount than the first two segments, PTT charges 9.33% of average gas cost that PTT buys from Seller at production fields. Nonetheless the rate charged SPP must not exceed THB 11.4759 per MMBTU.

On August 4, 2021 the National Energy Policy Council (NEPC) approved the natural gas tariff structure to facilitate the second phase of natural gas liberalization alongside a timeframe to enforce the structure. As a result, natural gas liberalization is now in the second phase, when operators are competing to supply LNG. Currently, the Energy Regulatory Commission (ERC) granted LNG Shipper License to a total of 8 recipients: PTT, EGAT, Gulf LNG, Hingong Power Holding, B.Grimm LNG, EGCO, PTT Global LNG, and SCG.

(2) Pipeline Tariffs

Pipeline tariffs consist of two components. First, the Demand Charge is calculated based on investment and constant operation costs with Internal Rate of Return on Equity fixed at 18% for the transmission pipeline system according to the first and second National Gas Master Plan and at 12.5% stipulated in the Third Pipeline Master Plan (Revised).[1/] The second component, Commodity Charge, is variable cost based on Variable OPEX incurred in the gas transmission services.

In 2021 the Demand Charge component remained the same as in 2020, calculated according to the formula approved by National Energy Policy Council (NEPC) on October 18, 2007. The Commodity Charges component is calculated based on the 2017 formula which the Energy Policy and Planning Office (EPPO) and PTT proposed to the regulator, ERC, for its approval. Gas transmission tariff shall be fixed according to each client's zone of gas use.

Remark:
1/ Effective from April 1, 2009

Demand Charge component of pipeline tariff structure is as followed:

Unit: THB/MMBTU

Zone	Pipeline	Demand Charge
1	Offshore pipeline at Rayong	8.5899[1/]
2	Offshore pipeline at Khanom	14.2177[1/]
3	Onshore pipeline	12.0654[1/]
4	Onshore pipeline at Chana	2.4855[2/]
5	Onshore pipeline at Nam Phong	1.1299[3/]

Commodity Charge component of pipeline tariff structure is as followed:

Unit: THB/MMBTU

Zone	Pipeline	Commodity Charge
1	Offshore pipeline at Rayong	1.0405[4/]
2	Offshore pipeline at Khanom	
3	Onshore pipeline	
4	Onshore pipeline at Chana	0.0994[4/]
5	Onshore pipeline at Nam Phong	0.0000[4/]

Remarks:
1/ Effective from April 1, 2009
2/ Effective from June 2011
3/ Effective from July 2012
4/ Effective from April 2021

The Demand Charge is subject to periodic adjustment, through review of constant costs over a cycle of five years or ERC-approved timing, or in the event of factors affecting significant change on tariff to main the approved EIRR. The Commodity Charge component is reviewed annually by defining indexes to adjust variable costs to reflect current circumstances and operational efficiency.

The National Energy Policy Council (NEPC) at its meeting on August 4, 2021 approved the natural gas tariff structure to promote competition in the second phase of natural gas liberalization. Substantive change from the previous version is the review of zoning in calculating tariff for buyers by incorporating offshore system usage onto the onshore system in Zone 1, to include offshore pipeline charges of Trans-Thai Malaysia (TTM) into PTT's offshore transmission tariff. The ERC announced criteria of tariff calculation for Shipper License holders using the pipeline on October 28, 2021.

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Gas Separation Business

Besides selling directly to clients, PTT feeds parts of supply to its gas separation plants to add value and optimize the feed through separation of key hydrocarbon components. Products from PTT gas separation plants include ethane, propane, liquid petroleum gas (cooking gas), isopentane and natural gasoline. Another byproduct of the process is carbon dioxide that can be utilized in various industries. Products from gas separation plants and applications are listed in this chart.

Product	Application
Ethane	Raw material in upstream petrochemical industry
Propane	Raw material in upstream petrochemical industry
LPG	Fuel for household, vehicle, industrial factory, and raw material in upstream petrochemical industry
Natural Gasoline	Feed for oil refinery as gasoline and raw material in upstream petrochemical industry
Isopentane	Raw material in upstream petrochemical industry

PTT is Thailand's largest gas separation plant operator, with a total of six plants. All of PTT's gas separation plants have consistently been improved and optimized, with actual processing capacity totaling 2,870 MMSCFD, outperforming the nameplate capacity of 2,660 MMSCFD.

The production volumes of GSP products from 2019 to 2021 as follows:

Product (Ton)	2019	2020	2021
Ethane	2,396,338	2,198,718	2,181,596
Propane	1,021,520	940,818	1,017,933
LPG	2,744,868	2,374,785	2,293,291
Natural Gasoline	525,146	625,831	489,937
Isopentane	50,877	37,164	43,055
Total	**6,738,749**	**6,177,316**	**6,025,812**

Source: PTT

Natural Gas Retail Business

In addition to selling most of natural gas to power producers, PTT supplies industrial customers, having invested in a distribution pipeline system connected from the main transmission pipeline system to industry customers for the purposes of production processes, cogeneration and commercial use, together with the contribution through trucking of CNG (Compressed Natural Gas) and LNG. PTT and retail clients shall enter a gas supply contract that specifies the quantity required and the agreed selling price structure, for a duration ranging from 6 months to 10 years. As of December 31, 2021, PTT is serving a total of 366 pipeline contracts and 8 CNG/LNG contracts.

The pricing structure for industrial customers differs from that of power producers. For industry clients, the tariffs consist of two components: gas cost according to actual volume used per month, and management fees to ensure availability per their advance notification to PTT. NG price for industrial customers is determined to be competitive with other alternatives such as fuel oil and LPG.

Natural Gas for Vehicles Business

To promote natural gas as alternative fuel in the transport sector, easing economic impact due to pricing volatility of global crude and refined oil prices, and environment impact, and in support of national energy strategy to use more local-sourced fuel, PTT introduced NGV to the public bus fleet of Bangkok Metropolitan Mass Transit since 1993. Subsequently NGV market expanded to other types to vehicles, and by end of December 2021, a total of 321,139 vehicles uses NGV as fuel according to transport authority's data. Total sales of NGV in 2021 averaged at 3.2 million kilogram per day. The 383 NGV service stations consist of 19 mother stations, distributing and trucking to feed 246 daughter stations outside the pipeline route, and to 118 conventional stations located along the pipeline route. A total of 178 stations serves Bangkok and Metropolitan area as well as 205 stations serves the upcountry.

Commercial and Marketing Management

In support of the government's natural gas liberalization policy, energy reform plan to make Thailand as the Regional LNG hub, new sub-unit on Commercial and Marketing Management was established under PTT's Natural Gas Business. Commercial and Marketing is responsible for commercial LNG market, natural gas products and services related to natural gas including expansion into growing markets such as Cambodia, Laos, Myanmar and Vietnam as well as China.

Sales volume of products from PTT's gas separation plants in 2019 - 2020 and distribute through Commercial and Marketing Management since 2021:

Product (Ton)	2019	2020	2021
Ethane	2,397,704	2,198,542	2,181,272
Propane	891,923	853,025	953,395
LPG	3,594,017	2,947,307	3,113,277
Natural gasoline	674,179	603,433	617,011
Isopentane	50,871	37,161	43,057
Total	**7,608,694**	**6,639,468**	**6,908,012**

Source: PTT

Main customers include petrochemical concerns such as GC, HMC Polymers, Rayong Olefins and oil operators according to Section 7 of the Fuel Oil Trade Act B.E. 2543. In 2021, gas separation plants sold mainly to Section 7 operators namely OR, Siam Gas and Petrochemicals Plc., and Unique Gas and Petrochemicals Plc.

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Pricing of products from gas separation plants to petrochemical clients complies with the formula mutually agreed with individual client, mainly benchmarked against petrochemical product prices in the global market. Natural gasoline price is benchmarked against naphtha price in the global market. For LPG sold domestically from August 2017, EPPO shall announce reference price for domestic retail price of LPG only. Criteria have been changed for imported LPG price from CP price announced monthly to benchmarking instead against LPG Cargo with Platts' Spot Cargo data (FOB Arab Gulf) bi-weekly average, to make LPG cost from all supply sources comparable and competitive in a liberalization environment. For gas separation plants, currently, the Committee of Energy Policy Administration resolved to collect the spread onto the Fuel Oil Fund in case LPG Cargo+X (import expense)is higher than LPG cost from gas separation plants and compensate in the event where LPG Cargo+X is lower than LPG cost from GSPs.

Since 2015 the public sector requested PTT's cooperation in assisting LPG users in the household sector (low-income households, vendors, small shops and food hawkers) to lessen the impact of LPG retail price adjustment. Effective from October 2017 PTT targeted help to only low-income citizens through the government's welfare card scheme. In 2021, PTT supported a total of THB 6,327,782.61.

Transmission Pipeline Business Unit

The business unit operates service, operation, maintenance work for transmission pipeline, and carrying out legal work related to gas transmission pipeline. When the Seller delivers natural gas to PTT at delivery point, natural gas shall be transmitted to clients via the pipeline systems which are assets of PTT's Upstream Petroleum and Natural Gas Business Group. These assets consist of offshore transmission pipeline, connected to production fields in the Gulf of Thailand and the onshore pipeline system in the east coast receiving gas from Gulf of Thailand, and the LNG station onshore westward that receives gas from Yadana, Yetagun and Zawtika fields in Myanmar to be distributed to power producers, GSPs, NGV and industries. Within PTT's pipeline systems, other critical components include Dew Point Control Unit and Common Header for quality control and harmonization processes for gas from various sources to yield unified heat rate and quality across the system.

As of December 31, 2021, PTT's transmission pipeline runs a total length of 4,566 kms consisting of onshore pipeline the length of 2,433 kms (inclusive of pipeline to supply independent power producers and to power plants, but excluding distribution pipeline) and offshore pipeline the length of about 2,133 kms.

This Table presents information on Transmission Pipeline, only the crucial systems, as of December 31, 2021

Transmission Pipeline System	Length (km)	Pipe size (inch)	COD Year	Details
Offshore Pipeline System				
Erawan - Rayong Gas Separation Plant (1st principal pipeline)	415	34	1981	Pipeline from Erawan production platform in the Gulf of Thailand to Rayong Gas Separation Plant in Map Ta Phut, Rayong.
Bongkot - Erawan (1st principal pipeline)	171	32	1996	From Bongkot platform in the Gulf of Thailand, connected to Erawan platform.
Erawan - Rayong Gas Separation Plant (parallel pipeline)	413	36	1996 - 1997	Parallel pipeline from Erawan platform to Rayong GSP in Map Ta Phut, Rayong
Erawan - Khanom Power Plant	161	24	1996	Pipeline from Erawan platform to Khanom Electricity Plant in Nakhon Si Thammarat
Arthit - Rayong Gas Separation Plant (3rd pipeline)	610	42	2007	The third pipeline from Arthit platform to Rayong GSP in Map Ta Phut, Rayong
JDA- Arthit	95	42	2008	The third pipeline from JDA to Arthit
Chevron Platform Extension (Platong 2) - 3rd offshore pipeline	48	28	2011	From Chevron Platform Extension (Platong 2) to 3rd offshore pipeline
South Bongkot - 3rd offshore pipeline	38	24	2012	Linking Bongkot South platform with the third offshore pipeline
Onshore Pipeline System				
Rayong Gas Separation Plant - Bangpakong Power Plant (2nd principal pipeline)	107	28	1981	From Rayong Gas Separation Plant in Map Ta Phut to Bangpakong Power Plant in Chachoengsao
Bangpakong Power Plant - Pranakorn South Power Plant (1st principal pipeline)	57	28	1981	From Bangpakong Power Plant in Chachoengsao to Pranakorn South Power Plant in Samut Prakan
Bangplee - Saraburi (principal pipeline)	99	24	1981	This pipeline system runs from Bangplee District, Samut Prakarn to the cement factory of Siam Cement Pcl in Tha-luang District, Saraburi
Nam Phong - Nam Phong Power Plant	3	16	1990	From Nam Phong production platform to Nam Phong Power Plant in Khon Kaen
Rayong Gas Separation Plant - Bangpakong Power Plant (parallel pipeline)	105	28	1996	Parallel pipeline system from Rayong GSP to Bangpakong Power Plant in Chachoengsao
Bangpakong - Wang Noi Power Plant (parallel pipeline)	101	36	1996	Parallel pipeline from the compresser station at Bangpakong to Wang Noi Power Plant in Phra Nakhon Si Ayutthaya
Transmission Pipeline from Thai-Myanmar border to Ratchaburi Power Plant	238	42	1998	From the delivery point along Thai-Myanmar border at Ban-I-Tong in Kanchanaburi, this system pipes natural gas from Yadana and Yetagun to feed Ratchaburi Power Plant in Ratchaburi
Ratchaburi - Wang Noi	154	30	2000	This connects the transmission pipeline at the gas measuring station in Ratchaburi with the Bangpakong - Wang Noi Power Plant segment (parallel pipeline) at Wang Noi gas measuring station
Rayong Gas Separation Plant - Bangpakong Power Plant (3rd pipeline)	110	36	2006	The third pipeline from Rayong Gas Separation Plant to Bangpakong Power Plant in Chachoengsao
Wang Noi Power Plant - Kang Khoi Power Plant	72	36	2006	Pipeline system from Wang Noi Power Plant in Phra Nakhon Si Ayutthaya to Kang Khoi Power Plant in Saraburi

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Transmission Pipeline System	Length (km)	Pipe size (inch)	COD Year	Details
Transmission pipeline from the pressure control station RA#6 - Pranakorn South Power Plant	70	30	2007	Transmission pipeline from the pressure control station RA#6 - Pranakorn South Power Plant in Samut Prakan
Offshore - Chana Power Plant	8	20	2007	Pipeline system off the coast of Chana district, Songkhla to Chana Power Plant in Songkhla
Transmission pipeline to Pranakorn North Power Plant	7	24	2009	The pipeline system connects Pranakorn South Power Plant with Pranakorn North Power Plant in Nonthaburi
Onshore pipeline along the Thai-Myanmar border - BVW#1	0.59	28	2014	The project to accommodate supply from Zawtika in Myanmar to feed existing transmission pipelines operated by PTT at BVW#1 in Kanchanaburi
Rayong - Kang Khoi (4th pipeline)	298	42	2015	Pipeline system from Rayong to the Wang Noi - Kang Khoi Power Plant
Nakhon Sawan	192	28	2015	The pipeline from Wang Noi Power Plant in Phra Nakhon Si Ayutthaya to Nakhon Sawan
Nakhon Ratchasima	145	28	2018	The pipeline from Wang Noi Power Plant in Phra Nakhon Si Ayutthaya to Nakhon Ratchasima
5th onshore pipeline (GDF4 - BV5.4)	72	42	2021	This system runs from Rayong to the gas compression station 5.4 in Chon Buri
Transmission system from the 6th gas compression station Ratchaburi - Wang Noi to Ratchaburi province	119	30	2021	From gas compression station RA#6 in Nonthaburi to BVW#10 in Ratchaburi connecting the transmission pipeline network between the east and west
The 5th onshore gas pipeline transmission project (BV5.6 - BP4)	57	36	2021	The pipeline runs from gas compression station 5.6 in Chon Buri to BP4 compression station in Chachoengsao
The 5th onshore gas pipeline transmission project (BV5.4 - BV5.8)	74	42	2021	The section connects gas compression station 5.4 in Chon Buri with control station 5.8 in Chachoengsao
The 5th onshore gas pipeline transmission project (GDF4 - TP5MX)	5	42	2021	The system from Rayong to Gas Quality Mixing Zone (TP5MX)

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Reimagine Upstream strategy focuses on exploration and production of natural gas domestically and internationally, unleashing growth opportunity in the region through undertaking such as LNG Value Chain, Regional Gas to Power, aspiring to be fully integrated player in gas and LNG Value Chain and exploring overseas investment opportunities.

Upstream Business Invested through PTT Group

Natural Gas Business

PTT operates natural gas-related businesses through its affiliates. For example, the LNG business operates LNG vessels, storage and regasification to accommodate Thailand's LNG import. PTT is expanding investment and business into the gas value chain. The business scope to date includes development and construction of distribution pipeline systems, gas transportation. PTT invests through PTT Natural Gas Distribution Co., Ltd. (PTTNGD), Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T)), Trans Thai-Malaysia (Malaysia) Sdn. Bhd. (TTM(M)), PTT LNG Co., Ltd. (PTTLNG) and Map Ta Phut Air Products Co., Ltd. (MAP).

Petroleum Exploration and Production

PTT has conducted petroleum exploration and production businesses via PTT Exploration and Production Plc. (PTTEP), which is PTT Group's flagship company in the Exploration and Production. PTTEP operates domestic and international petroleum E&P and invested in related businesses to prospect petroleum sources of crude oil and natural gas for the purposes of ensuring Thailand's energy security and selling petroleum outputs from domestic and regional projects, mostly natural gas, primarily to the domestic market. As of December 31, 2021, PTTEP had more than 40 petroleum exploration and production projects in 15 countries including Thailand and other countries globally.

Overseas Investment (Upstream)

PTT has operated energy businesses overseas to find new energy sources and alternative energy to reinforce Thailand's energy security and upgrade its own existing businesses by leveraging the knowledge, expertise, and experiences of its human resources as well as collaborations within its group to expand its investment outside Thailand. PTT invests overseas through PTT Energy Resources Co., Ltd. (PTTER), PTT Global Management Co., Ltd. (PTTGM) and PTT Green Energy Pte. Ltd. (PTTGE), with all three wholly owned by PTT. In addition, there is PTT Global LNG Co., Ltd. (PTTGL) in which PTT and PTTEP each holds 50% shares.

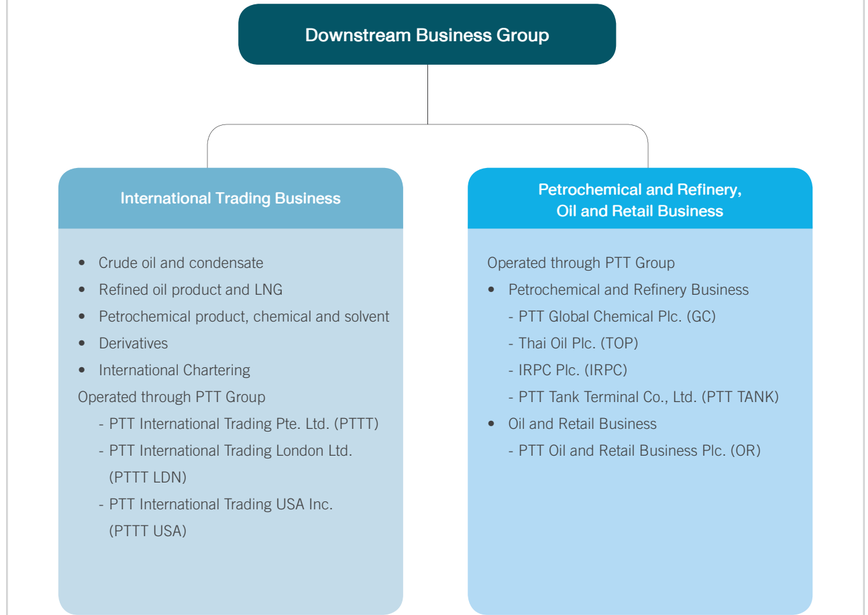
READ MORE
READ MORE

More details on Business/ Supply/ Distribution by individual company within the Group in which PTT invests are available at www.investor.pttplc.com/en/downloads/annual-reports and on PTTEP at www.pttep.com/en/Investorrelations/Regulatorfilings/Annualfiling.aspx

Downstream Business Group

PTT's downstream business is divided into two business segments.

Downstream Business Group Structure



PTT-Operated Downstream Business

International Trading Business

International Trading Business Unit engages in fully integrated international trading ranging from supply procurement, import, export, to international trading of assorted products, namely crude oil, condensate, liquefied natural gas, liquefied petroleum gas, refined product, petrochemical, solvent, and chemical, together with price risk management (hedging) services and international chartering services. Its core objective is to enhance energy security while adding value to Thailand's surplus products in parallel with trading platform expansion to all regions around the world and raising international trading competitiveness for PTT Group.

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The business unit's performance hinges on its pursuit of growth opportunities in out-out trading activities. It therefore formed affiliates and representative offices in trading hubs around the world, including Singapore, Abu Dhabi (the United Arab Emirates), Shanghai (China), London (the United Kingdom), and Houston (the United States of America). As a result, the business unit engages trading transactions with various partners covering around the world. Since international trading transactions carrying high values activities, the business unit applied the risk control system employed by the world-class trading houses as its best practices. In addition, a committee is in place to set risk management policies, steer assorted risk management tasks and clearly divide the work structure and roles in the system as Front-Mid-Back for checks and balances. Digital technology is also applied to develop systems for operation and transaction risk controls to enable quick and transparent transactions along with an efficient audit.

Nature of Merchandises and Products

International Trading Business deals in 4 categories of Merchandises and Products

1) Crude oil

Crude oil is hydrocarbon composite. Qualify of crude oil differs depending on types of organic compounds from its origin and other substances, and this is one of the key limitations and key consideration for refinery. Thailand has a number of crude oil fields but the quantity extracted and used can meet only 20% of overall demand from refineries in Thailand. Therefore, it is necessary to import crude oils, mostly from the Middle East such as Saudi Arabia, United Arab Emirates, Qatar, Oman, from the Far East including Australia, Malaysia, Brunei, Vietnam and Indonesia, and from other sources in Africa, Americas.

2) Condensate

Condensate is natural gas that is present as gaseous components in underground under high pressure but liquefies once brought up to the surface of the earth, and it is considered as a by product of natural gas production. Over 60% of condensate used in Thailand is from domestic gas production, with the rest imported. Refineries process condensate directly or blend with crude oil for refining. Products yielded will have the same property as those refined using light crude.

3) Refined Oil Product & Liquefied Natural Gas

- Refined oil product such as gasoline, kerosene, aviation fuel, gasoil, fuel oil, low sulfur waxy residue.
- Liquefied Petroleum Gas (LPG)
- Natural Gasoline (NGL)
- Liquefied Natural Gas (LNG)

4) Petrochemical Product, Chemical and Solvent

- Feedstock and by product such as Naphtha, Pygas
- Olefins group of products such as Propylene, C4 Raffinate, Butane
- Aromatics such as Benzene, Toluene, Mixed Xylene, Paraxylene, Cyclohexane, Stylene Monomer
- Chemicals such as Methyl tert-butyl ether (MTBE), Sulfuric Acid
- Solvents such as Methanol, Diethylene glycol, Acetone

Product Distribution of International Trading Business

PTT's international trading business is divided into 3 main aspects namely

1) Crude oil and condensate business
2) Refined oil product and liquified natural gas business
3) Petrochemical, chemical, and solvent trading business

1) Crude Oil and Condensate

The scope of operations includes international trading transactions, procurement, import and export of crude oil and condensate from domestic and international sources to supply refineries in and outside Thailand, as well as seeking opportunities for physical swap of crude oil and condensate with a view to profit and balance of the system, and ensuring that indigenous crude oil and condensate are consumed effectively.

1.1) Domestic Crude Oil

Due to resource scarcity in Thailand which is an importer, crude oil is precious and must be optimized. At present PTT procures domestically from various fields including Sirikit (Phet), Kampangsaen and U-thong (BP), Sankajai, Buengyah and Buengmuang (North Central), Wichianburi and Srithep (Wichianburi), East Na-sa-noon (NSE), Arunotai, Pattani, Jasmine, Thantawan, Benjamas, Bualuang, Manohra. PTT buys parts of indigenous crude from concessionaires and sells this portion to domestic refineries.

1.2) International Crude Oil

PTT procures and transports crude oil from outside Thailand for domestic refineries together with providing hedging management services. PTT is fully supply crude and condensate to GC and IRPC refineries, whereas supply part of crude and condensate to TOP, Bangchak Corporation Plc. (BCP), and Star Petroleum Refining Plc. (SPRC). The procured volumes are dependent on the quality, prices, bidding, and trading terms proffered by refineries.

PTT procures and imports feedstock to domestic refineries, accounting to over 60% of their throughput needs. PTT also serves as the PTTEP's trading arm for the domestic and international crude oil trade.

Besides supplying imported crude oil for domestic refining, PTT also trades crude oil overseas for out-out trading, which procuring from producing countries worldwide and supply to other countries. This could generate revenue and profits from overseas, as well as building a reputation for the country in the international trading platform.

1.3) Condensate

PTT procures and transports condensate for domestic petrochemical plants and refineries, which GC, PTT Group's petrochemical flagship, serves as the foremost buyer for feedstock purposes. PTT purchases condensate from domestic concessionaires, operators of onshore gas fields namely Sinphuhorm and Gulf gas fields, namely Erawan, Pailin, Bongkot, and Arthit. However, during the shortage of domestic condensate, PTT will import from overseas sources for instance Malaysia, Australia, Philippines, and Indonesia, etc.

Volume of PTT's Crude Oil and Condensate Supply

	2019		2020		2021	
	Volume (Million barrels)	%	Volume (Million barrels)	%	Volume (Million barrels)	%
Domestic crude oil	32.4	8.6	28.0	7.8	26.3	7.9
Domestic condensate	34.5	9.1	27.9	7.8	26.8	8.0
Imported crude oil	178.1	47.2	168.2	46.9	175.2	52.3
Imported condensate	13.5	3.6	22.1	6.2	18.4	5.5
Internationally traded crude oil and condensate	118.7	31.5	112.4	31.4	88.3	26.3
Total	**377.1**	**100.0**	**358.6**	**100.0**	**335.0**	**100.0**

Source: PTT

2) Refined Oil Product & Liquefied Natural Gas

PTT procures, imports, exports and trades in refined oil product, semi-refined products, LPG and LNG for the purpose of energy security and balance under normal circumstances and emergency. It sells to PTT Group and other corporate buyers, both of domestically and internationally. PTT seeks trading opportunities in the world market to generate income for the national economy and fostering energy-security network worldwide. These endeavors have established PTT's reputation in the world arena. PTT imported LPG and LNG and basic gasoline for production of gasohol to meet domestic demands, and then exported natural gasoline which is by product of gas separation plants, as well as fuel oil from refineries the portion excess of domestic demand. Currently, PTT is well-positioned to export refined oil product to all parts of the world, with trading price in line with market mechanism.

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3) Petrochemical Product, Chemical and Solvent

PTT procures, imports, exports and trades internationally in both upstream and midstream petrochemical products of aromatics and olefins, along with chemicals and solvents, covering raw material, primary and by products from refineries and petrochemical plants. PTT is the principal exporter of GC's surplus petrochemicals in aromatics for example benzene and paraxylene. Additionally, PTT increases trading opportunity through its participation in bidding of products from other petrochemical plants both inside and outside Thailand, to generate revenue and profits from international trading in all parts of the world.

International Trading Support

PTT has the supports for its international trading as follows:
1) Price risk management
2) International chartering

1) Price Risk Management

Derivatives Trading Division is a support unit dealing with price risk management from trading transactions, refining, production, petroleum products, petrochemicals, cargo vessels to PTT including PTT Group by trading derivatives in the derivatives market to hedge against transaction risk and product price volatility risk.

2) International Chartering

International Chatering division is a support unit for international trade by securing cargo vessels and managing time charter for import, export and trading products of PTT and PTT Group as well as external agencies both in Thailand and overseas, to enhance our competitiveness and end-to-end business operation.

Revenue Structure of International Trading

As of December 31, 2021, PTT's international trading business reported sales revenue of THB 1,146,564 million.

Volume and Value of International Trading by Product

Product	2019		2020		2021	
	Value (THB million)	Volume (Million Liter/ Thousand Ton)	Value (THB million)	Volume (Million Liter/ Thousand Ton)	Value (THB million)	Volume (Million Liter/ Thousand Ton)
International Trading						
- Crude oil and condensate	763,616	378	482,062	359	761,374	335
- Refined oil product	248,554	120	131,752	97	301,484	114
- Petrochemical product	72,392	24	41,898	19	83,420	24
- Other product (thousand ton)	468	-	506	-	286	-
Total of international trading	**1,085,030**	**522 / 0**	**656,218**	**475 / 0**	**1,146,564**	**473 / 0**

Source: PTT (inclusive of transactions through PTT Group)

Reinforce Downstream strategy involves shifting from Hydrocarbon-Based position to accommodate global trends towards renewables and clean energy, by adopting technology to reinforce the supply chain and adjust the investment portfolios to increasing weighting of non-refinery business.

Downstream Business Invested through PTT Group Companies

International Trading Business

PTT invested in international trading business to undertake full-fledged international trading transactions through 4 companies which are PTT International Trading Pte. Ltd. (PTTT), PTT International Trading London Ltd. (PTTT LDN), PTT International Trading USA Inc. (PTTT USA) and PTT MEA Ltd. (PTTMEA).

Details of business/ procurement/ distribution each company in which PTT invests through its Affiliates are available on the website investor.pttplc.com/en/downloads/one-report

Petrochemical and Refining and Oil Business and Retail Business

PTT invests in refining business in 3 out of existing 6 refineries of Thailand, with a combined capacity of 770,000 barrels per day (BPD), or account for 62 of the national refining capacity (as of December 31, 2021) and integrated petrochemical business covering upstream to downstream, from production to distribution of fuel oil, upstream - midstream and downstream petrochemicals both of olefins and aromatics, which focus on value creation, including marine terminal and tank service. PTT will procure crude oil, procure crude oil, and purchase fuel oil and petrochemical products partially from PTT Group company to supply both domestic and international markets. Performance of oil, petrochemical and refining businesses mainly depend on economic situation, spreads between crude oil, feedstock and petroleum and petrochemical products in the global market which fluctuate according to global demand and supply, as well as year-end inventories. For PTT Group, GC is the Petrochemical Flagship, TOP is the Refinery Flagship, IRPC is the Integrated Petrochemical and Refinery Flagship and OR is the Oil and Retail Business Flagship which conducts the business of distributing petrochemical products, retailing, and non-oil services, inside and outside Thailand. Its business includes distribution of petroleum and other products in retail and commercial markets, coffee business food and beverages, convenient stores and space management. Furthermore, PTT TANK operates the business of receiving, storing and transferring of products to PTT Group company. PTT exercises direct and indirect governance of it affiliates through representative that serves as directors and secondment.

PTT invests in Petrochemical and Refining, and Oil Business and Retail Business through its following 5 affiliates:

1. PTT Global Chemical Plc. (GC)
2. Thai Oil Plc. (TOP)
3. IRPC Plc. (IRPC)
4. PTT Oil and Retail Business Plc. (OR)
5. PTT Tank Terminal Co., Ltd. (PTT TANK)

Details of business/ procurement/ distribution each company in which PTT invests through its affiliates are available on the website investor.pttplc.com/en/downloads/one-report
And
GC: pttgcgroup.com/en/investor-relations/document/annual-filings
TOP: investor-en.thaioilgroup.com/form_561_one_report.html
IRPC: irpc.co.en/about-us/library/annual-report/
OR: investor.pttor.com/en/downloads/one-report

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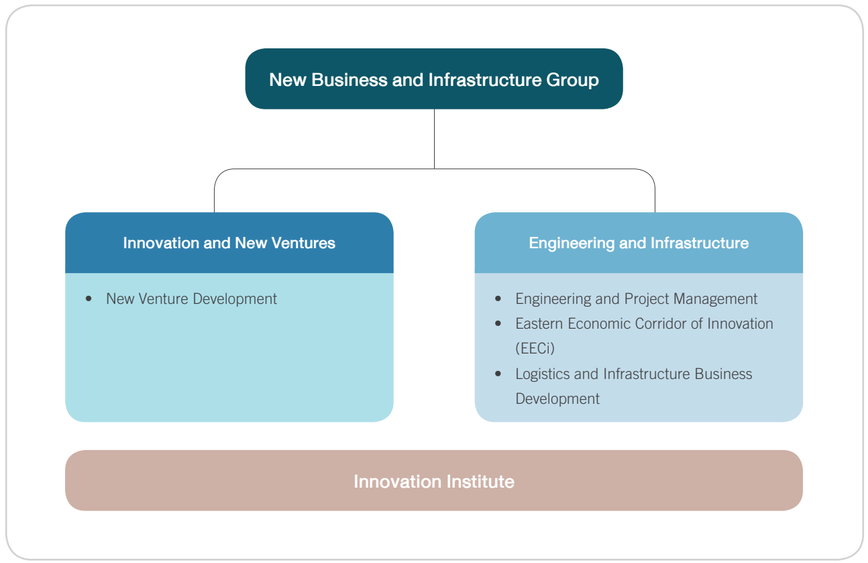
Develop and expand new business models to replace the share of growth in hydrocarbon value chain such as the business related to the future energy (Future Energy) business and businesses beyond the energy and hydrocarbon industry (Beyond)

New Business and Infrastructure Group

New Business and Infrastructure Group was formed on October 1, 2021, as a result of organizational restructuring. The objective is to steer the operation of business units and subsidiaries in accordance with PTT Group's transition from legacy to new business in which Future Energy and Beyond will become PTT's core business in the future. This business group engages in engineering-related management, construction, real estate, logistics business development related to transport and infrastructure, research and development (R&D) of innovations for the commercialization, as well as, extending digital advancements and developing digital transformation to accommodate business growth.

New Business and Infrastrucutre Group operates as follows:

Structure of New Business and Infrastructure Group



PTT-Operated New Business and Infrastructure

Innovation and New Business

Innovation and New Business focuses on developing new businesses, exploring business opportunities in new technologies and innovations to accommodate megatrends and groom PTT for entering New Business which is in line with "Future Energy and Beyond" vision. These include new energy business by investing in renewable power projects, battery business, electric vehicles-related businesses, hydrogen business, energy management services, as well as digital platforms to support the business and other new businesses which currently outside PTT value chain. Furthermore, this business unit shall regulate the investment in new business development and charting direction for the operation of companies within the Innovation and New Business.

Engineering and Infrastructure

Engineering and Infrastructure consists of engineering and construction project management including construction of gas transmission pipeline and gas separation plant, assets management including land and building. In addition, this segment shall implement projects that execute PTT's new business strategy, primarily the Eastern Economic Corridor of Innovation Project (EECi); exploring joint development possibility in various Smart City projects and exploring business opportunity in logistics and infrastructures. All these are geared towards excellence in real estate development business and integrated engineering service.

Innovation Institute

Innovation Institute undertakes R&D for products and innovations, to strengthen technology capability as well as advancing the capacity of researchers towards specialization in support of cost-optimization, increasing productivity and commercialization of R&D and innovations to yield business outcome.

New Business and Infrastructure Operated through PTT Group

As of December 31, 2021, the following PTT Group companies are under the supervision of the New Business and Infrastructure Group:

1. Global Power Synergy Plc. (GPSC)
2. District Cooling System and Power Plant Co., Ltd. (DCAP)
3. Energy Complex Co., Ltd. (EnCo)
4. PTT Energy Solutions Co., Ltd. (PTTES)
5. PTT Digital Solutions Co., Ltd. (PTT DIGITAL)

PTT Group engaged in power business through GPSC, a Power Flagship. GPSC conducts its business primarily in the production and distribution of electricity, steam, industrial water and other utilities which operates by itself and by invested in other companies. As of the year-end 2021, its total equity capacity is 7,122 megawatt (MW) of power generation, 2,946 tons per hour of steam, 7,372 cubic meters per hour of industrial water, 15,400 refrigerated tons of chilled water, and 141 megawatts hour of energy storage unit.

On January 4, 2021, PTTGM (a subsidiary of PTT) has acquired 50% shares of Global Renewable Power Co., Ltd. (GRP)'s ordinary share, a wholly owned subsidiary of GPSC). This share acquisition is in accordance with PTT Group's strategic plan to become a leader in renewable energy or green energy sectors. In addition, this also supports PTT Group to expand and enhance its capability to invest in renewable energy, both domestic and international to achieve the group target of renewable power output of 12,000 MW by 2030. On June 14, 2021, GPSC established Global Renewable Synergy Co., Ltd. (GRSC) which GPSC holds 100% with the objective to increase flexibility and competitiveness in investing in renewable energy in key target countries within Asia.

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Furthermore, PTT has established new subsidiaries to execute new businesses according to PTT's New S-Curve strategy. For **the electric vehicle value chain business,** ARUN PLUS Co., Ltd. is set up to pursue opportunities across the EV value chain, creating the EV ecosystem in Thailand, exploring EV manufacturing opportunity in Thailand through business partnership, distribution of EV chargers and expanding EV charging services located outside service stations. EVME PLUS Co., Ltd. offers services through EV digital platforms such as EV rental, information of charging and maintenance stations. Swap and Go Co., Ltd. operates infrastructure platform and battery-swap network for electric motorcycles for instant swap. For **the life science business,** Innobic (Asia) Co., Ltd. is set up to be an investment vehicle to support businesses such as pharmaceutical, nutrition, medical equipment and diagnosis. The investment in this business will enhance PTT's capability in life sciences and to create added value for the country which including the purchase of Lotus Pharmaceutical Co., Ltd. (LOTUS)'s ordinary shares, a listed company in Taiwan Stock Exchange whose core business is research and development (R&D), manufacturing, and distribution of Generic drugs that cover therapeutic areas especially oncology and central nervous system. **AI, Robotics and Digitalization Business,** Alpha Com Co., Ltd. serves as an investment vehicle in new businesses for PTT and the PTT Group, whereby new business models can be tested prior to actual investment decision. PTT Raise Co., Ltd. (PTT RAISE) supplies and installs robotics and automation system to industrial customers. PTT and TGES Optec Co., Ltd. (OPTEC) operates One-stop Total Improving Efficiency Technology Solutions/ Services that deploys technology to enhance efficiency of industrial equipment and machineries. ReAcc Co., Ltd. functions as the trading platform for clean energy and climate neutrality through the digital platforms for Renewable Energy Certificates (RECs), Corporate Power Purchase Agreement (CPPA), and renewable energy for EV. Mekha Technology Co., Ltd. (Mekha Tech) is set up to invest in business of public cloud which provides various types of information system services including data storage, data processing, and data management for organizations as well as PTT group.

Details of business/ procurement/ distribution/ of each company in which PTT invests through affiliates are available on the website investor.pttplc.com/en/downloads/one-report and for GPSC on gpscgroup.com/en/investor-relations/downloads/one-reports

Other Businesses

PTT Treasure Center Co., Ltd. (PTT TCC) serves as treasury center for PTT and companies within PTT Group by securing Thai Baht and foreign currency over long and short term to be lent to PTT and/or affiliates. It also handles their debt management, liquidity management and financial management, in the interest of PTT and affiliates.

Further information concerning business/ procurement/ distribution of companies in which PTT invests through its affiliates are available on the website investor.pttplc.com/en/downloads/one-report

1.2.3 Market and Competition

Exploration and Production Business

Marketing

PTTEP operates petroleum exploration and production business in both domestic and international. The target markets are both domestic and overseas where the company has invested. In 2021, the total sales ratio of domestic to overseas was 64% : 36%. PTTEP sells its outputs from domestic and ASEAN primarily to the Thai market through PTT, the major buyer and processor of all products. PTT then turns the processed products to power sector, petrochemical sector, transportation sector, industry sector, and household sector.

Marketing of petroleum products varies with their characteristics and field location which resulting in differentiate the market and sales price structures as summarized herewith.

1) Natural Gas

Due to capital-intensive investment in developing oil and gas exploration business, gas sales agreements (GSAs) must be agreed or signed between the buyer and seller before any major investment is made. GSAs are typically a long-term contract, ranging from 15 to 30 years. Prices, volumes, and points of sale are stipulated for each of the contracts. Gas prices are usually linked to fuel oil prices and several key economic indices to reflect the investment costs and be competitive comparing with other fuels along the GSA period.

2) Condensate and Crude Oil

Condensate and crude oil prices are determined by their properties and benchmarked with condensate price and crude oil prices of those predominantly sold in the region. Contracts are either short-term or long-term, and some are sold in spot markets.

3) Naphtha

Naphtha produced from ADNOC Gas Processing Project (AGP), the largest gas processing complex located onshore of Abu Dhabi, UAE, is sold by Abu Dhabi National Oil Company (ADNOC) which represents as Marketing Agent. Selling price followed official selling price in the region and naphtha is sold under short-term contract.

4) LPG

LPG produced from S1 Project is sold to PTT under a longterm contract with the price in line with the government's policy and announcements by the Joint Committee on Energy Policy Administration. Moreover, LPG produced from ADNOC Gas Processing Project (AGP) is sold under short-term contract which selling price refer to official selling price in the region.

Competition

Thailand's E&P industry is an oligopolistic since high petroleum demand compared with production, due to the business' relatively high investment and advanced technology required. The GSAs, especially natural gas, are predominantly long-term contract coupled with take-or-pay clauses to attract new investments to the market.

In 2021, PTTEP's production accounts for about 43% of total domestic production, the highest among peers as follows:

Producers	% Domestic Production Volume
PTTEP	43
Chevron	21
Mitsui Oil Exploration	6
Petronas	10
Total	9
Others	11

Source: Department of Mineral Fuels, Ministry of Energy (as of November 2021)

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As of year ended 2020, the total amount of the natural gas reserves in Thailand and the Malaysia-Thailand Joint Development Area (MTJDA) are as follows:

Reserves	Natural Gas (Billion Cubic Feet)	Crude Oil (Million Barrels)	Condensate (Million Barrels)
Proved Reserves	3,947.90	92.44	102.65
Probable Reserves	3,617.77	81.67	129.82
Possible Reserves	2,198.76	44.53	111.52

Source: Department of Mineral Fuels, 2020 Annual Report

In Thailand, there are many large operators in petroleum exploration and production such as Chevron Thailand Exploration and Production Ltd., PTT Exploration and Production Plc., Chevron Offshore (Thailand) Ltd., Hess (Thailand) Ltd., Mitsui Oil Exploration Co., Ltd. In 2021, the average production volume of domestic natural gas was at 3,204 MMSCFD, decreased by 2% from previous year, crude oil production was at 97,620 BPD, decreased by 17% from 2020. Additionally, condensate production volume was at 79,549 BPD, decreased by 6% from 2020.

Thailand's Petroleum Production Volume 2011 - 2021

Year	Natural Gas (MMSCFD)	Crude Oil (BPD)	Condensate (BPD)
2011	3,577	139,991	84,136
2012	4,007	148,985	89,885
2013	4,045	149,482	91,159
2014	4,073	138,552	94,330
2015	3,852	152,387	95,629
2016	3,777	163,527	94,489
2017	3,620	141,248	98,572
2018	3,527	129,201	99,010
2019	3,623	125,889	102,332
2020	3,262	117,029	84,835
2021	3,204	97,620	79,549

Source: Website of the Energy Policy and Planning Office, Ministry of Energy (www.eppo.go.th)

Natural Gas Business

In Thailand, natural gas business is regulated by the Energy Regulatory Commission under the Energy Business Act B.E. 2550. In view of the government's policy to restructure energy business, separating regulatory work from energy business, and for the regulatory scope to cover electricity and natural gas business for efficiency, prosperity, and adequate supply, the Energy Regulatory Commission was established. As independent regulator, the scope of ERC authority includes prevention of monopoly, protection of energy user and those affected by energy business. The Energy Business Act B.E. 2550 was gazetted on December 10, 2007, effective from December 11, 2007 onwards.

PTT is the sole integrated operator of natural gas business in Thailand. In 2021 PTT and affiliates have the following market policy.

- Supply Strategy: This includes the procurement of natural gas and LNG to ensure energy security together with commercial competition accommodating the policy to promote competition in natural gas business.
- Operating Strategy: Maintaining operational excellence in meeting client's needs and lay the foundation for future growth.
- Marketing Strategy: Managing supply contracts with power producers to maintain market share while exploring new avenue to boost natural gas sales or LNG in Thailand and internationally.
- Portfolio Expansion: Pursuing investment opportunity in Thailand and beyond including Gas/ LNG Business and Non-Gas Business.

For the natural gas wholesale business, the ERC granted Shipper License to the following eight companies:

1. PTT Plc.
2. EGAT
3. Gulf Energy Development Plc.
4. Hingong Power Holding Co., Ltd.
5. B.Grimm LNG Co., Ltd.
6. EGCO Plc.
7. PTT Global LNG Co., Ltd.
8. SCG Plc.

In 2021 PTT continued to supply most natural gas into the pipeline transmission system, with EGAT being the only Shipper License holder importing spot LNG for its own power generation plants. The purpose of EGAT's debut is to put in practice for the Third Party Access (TPA) regime involving pipeline connection and LNG terminal use. These developments align with the government's policy to promote competition in natural gas business Phase 1 as prescribed by the Ministry of Energy. EGAT procured a total of 5 cargoes from the LNG spot market.

Regarding Distribution Pipeline System, PTT remains the lead player in investment and operation. Apart from PTT, other entities have started activities, for example PTTNGD developed and constructed sub-pipeline system to transport and distribute natural gas to clients in industrial zones located in Bangkok Metropolis and Vicinity.

Natural Gas Demand

In 2021 natural gas supply averaged 4,420 MMSCFD (heat value of 1,000 BTU per cubic foot), 64% of which domestic and 36% international production. Volume of gas supply in 2021 increased by 31 MMSCFD or 0.7% from 2020. Overall supply and distribution of natural gas increased due to the economic recovery after better situation of COVID-19.

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PTT supplied natural gas in 2021 to the following clients:

- **Electricity**

Averaging 2,618 MMSCFD, accounting for 59% of overall sales volume, 0.2% increase from 2020 which is average of 2,613 MMSCFD. In this segment, supply to EGAT totaled 700 MMSCFD, along with 587 MMSCFD to independent power producers and 1,331 MMSCFD to small power producers.

- **Industry**

Averaging 779 MMSCFD, 18% of total sales, increased by 10% from 2020 sales volume of 709 MMSCFD.

- **Transport**

Natural gas sales in the transport sector in 2021 averaged at 131 MMSCFD, 3% of total sales, which decreased by 20% from 2020 at 163 MMSCFD.

- **Gas Separation Plant**

The gas usage on gas separation plant in order to add the value to natural gas had the total volume at 909 MMSCFD, accounted for 20% of total sales volume, which equal to 2020 at 909 MMSCFD.

Electricity Output by Fuel Type 2017 – 2021

Unit: Million Units

	2017	2018	2019	2020	2021
1. Hydropower	4,687	7,597	6,310	4,540	4,540
2. Natural gas	121,044	116,265	121,841	113,859	113,113
3. Fuel oil and diesel	330	177	1,125	722	716
4. Coal	35,732	35,796	35,825	36,823	36,065
5. Imported electricity	24,427	26,669	25,547	29,551	33,356
6. Renewable energy and others	14,944	17,923	21,402	20,540	21,894
Total	**201,164**	**204,427**	**212,050**	**206,035**	**209,684**
Expansion rate (%)	**0.8**	**1.6**	**3.8**	**(2.8)**	**1.8**

Source: www.eppo.go.th

Policy to Promote Competition in Natural Gas Business

The Royal Thai Government supports sector-wide competition in natural gas business with the objective to increase efficiency of supply and services, ultimately in the interest of consumers who will get quality service at appropriate and fair price. The policy is acted out by increasing number of players in LNG supply and trading. The Energy Regulatory Commission (ERC) is authorized to grant the License for operated in natural gas supply and wholesales business (Shipper License) and chart regulations governing Third Party Access (TPA) regime of transmission pipeline and LNG terminal use to license shippers other than PTT, to use PTT-invested natural gas infrastructure. PTT complies accordingly with the policy and announced TPA terms for onshore pipeline connection on March 30, 2015 (First Edition) with the revised version now in use effective from June 7, 2017. PTTLNG announced third party access terms to LNG terminal on March 30, 2015, updated March 31, 2020.

The ERC on August 30, 2019 allowed EGAT to import Spot LNG at no more than 200,000 tons to test the natural gas liberalization system. The import is divided into two vessels of 65,000 ton capacity each. PTTLNG coordinated with EGAT in compliance with the ERC resolution, by receiving the first LNG vessel on December 28, 2019 and the second on April 21, 2020.

Following EGAT's trial in Phase 1, the Energy Ministry reviewed and drew up a framework and blueprint for Phase 2 and on April 1, 2021, the National Energy Policy Council approved the natural gas liberalization Phase 2 and assigned relevant agencies to work out for the details. The Council assigned the Committee on Energy Policy Administration (CEPA) to deliberate and act according to the guideline. On August 4, 2021, ERC approved the natural gas pricing structure to promote competition in Phase 2, along with timeframe to enforce the pricing structure. This would result in an increase in more natural gas operators for LNG supply. Until now, the ERC awarded Shipper License to eight entities listed as mentioned.

On its parts, PTT has been preparing for the imminent competition in natural gas business. It has plans and structure in place to act on the government's policy of making Thailand Regional LNG Hub importing and exporting LNG to countries in the region.

On June 28, 2021 CEPA approved the allocation of LNG supply rights for the natural gas liberalization Phase 2 spanning 2021 - 2023 in the amount of 0.48, 1.74, 3.02 MTPA respectively.

Natural Gas Demand Outlook

The Cabinet on October 20, 2020 endorsed NEPC's resolution of March 19, 2020 to approve Thailand's Power Development Plan B.E. 2561 - 2580, the first revision edition. (PDP 2018 Rev.1) and Gas Plan 2018 as proposed by the Energy Ministry. The conceptual framework and objectives of Gas Plan 2018 envisage natural gas use in multiple economic sectors to reduce air pollution, accelerate exploration and production in-country, in Joint Development Areas and overlapping areas, develop and optimize natural gas infrastructure and promote sector competition.

On gas demand outlook, Gas Plan 2018 worked on assumptions of demand chiefly from power generation, according to PDP 2018 Rev.1 reduced output from coal and nuclear and increased natural gas share from 37% in 2079 (PDP 2015) to 53% in 2080 (PDP 2018 Rev.1). Gas separation plants' demand (as feedstock for LPG and petrochemicals) is estimated on the back of Gulf of Thailand supply. Industry sector demand is based on GDP growth forecast 2018 - 2037 at 3.8% annual average and factoring in distribution pipeline network expansion while transport sector is calculated on future numbers of NGV vehicles. These elements combined, overall Thailand gas demand is estimated in the range of 5,348 MMSCFD in 2037, annual average increase by 0.7% per year. (Power generation 67%, industry 21%, gas separation plants 11% and transport 1%) These estimates are revised upward of Gas Plan 2015 according to revision 2 assumptions forecasting 2036 demand at 5,062 MMSCFD, increase by 0.1% per year.

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The NEPC on August 4, 2021 endorsed the new framework of Power Development Plan with the objective of transitioning Thailand along the clean energy path, and net zero emissions goal by 2065 - 2070. This is aimed at empowering Thai businesses to compete internationally in line with global low-carbon trends and using innovation to add value to the national economy. These align with Thailand's long-term GHG emissions goal. NEPC assigned CEPA to review the plan to boost clean power generation under PDP 2018 Rev.1 for synergy with immediate action plans to achieve renewable energy outcome written in Thailand's long-term National Strategy.

Actions in the natural gas sector focus on (1) promoting LNG use in manufacturing and transport in place of solid fuel, oil and coal to scale back on macro-level GHG emissions, (2) manage domestic gas supply efficiently through modernization of a system to evaluate and regulate petroleum resources together with the LNG supply management from other countries in order to support the higher gas demand in the future, (3) develop gas infrastructure including transmission pipeline, LNG storage and regasification facilities in view of decentralized use of natural gas that follows promotion of LNG as substitute fuel, and regulating safety and service quality, and (4) liberalization of natural gas business to promote competition and system-wide efficiency, through removal of regulatory barriers to multiple operators. At the same time, the pricing structure is reformed to ensure transparency, fairness, reflecting true costs and incentivizing full-blown competition.

International Trading Business Unit

Marketing

Domestic market clientele consists principally of refineries demanding crude oil and condensate through supply by domestic producers and imports from oversea producers, and petrochemical plants that need feedstock or precursor in production processes from oversea producers. In addition, there are gasoline import for gasohol production, LPG import for industries, transport and households, LNG import for power and industries to meet domestic demands. These reflect PTT's role in Thailand's energy security. In 2021, the share of revenue from domestic market is 54% (11% from domestic supply and 40% from import).

Outside Thailand, main clients include refineries, petrochemical plants, national oil companies, multinational energy companies and international trading houses through transactions of commodities such as crude oil, condensate, LNG, LPG, refined oil, petrochemicals, chemical and solvent, and export of refined oil products, petrochemicals, chemical and solvent the portion exceeding domestic demand to generate income and profits from oversea. In 2021 share of revenue from international market is 46% (45% from out-out trading and 1% from export).

To grow business and trading opportunity requires international presence and a key strategy is to make inroads into trading hubs through establishing offices in various countries such as Singapore for Asia, China for China and nearby countries, UAE for Middle East, UK for Europe and Africa, and in the US for the Americas. This global presence enables PTT to closely monitor ongoings around the clock across time zones for demand-supply, effectively capturing arbitrage opportunity when imbalance arises. These offices also facilitate relationship between PTT and clients and partners and exploring value-add opportunity in those regions.

Competition

International trading has become more competitive as national oil companies in the Middle East and global energy companies holding various assets such as production wellheads, jetty, oil terminal, refinery and petrochemical plants ventured into Asset-backed Trading. Asset-backed trading is a form of trade in which major multinational trading companies expand investment into their assets to add value and competitiveness in the playing field. In addition, technology and digitalization enable fast and well-rounded access to pricing and trading data, where speed can make or break trading and profitability opportunities. In 2021, the volume of International Trading Business and PTT Group total trade volumes of 1.3 million barrels a day, or 1.4% of the global trade value with partners and clients numbering over 1,200 companies located in 70 countries worldwide.

Going forward, industry and competition outlook remain intense. World's economic growth, particularly post of COVID-19 recovery and trade war between China and the US are affecting global energy demand. While, political instability besetting oil producing countries and oil producing countries' influence on global production affect competition. In long-term trading outlook, global fossil fuel trade may slow due to protracting trends to reduce on climate-harmful energy and the switch to clean energy such as wind and solar, or battery cell and hydrogen in automobile and transport sectors. However, clean energy is far from being tenable and limitations abound. Therefore, LNG is the key alternative in the energy transition. For the moment, LNG is emerging prominent in international energy trading due to continuous expansion in production capacity by large-scale producers and enabling inter-continental transport. As a result, many countries are leaning towards LNG as national staple energy source and of the world. This presents a challenging opportunity in LNG trade expansion for its International Trading Business Unit.

Refining Business

Refining Industry

Marketing

Currently, Thailand has a total of 6 oil refineries with combined refining capacity of 1,244,500 barrels per day (BPD) (including GC's condensate splitter capacity of 135,000 BPD). As of December 31, 2021, these refineries yielded 992,411 BPD (inclusive of LPG production from gas separation and petrochemical plants).

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Thailand's production capacity of refined product outputs appears in the table below:

Unit: BPD

Product	2019	2020	2021
Gasoline	225,488	224,358	214,845
Diesel	423,460	486,583	476,859
Aviation fuel	131,244	56,192	36,221
Fuel oil	94,177	81,366	91,782
Kerosene	35,217	28,448	28,864
LPG	155,733	142,132	143,840
Total	**1,065,318**	**1,019,079**	**992,411**

Source: Department of Energy Business, Ministry of Energy

Competition

In 2021, Thailand's demand for fuel product average per day decreased 3.5% compared to 2020 from aviation fuel, Gasoline, diesel and kerosene decreased 36%, 8.5%, 3.5% and 6.3%, respectively, which resulted from travel restriction to control COVID-19 widespread. However, the demand of fuel oil and LPG increased 15.6% and 7.4%.

Exports of refined products in 2021 were gasoline, diesel, biodiesel, fuel oil, Aviation fuel, kerosene and LPG, with the export volume increasing to 203,182 BPD (an increase of 9.3%), with a total export value of THB 15,141 million per month (an increase of 81.7%)

Petrochemical Business

Marketing

The overall of Thailand's petrochemical industry in 2020 slowed due to the lockdown measures to control the widespread of COVID-19, which affect the export sector including their petrochemical product, plastic pellet and plastic products. Petrochemical plants had to either scale back or halt production, and likewise for downstream industries such as automobile and electronics. However, consumer behaviors has changed brought about by work-from-home and increased demands of hygiene/sanitization products, coupled with the government's economic stimulus packages bode well for plastic product demand for medical and hygiene packaging.

Thailand's profile of overall production, import, export and consumption of Petrochemical Product

Unit: Thousand tons/year

Year	Supply		Consumption	
	Production	Import	Consumption	Export
2018	24,132	1,562	17,199	8,479
2019	23,934	1,577	17,277	8,234
2020	23,500	1,739	17,672	7,573

Source: Petroleum Institute of Thailand

Competition

Olefins

- In 2020, the production volume decreased from 2019 in line with product prices that was pressured by the COVID-19 pandemic, resulting in contraction of total annual import. Export meanwhile contracted on the back of shrinking demand. However, propylene export increased by 10.0%, with Vietnam, China, Singapore, and Indonesia as major export destinations.

Aromatics

- In 2020, the production output was on par with 2019 amidst less domestic demand. Whereas, export improved from the previous year which the key destinations were India, Vietnam, Indonesia, and China.

Oil Business and Retail

Thailand has a total of 52 registered fuel traders in Article 7 (as of December 31, 2021). In 2021, domestic oil demand totalled 44,186 million liter with the largest share being diesel, followed respectively by gasoline, LPG, aviation fuel and fuel oil.

Oil trade in Thailand is market-driven with fluid dynamics affecting pricing, product and service development, cost management in the supply chain, and new business models to drive revenue. Oil use in Thailand in 2021 has decreased compared to 2020 due to COVID-19 pandemic impact. Business value chain has been consistently disrupted, dampening energy demand while the domestic economy slowed.

Thailand's Fuel Consumption for 2019 – 2021

Unit: Million liter

Product	2019	2020	2021
LPG[1/]	7,035	6,276	6,246
Gasoline	11,751	11,608	10,762
Kerosene	7	6	6
Aviation fuel	7,153	2,745	1,775
Diesel	24,604	23,946	23,042
Fuel oil[2/]	1,941	1,728	1,897
Lube	449	425	458
Total	**52,940**	**46,734**	**44,186**

Source: Department of Energy Business, PTT Oil and Retail Business Plc. (OR)
Remarks:
1/ Excluding Propane, and Butane
2/ Excluding fuel oil sold to the Electricity Generating Authority of Thailand

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OR is a lead player in the domestic fuel across most product categories. According to the statistics collected by the Department of Energy Business, In 2021, its market share was 42.2% of the oil trade's overall scale.

Oil Traders' Market Shares from 2019 – 2021

Unit: Percent

Company	2019	2020	2021
OR[1/]	41.31	42.30	42.21
Bangchak	10.93	10.32	10.39
Esso	10.74	10.94	11.29
Shell	9.30	8.88	7.50
Minor traders	27.72	27.56	28.61

Source: Department of Energy Business
Remarks:
Excluding LPG used as petrochemical feedstock
1/ Including PTT's and OR's market shares

Oil Price Structure

Oil price structure consists of 2 components: refiners' wholesale price and retail price. The wholesale price at refinery gate incorporates refining costs, excise duty, municipal tax, contribution to Oil Fuel Fund, Energy Conservation Fund, and value-added tax (VAT). The retail price component consists of refiners' wholesale price, marketing margin and VAT.

Given Thailand's oil importer status mostly in crude oil and partially refined oil, and a free-market trade system, determination of oil price at refinery is benchmarked against global oil price on Import Parity principle, decided by the authority. Pricing is also subject to foreign exchange rates (value of Thai Baht) which directly affects Import Parity cost calculation.

Regarding excise duty, municipality tax and VAT, contribution to the Oil Fuel Fund, and Energy Conservation Fund, the state determines tariffs which differ with each category of oils. Producers are responsible to paying tax and into funds at the rates fixed by the state.

With refined oil price in the world market moving in line with market conditions, and that the government fixed different rates for different fuel categories resulted in continuous adjustments of retail oil prices. The table below shows oil price structure at December 30, 2021.

Oil Price Structure in Bangkok Metropolis as of December 30, 2021

Unit: THB/liter

	Gasoline 95	Gasohol 95 E10	Gasohol 91	Gasohol 95 E20	Gasohol 95 E85	Diesel B10
Ex-refinery price	**19.8457**	**20.0453**	**19.6284**	**20.2341**	**23.6258**	**21.2881**
Excise tax	6.5000	5.8500	5.8500	5.2000	0.9750	5.9900
Municipal tax	0.6500	0.5850	0.5850	0.5200	0.0975	0.5990
Oil Fund	6.5800	0.6200	0.6200	(2.2800)	(7.1300)	(1.9900)
Energy Conservation Promotion Fund	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Ex-refinery wholesale price	**33.5807**	**27.1053**	**26.6884**	**23.6791**	**17.5733**	**25.8921**
VAT	2.3506	1.8974	1.8682	1.6575	1.2301	1.8124
Ex-refinery wholesale price including VAT	**35.9313**	**29.0026**	**28.5566**	**25.3366**	**18.8035**	**27.7045**
Marketing margin	2.4567	2.0069	2.1714	4.0219	4.6136	0.6873
VAT	0.1720	0.1405	0.1520	0.2815	0.3230	0.0481
Retail price	**38.5600**	**31.1500**	**30.8800**	**29.6400**	**23.7400**	**28.4400**

Source: Energy Policy and Planning Office
Remarks:
- *Refiners' price, benchmarked against refined oil in global market on Import Parity principle*
- *Tax and fund contribution rates determined by the state*

LPG Supply Industry

In 2021, Thailand's demand of LPG averaged at 16.52 million kg/day, up 7.4% from 2020 due to higher use in the petrochemical sector at 7.26 million kg/day (up 19.1%) and in industry sector at 1.87 million kg/day (up 11.6%) whereas the household sector averaged at 5.65 million kg/day (up 1.6%). In any case, transport sector use decreased to average at 1.74 million kg/day (14.8% less than in 2020).

LPG Price Structure

LPG price structure consists of two components:
(1) Ex-refinery wholesale price, consisting of
- Price at refinery
- Excise duty, municipal tax, oil fund contribution, and VAT

(2) Retail price, consisting of
- Ex-refinery wholesale price
- Marketing margin and VAT

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LPG Price Structure as of December 30, 2021

	THB/kg
Ex-refinery price	**25.2169**
Excise tax	2.1700
Municipal tax	0.2170
Oil fund contribution	(13.2281)
Ex-refinery wholesale price	**14.3758**
VAT	1.0063
Ex-refinery wholesale price including VAT	**15.3821**
Marketing margin	3.2566
VAT	0.2280
Retail price	**18.8667**

Source: Energy Policy and Planning Office

New Business and Infrastructure

Electricity Business

Industry Overview

Currently, Thailand has an installed power generation capacity of 50,269 megawatts. Electric power consumption at the end of September 2021 was 143,663 gigawatt-hours, increasing 1% compared to the same period last year. The increase resulted from robust industrial demand following the economic recovery signaled by continuous expansion of export from the start of 2021. The overall peak demand of the electricity system in 2021 was at 30,135 megawatts, 2.2% higher than in 2020. The direction of renewable energy production according to the framework of the National Energy Plan of the National Energy Policy Council (NEPC) focuses on increasing production of renewable and clean energy going forward.

Competition

Amidst increasingly competitive market in electricity sector, PTT's power company stands strong with the potential to compete with other players from its long experience and expertise in power generation and steam business, in combination with security of grids linking outputs from various generation plants as well as coverage of large geographical area, customer care, guarantee of secure electricity and steam supply to clients throughout contractual duration. These aspects are characterized by sustainable growth policy focusing on innovation. That is why it can generate using wide range of fuel types, resulting in lower cost versus competitors, or proprietary utility invested by individual customers in an industrial estate.

Electric Vehicle and Value Chain Business

Industry Overview

Currently, Electric Vehicle (EV) is emerging globally as a megatrend to address environment challenge, to reduce fossil fuel dependence, presenting New S-Curve opportunity. These are positive drivers for EV operators in Thailand as the country has plans to develop EV industry with potentials to become a lead global player. Thailand's National EV Policy Committee has announced an EV incentives guideline under a "30/30 policy" which targets manufacturing Zero Emission Vehicle (ZEV) by at least 30% share of total car outputs by 2030, as parts of Thailand's drive towards a Low-carbon Society in the future. Countries including China, Japan, USA and in Europe have set clear targets and measures to promote EV. Thailand's National EV Policy Committee assigned various sub-committees to study details and feasibility of incentives to be implemented in 3 phases:

Phase 1 (Immediate): 2021 – 2022

Pilot promotion of electric motorcycles and nationwide EV infrastructure

Phase 2: 2023 – 2025

Develop EV industry at production target of 225,000 units of passenger cars and pick-up trucks, 360,000 units of motorcycles, and 18,000 units of buses/trucks by 2025 along with battery production to meet domestic demand, which is the first indicator of economies of scale manufacturing.

Phase 3:2026 – 2030

Drive plans and measures to achieve concrete results in line with the 30/30 policy for total target production of 725,000 passenger cars and pick-up trucks, 675,000 electric motorcycles, amounting to 30% share of total production in 2030 including the production of battery to meet domestic demand.

1.2.4 Business Assets

PTT's core business assets consist of investment properties; property, plant and equipment; right-of-use assets; goodwill; intangible assets; and exploration and evaluation assets. The net book values as of December 31, 2021 were as follows:

Unit: THB million

	Investment Properties	Land	Buildings & Building Improvements	Machinery & Equipment	Exploration and Production Properties	Mining Properties	Other Assets	Construction in Progress	Right-of-use Assets	Goodwill	Other Intangible Assets	Exploration and Evaluation Assets	Total
Net value	10,459	52,401	148,570	645,463	370,942	4,406	6,164	197,468	79,420	182,652	144,866	104,595	1,947,406
Obligations	None	1,327	11,240	70,051	None	None	8,819	110	None	None	None	None	91,547

Besides assets stated above, PTT's business assets include petroleum reserves, which are core business assets of PTTEP, PTT's subsidiary. As of December 31, 2021, PTTEP and its subsidiaries have a total Proved Reserve of 537 million barrels of crude oil, condensate, and LPG, as well as 5,973 billion cubic feet of natural gas, or equivalent to total of 1,350 million barrels of crude oil equivalent. PTTEP's geologists and petroleum engineers audit and appraise these reserves every year to achieve standardized numbers.

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Proved Crude Oil, Condensate, and Natural Gas Reserves[1/]

	Crude Oil and Condensate[2/] (Million Barrels)			Natural Gas (Billion Cubic Feet)			Crude Oil Equivalent (Million Barrels of Crude Oil Equivalent)		
	Indigenous	Overseas	Total	Indigenous	Overseas	Total	Indigenous	Overseas	Total
Proved Reserves									
As of December 31, 2019	123	187	310	2,704	2,377	5,081	564	574	1,138
1) Revision of previous estimates	9	4	13	145	23	168	33	9	42
2) Improved recovery	1	6	7	1	0	1	1	6	7
3) Additional development well drilling & new discoveries	6	6	12	165	2	167	33	6	39
4) Purchase/ sale of reserves	-	-	-	-	-	-	-	-	-
5) Production	(27)	(20)	(47)	(435)	(231)	(666)	(98)	(55)	(153)
As of December 31, 2020	**112**	**183**	**295**	**2,580**	**2,171**	**4,751**	**533**	**540**	**1,073**
Proved Reserves									
As of December 31, 2019	112	183	295	2,580	2,171	4,751	533	540	1,073
1) Revision of previous estimates	7	4	11	51	(25)	26	15	2	17
2) Improved recovery	2	-	2	2	-	2	3	-	3
3) Additional development well drilling & new discoveries	20	8	28	781	48	829	147	15	162
4) Purchase/ sale of reserves	-	69	69	-	1,117	1,117	-	264	264
5) Production	(26)	(22)	(48)	(470)	(342)	(812)	(103)	(76)	(179)
Proved reserves derived from joint-venture investments[3/]	-	-	-	60	-	60	10	-	10
As of December 31, 2021	**115**	**242**	**357**	**3,004**	**2,969**	**5,973**	**605**	**745**	**1,350**

Remarks:

1/ Proved reserves include PTTEP's net equity reserves and those of the countries that own oil and gas fields

2/ Including NGL

3/ Including reserves under the APICO joint-venture project

Long-Term Leases

PTT's major long-term property leases are the agreements for using Ratchaphatsadu land (royal land) subleased to the Ministry of Finance for PTT Plc.'s business under an agreement between the Ministry and PTT dated June 3, 2008. Properties which PTT segregated to the Ministry under the verdict of the Supreme Administrative Court are right-of-use land, pipelines, equipment, and tools which together form transmission pipeline systems. The assets under the agreement were booked as right-of-use of such Ratchaphatsadu land for 30 years (January 1, 2008, to December 31, 2037). After the period expiration, the Ministry pledges to allow PTT to use this segregated land for another 30 years. Regarding compensation payment for land use, the agreement calls for annual payment at the rate derived from revenue sharing of onshore gas transmission pipeline tariff of each calendar year. This tariff means the charge for the onshore transmission pipeline system (Area 3), which includes demand charge and commodity charge under the rule for setting natural gas prices and pipeline charges under the NEPC announcement No. 1 of 2001 or future amendments. The compensation is calculated by a sliding scale as detailed below.

Unit: THB Million

Revenue	Compensation Rate (% of Revenue)		Annual Compensation
	Minimum	Increment	
0 - 3,600	5%		= Minimum Compensation 180
> 3,600 - 3,700		10%	> 180 - 190
> 3,700 - 3,900		15%	> 190 - 220
> 3,900 - 4,100		20%	> 220 - 260
> 4,100 - 4,300		25%	> 260 - 310
> 4,300 - 4,500		30%	> 310 - 370
> 4,500 - 5,000		36%	> 370 - 550
> 5,000			= Maximum Compensation 550

Investment Policy in Subsidiaries and Associates

PTT's investment policy, whether for new investments, expansion or capacity growth, share purchase or acquisition, takes a number of aspects into consideration, namely, business growth trends, investment capable of adding value and economic viability, and enhanced competitiveness. PTT or its subsidiaries may carry out the investments, depending on each company's suitability and capability.

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1.2.5 Outstanding of Undelivered Project

-None-

1.2.6 Environmental Impacts

Environmental Impacts of Gas Separation Plants (GSPs)

Throughout the operations of the Gas Separation Plants (GSPs), PTT pays great attention to the impacts on the environment, safety and occupational health as well as the quality of life and health of people living nearby by continuously and strictly monitoring environmental quality follows the relevant laws. Based on the environmental quality monitoring results of all GSPs since the start of operations, air quality, noise, water quality and waste management from the processes are all well below regulatory limits. In addition, PTT improves the efficiency of processes as well as implementing energy conservation projects, for example, a waste heat recovery project at GSP Unit 5, power generation and cogeneration projects for the Ethane GSPs, and a waste gas recovery unit (Remaining Gas Recovery Unit, RGRU) for GSPs in Rayong.

Moreover, PTT has determined to control air pollution consistently. In 2019, the construction was begun to install Regenerative of Thermal Oxidizer (RTO) and the SO_2 Scrubber at GSP Unit 5 and the expansion of the installation of Regenerative Thermal Oxidizer (RTO), a hydrogen sulfide removal unit for gas contaminated with residual acidic gas from gas separation, and SO_2 Scrubber to GSP Unit 6 and Ethane Separation Plant. The installation will begin in 2022, of which EIA report has been approved by the licensing agency.

In addition to compliance with laws, PTT's GSPs at Rayong achieved Integrated Management Systems (IMS) Certification, Environmental Management Systems Certification (ISO 14001), Occupational Health and Safety Management System (ISO 45001) Certification, Quality Management System (ISO 9001) Certification, Business Continuity Management System (ISO 22301) Certification, Energy Management System (ISO 50001) Certification, and Occupational Health and Safety Management System (ISO 45001) Certification. Khanom GSP has received the above management standard certifications as well.

Environmental Impacts of Gas Transmission Pipeline Operations

PTT has been developing the natural gas pipeline network since 1981. Originally, the natural gas pipeline system was not designated for environmental impact studies until the adoption of the National Environmental Quality Promotion and Preservation Act B.E. 2535 and the Ministry of Science, Technology and Environment Announcement No. 3 in 1996 on determining the type and size of projects or businesses of government, state-owned or private sectors that require the preparation of the Environmental Impact Analysis Report, respectively. As a result, Environmental Impact Assessment (EIA) of natural gas pipeline system projects must be studied and prepared. At the time, the network of natural gas pipeline systems under PTT's operations consisted of natural gas pipeline projects under the National Natural Gas Pipeline Master Plan Project, Natural Gas Pipeline Project to Industrial Customers, Power Plants and Natural Gas for Vehicles (NGV) Service Stations. Environmental impacts in accordance with the requirements of the announcement have been studied since then. In addition, when additional environmental requirements are enacted, PTT has studied and specified the types of projects that are deemed to be subject to a complete study of environmental impacts in accordance with relevant requirements, such as the Ministry of Energy Announcement on determining the type and size of natural gas pipeline transport system and the guidelines, methods, regulations, and guidelines for preparing Environmental Report (ER) B.E. 2556.

Therefore, before entering the construction preparation, construction and operation phases, all PTT natural gas pipeline projects must study and assess direct or indirect potential environmental impacts from project implementation to lead to the determination of preventive, corrective, and environmental impact monitoring measures, then compiling it as an EIA or ER and presented to the Office of Natural Resources and Environment Policy and Planning (ONEP)) and related licensors such as the Department of Energy Business (DOEB), the Energy Regulatory Commission (ERC). After the EIA or ER is approved, PTT will direct, monitor, and present the results of compliance with the conditions specified in the report, including strict environmental measures both during the construction and after-construction phases. The project will deliver the project care to the natural gas transmission business throughout the period of gas transportation through the pipeline system. The results of EIA or ER compliance will be reported to the relevant licensors on a 6-month basis or according to the conditions specified by each agency. All PTT projects have fully implemented the measures proposed in the report until now.

1.2.7 Notable Research and Development (R&D) Work of PTT Innovation Institute

Process Technology and Applied Energy

The core business of PTT Group revolves around production process, from natural gas industry to petroleum refinery and petrochemicals. PTT Innovation Institute focuses on research and development to add value to product, increase process efficiency in terms of energy use, productivity, and high-tech processes. To date, PTT Innovation Institute has played an instrument role in the development and evaluation of catalyst and solvent for PTT Group of companies to substitute import and to enable performance evaluation for appropriate choice of catalyst and solvent. These result in cost cutting and value adding to Business Units to the tune of over THB 100 million per year.

Furthermore, the Institute works on simulation of processes to enhance energy efficiency or develop new technology corresponding with raw material and market trends. For example, the Microchannel Base reactor that is compact and efficient in transfer of intense energy and matters. It plays a part in evaluation of CO_2 Conversion to manage process and turn CO_2 into valuable product, demonstrating for Business Units in their investment consideration and potential new business of PTT in the future.

To support work in applied energy to PTT Group and external entities, PTT Innovation Institute has finalized an Energy Application Lab, ready for use. The objective is to develop industrial machinery and natural-gas technology for industries and households, as well as training on gas-propelled engines to operators who are PTT clients. This is to facilitate industry-wide fuel shift from diesel, cooking gas or fuel oil to natural gas, while supporting expansion of gas sales volume, and developing applied energy technology in industry and commerce beyond natural gas.

Biotech and Materials Research

In support of PTT's sustainable business, PTT Innovation Institute pursues R&D in biotechnology, technology, polymer, materials, chemicals to generate innovation and product for PTT Group and to support PTT's new business in Life Science, Bio-economy and Advanced Material.

Furthermore, the Institute prioritizes the field of inspection and life extension of gas pipeline system to maintain pipeline quality at optimum performance in support of gas supply and transport from production fields inside Thailand and import. Work in this field includes R&D of chemicals to prevent erosion inside and the plange of the pipe, leakage prevention, valve cleaning solutions, Sacrificial anode, Pigging disc. These outcomes have been delivered for actual use and for further opportunity of commercialization to external clients.

In supporting PTT's new business, the Institute works on bio material for medical use such as bio-cellulose wound dresser. In addition, it works in the polymer field, material and chemicals for PTT Group, ranging from petroleum plastic and bioplastic such as pellets to clean machinery. The Institute also successfully developed Coffee Chaff Compound, using coffee chaff which is waste from bean roasting process to mix with polymer and shape into products and furniture pieces to reduce waste generation and add value by producing environmentally friendly products.

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Petroleum Product and Automobile Research

PTT Innovation Institute plays an active role in development of oil and lubricant products for both automobile and industry. This enables PTT Group to maintain its market share and leadership by responding to new needs of clients, new international standards and to provide technical support to the state in matters relating to fuel, alternative fuel, lubricant and automobiles supplying evidence for a policy formulation. In 2021, there was a new product to be commercialized in 2022 includes New E20.

In addition, PTT Innovation Institute has laboratories to provide fuel-related technical service and lubricants for machinery and vehicle for PTT affiliates and external entities. This is to support research, solutions, analysis and test, standard setting. The Institute offers consultancy and keeps a database of related research. There is a state-of-the-art Automotive Lab for testing and benchmark testing against international standards, test and evaluation of vehicle and engine performance, combustion and pollution emission from different fuel types.

New Energy Technology Research

In addition to supporting PTT's existing business, the Institute recognizes the importance of new technology and innovations to strengthen PTT's energy business. Its innovations focus aligns with the value chain of electricity, energy transition and electrification technology. It is working on renewable power generation such as energy storage technology in the forms of battery or hydrogen. PTT Innovation Institution collaborates with Vidhyasirimedhi Institute (VISTEC) in developing battery cell using Core Shell technology for higher storage capacity than those available in the market, and it is ready for commercialization and business development. The Institute has equipment and lab to mold cell at bench scale and pilot scale and is jointly developing pack battery with GPSC to supply the household sector and industry sector. PTT Innovation Institute recognizes the importance of hydrogen technology as a form of energy storage and it is a founding partner in Hydrogen Thailand Committee, a public-private body tasked with setting direction for hydrogen energy for Thailand. Furthermore, the Institute works on capacity-strengthening for technical due diligence task for investment in renewables namely wind, solar, to expand renewables portfolio of PTT Group in Thailand and internationally.

Beyond the above, the Institute works in systems tool for electrical machinery, measuring and Internet of Things for PTT Group. It has developed EV Wall Charger to be sold to real estate developers or EV users. It is continuing work on this for further diversification of electric power and formats, as well as collaborating with ARUN PLUS in manufacturing and distribution of EV Wall Charger and managing EV charging stations.

Environment Technology Research

Beyond business perspective, PTT upholds environment conservation. It has conducted R&D in environment management to mitigate and prevent impacts of PTT operations, to ensure sustainability in PTT's growth, Circular Economy and Smart Environment. The Institute provides R&D services, development and application of environment technology and products to PTT Group of companies and external parties.

PTT Innovation Institute conducts R&D on environmental quality assessment - air, water, soil and waste to PTT's businesses and PTT's office building to define approach, method and measures to resolve or mitigate non-compliance. Its R&D work covers preventive solutions, control, and elimination of pollution from PTT Group's business activities over short and long terms. These include factory-generated VOCs treatment system, prototype food waste digestion machine, prototype anti-PM 2.5 and pathogen machine. The Institute has developed a climate simulation prototype using pollution databases to enable 3-dimensional inspection of pollution on the ground for PTT Group. It has conducted Life Cycle Analysis (LCA) of fuel and products by PTT Group to gather evidence for renewables with the least environmental impact. All these efforts are exerted to ensure efficiency of environmental rehabilitation process and mitigate business impact on the environment and community, aligned with corporate social responsibility and sustainability principles in PTT Group's business.

Strategic Plan and Innovation Management

Research and innovation management plays an important part in shaping the direction, tracking performance and steering PTT Innovation Institute's work towards outcome efficiently. Managing research and innovation consists of strategic planning and innovation management, intellectual property management, research capacity development, commercial technology work and other support.

In strategic planning and innovation, PTT has a process of project screening to prioritize and allocate resources properly, as well as collaboration on innovation with other units within PTT Group under supervision of the PTT Innovation Management Committee (PTT IMC) and PTT Group-wide integration through oversight of the PTT Group Technology Committee (PTT GTC).

Furthermore, PTT Innovation Institute operates a unit on commercialization of technology. The scope of its work includes economic feasibility assessment of research projects, develop business model to commercialize research, and ensure effective commercialization of research. PTT Innovation Institute has an intellectual property management unit in charge of IP Landscape & FTO study prior to research undertaking. The unit maintains an IP data base, IP valuation as well as facilitating patent application in support of PTT Group's innovation.

And to ensure sustainability of PTT's innovation, the Institute operates a knowledge management unit that advances the capacity of researchers and staff to ensure that innovation generation is systematic and efficient. The unit handles general support including public dissemination of research outcome and innovation, community relations work, procurement, and overall administration of the Institute itself.

PTT Innovation Institute is certified ISO 14001 for its environment management system, and OHSAS 18001 from Management System Certification Institute (Thailand) (MASCI), and TISI 17025 from the Thai Industrial Standards Institute (General Requirement for the Competence of Testing and Calibration Laboratories).

Our vision of "Powering Life with Future Energy and Beyond." is to respond to all stakeholders in a balanced way which includes, the country, society, shareholders, clients, business partners and our workforce. We promote the organizational values of SPIRIT: Synergy, Performance Excellence, Innovation, Responsibility for Society, Integrity & Ethics, Trust & Respect, to drive accomplish its long-term goal towards the vision.

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1.3 Shareholding Structure of PTT Group

1.3.1 Shareholding Structure of PTT Group

PTT is a fully integrated national petroleum and petrochemical company with the mission to ensure national energy security, economic prosperity, and organization sustainability in parallel with socio-environmental stewardship.

Our operations cover the energy industry's entire business value chain from upstream to downstream activities with an emphasis on value added to its businesses as well as creating energy innovation. PTT has its own business operations and operate through subsidiaries. The following structure illustrates the integration of our operations.

Business Structure of PTT Group Companies

Upstream Petroleum and Gas Business Group

Gas Business Unit
- Supply and Distribution
- Gas Separation Plant
- Distribution Pipeline
- NGV
- Commercial and Marketing Management

Gas Transmission Business Unit

PTT LNG Co., Ltd. (PTTLNG)	100.00%
PTT Exploration and Production Plc. (PTTEP)1/	63.79%
PTT Natural Gas Distribution Co., Ltd. (PTTNGD)3/	58.00%
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))3/	50.00%
Trans Thai-Malaysia (Malaysia) Sdn. Bhd. (TTM(M))3/	50.00%
PTT Global LNG Co., Ltd. (PTTGL)	50.00%
Map Ta Phut Air Products Co., Ltd. (MAP)3/	49.00%

Downstream Petroleum Business Group

International Trading Business
- Oil and Condensate Trading
- Petroleum Products and LNG Trading
- Petrochemical, Chemicals and Solvents Product Trading
- Other Product Trading
- Derivatives Trading
- International Chartering

PTT International Trading Pte. Ltd. (PTTT)	100.00%
PTT International Trading London Ltd. (PTTT LDN)	100.00%
PTT International Trading USA Inc. (PTTT USA)	100.00%

Petrochemical and Refining Business

PTT Global Chemical Plc. (GC)1/	45.18%
Thai Oil Plc. (TOP)1/	45.03%
IRPC Plc. (IRPC)1/	45.05%
PTT Tank Terminal Co., Ltd. (PTT TANK)	100.00%

Oil and Retail Business

PTT Oil and Retail Business Plc. (OR)1/	75.00%

International Investment Business

PTT Energy Resources Co., Ltd. (PTTER)	100.00%
PTT Green Energy Pte. Ltd. (PTTGE)	100.00%
PTT Global Management Co., Ltd. (PTTGM)	100.00%

New Business and Infrastructure Business Group
- Innovation and Digital
- Engineerng and Project Management

Energy Complex Co., Ltd. (EnCo)	50.00%
PTT Energy Solutions Co., Ltd. (PTTES)	40.00%
Global Power Synergy Plc. (GPSC)1/	42.53%
District Cooling System and Power Plant Co., Ltd. (DCAP)	35.00%
PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	20.00%
InnoSpace (Thailand) Co., Ltd. (InnoSpace)	13.61%
HG Robotics Co., Ltd. (HG ROBOTICS)	9.47%
Baania (Thailand) Co., Ltd. (Baania)	2.73%
Sunfolding, Inc. (Sunfolding)	5.59%
Luminar Technologies, Inc. (Luminar)	0.07%
Ample, Inc. (Ample)	1.13%

Other Businesses

PTT Treasury Center Co., Ltd. (PTT TCC)	100.00%
Business Services Alliance Co., Ltd. (BSA)2/	25.00%
Sam Palung Social Enterprise Co., Ltd. (SPSE)	20.00%
Dhipaya Group Holdings Plc. (TIPH)1/	13.46%
Suez Environmental Services Co., Ltd. (SES)	40.00%

Investment in PTT Group
Own Operations

Remarks:
Information as of December 31, 2021. (All figures are presented by PTT's portion.)
1/ These 7 listed companies registered in The Stock Exchange of Thailand.
2/ BSA is a wholly owned subsidiary as PTT holds all common shares of BSA.
3/ Shareholding in these subsidiaries is a joint investment in other businesses. Details are in Supplementary of 56-1 One Report for year 2021.

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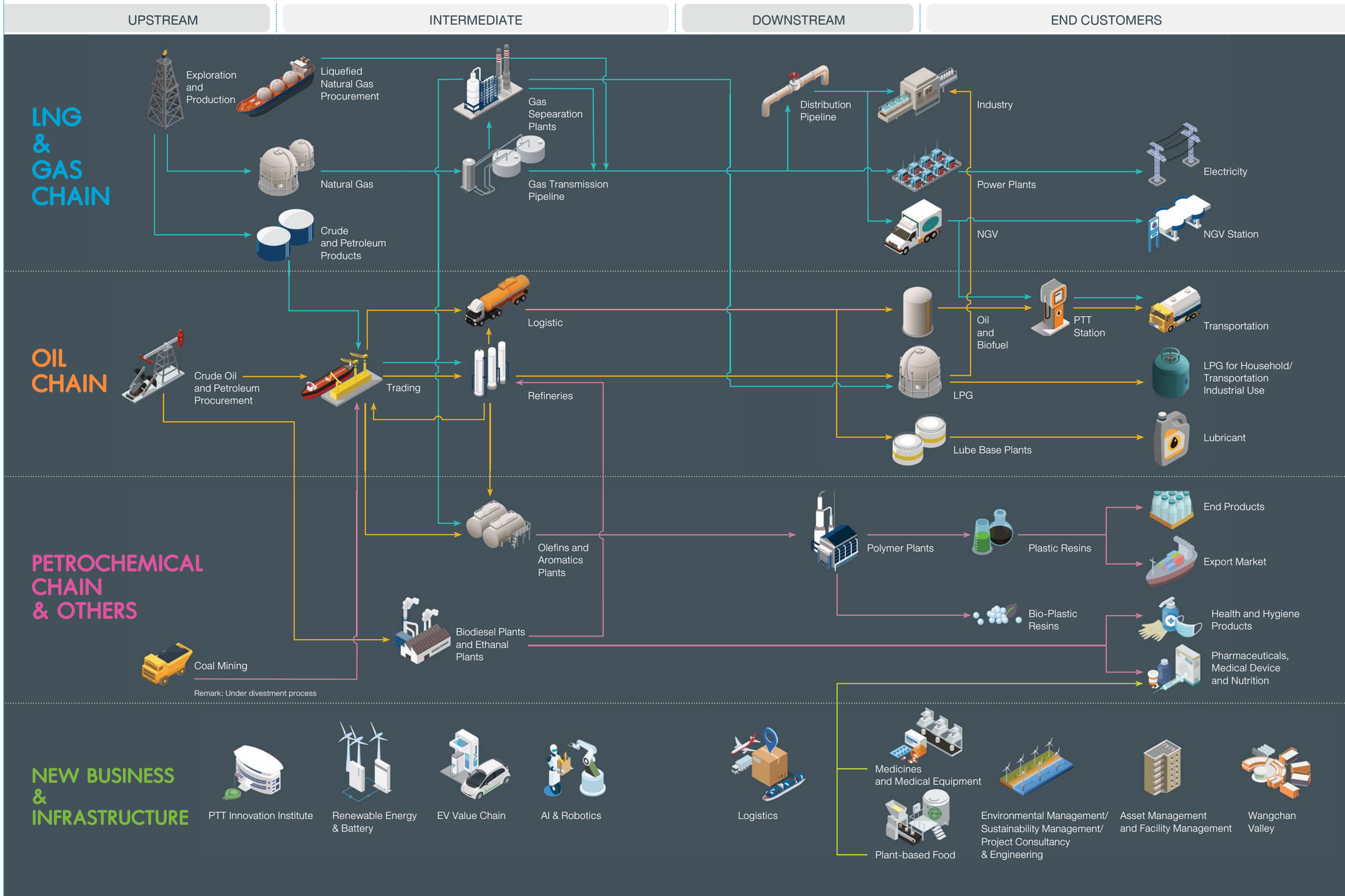
Create Value through Business Chain



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1.3.2 Parties with Conflict of Interest

-None-

1.3.3 Relations with Major Shareholders' Business Group

PTT is a state enterprise, with the government through the Ministry of Finance as its major shareholder, under the supervision of the Ministry of Energy. Its business operations must also comply with the National Energy Policy Council Act B.E. 2535 (1992) with the supervision of the National Energy Policy Council (NEPC). As a state enterprise, the public sector can supervise its operations in compliance with national energy, economic and social policies.

1.3.4 Shareholders

The following table illustrates PTT's shareholding structure as of September 30, 2021, the record date for the 2021 interim dividend payment.

Item	Shares (million)	THB million	%
Registered Capital	**28,562.9**	**28,562.9**	**-**
Paid-up Capital (as of September 30, 2021)	**28,562.9**	**28,562.9**	**100.00**
• Ministry of Finance	14,598.9	14,598.9	51.111
• Vayupak Fund 1 by MFC Asset Management Plc.	1,736.9	1,736.9	6.081
• Vayupak Fund 1 by Krung Thai Asset Management Plc.	1,736.9	1,736.9	6.081
• Institutional and public investors	10,490.2	10,490.2	36.727
Unpaid Capital	**-**	**-**	**-**

Top 10 shareholders (as of September 30, 2021) are as follows:

No.	Name	Shares	%
1.	Ministry of Finance	14,598,855,750	51.111
2.	Vayupak Fund 1 by MFC Asset Management Plc.	1,736,895,500	6.081
3.	Vayupak Fund 1 by Krung Thai Asset Management Plc.	1,736,895,500	6.081
4.	Thai NVDR Co., Ltd.	1,504,278,113	5.267
5.	Social Security Office	610,902,700	2.139
6.	SOUTH EAST ASIA UK (TYPE C) NOMINEES LTD.	529,155,885	1.853
7.	Federation of Savings and Credit Cooperative of Thailand Ltd.	439,456,600	1.539
8.	STATE STREET EUROPE LTD.	366,819,399	1.284
9.	Electricity Generating Authority of Thailand Saving and Credit Cooperative Ltd.	251,184,100	0.879
10.	THE BANK OF NEW YORK MELLON	209,568,518	0.734
	Total	**21,984,012,065**	**76.968**

Remarks:

- *Number 6 is a nominee account. PTT's investigation at Thailand Securities Depository Co., Ltd. (TSD) found that the ultimate shareholder's names could not be disclosed. However, the Ministry of Finance remained the sole majority shareholder on behalf of the State, which in part dictates PTT's management policy. The ministry nominated directors to the Board for approval by the shareholders. Other substantial shareholders, including Number 6 exercise no influence over PTT's management policy formulation, including director nomination.*
- *Shareholders of Thai NVDR Co., Ltd., who hold non-voting depository receipts (NVDR) in No. 4, are ineligible for voting at shareholders' meetings except when exercising their voting rights on delisting the shares from SET.*

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1.4 Registered and Paid-up Capital

1.4.1 Common Shares

As of December 31, 2021, PTT's registered capital totaled THB 28,562,996,250, consisting of 28,562,996,250 common shares at THB 1 per share. These shares represented THB 28,562,996,250 in paid-up capital, or 28,562,996,250 common shares.

1.4.2 Other Shares with Different Terms or Rights from Common Shares

-None-

1.4.3 PTT's Shares or Convertible Securities as Underlying Securities for Issuing Mutual Funds for Foreign Investors

-None-

1.5 Inssuance of Other Securities

1.5.1 Convertible Securities

-None-

1.5.2 Debt Securities

Bonds and Debentures

As of December 31, 2021, PTT had THB 124,354 million of Baht denominated debentures and US-dollar denominated debentures issued by PTT and PTT Treasury Center Co., Ltd. (PTT TCC), which are guaranteed by PTT, equivalent to THB 52,702 million. The detail is summarized as follows:

Debentures	Amount (THB million)	Redemption Date	Guarantee
Domestic debentures[1/]	124,354	2022 - 2110	-None-
Foreign debentures2[2/ 3/]	52,702	2035 - 2070	-None-
Total	**177,056**		

Remarks:
1/ Fitch Rating's national rating of long-term PTT debentures at "AAA (tha)"
2/ Moody's international rating of foreign PTT and PTT TCC debentures at "Baa1"
3/ S&P's international rating of foreign PTT and PTT TCC debentures at "BBB+"

Unsecured, Unsubordinated Domestic Debentures

Unit: THB million

Symbol	Issuance Date	Maturity Date	Tenor	Amount (THB million)	Annual Coupon Rate (%) (payment frequency)	Terms
PTTC222A	Feb 25, 2010	Feb 25, 2022	12 years	4,000[1/]	4.50 (semi-annually)	-
PTTC227A	Jul 2, 2020	Jul 2, 2022	2 years	2,000	1.21 (semi-annually)	-
PTTC232A	Aug 6, 2021	Feb 6, 2023	1.5 years	4,000	Compounded Thor + 0.18 (once at the end of redemption period)	-
PTTC237A	Jul 24, 2020	Jul 24, 2023	3 years	2,000	2.25 (semi-annually)	-
PTTC239A	Sep 13, 2013	Sep 13, 2023	10 years	10,000[2/]	6.58 (once at the end of redemption period)	-
PTTC243A	Mar 6, 2009	Mar 6, 2024	15 years	14,967[3/]	Year 1 - 5 5.00 Year 6 - 8 6.20 Year 9 - 15 6.80 (semi-annually)	Debenture holders can redeem at the end of the 8th year.
PTTC247A	Jul 31, 2009	Jul 31, 2024	15 years	9,387[4/]	Year 1 - 5 4.25 Year 6 - 10 5.50 Year 11 - 15 5.75 (semi-annually)	Debenture holders can redeem at the end of the 10th year.
PTTC248A	Aug 6, 2021	Aug 6, 2024	3 years	15,000	0.96 (semi-annually)	-
PTTC257A	Jul 2, 2020	Jul 2, 2025	5 years	3,000	2.05 (semi-annually)	-
PTTC268A	Aug 6, 2021	Aug 6, 2026	5 years	15,000	1.31 (semi-annually)	-
PTTC277A	Jul 24, 2020	Jul 24, 2027	7 years	13,000[5/]	2.85 (semi-annually)	-
PTTC288A	Aug 6, 2021	Aug 6, 2028	7 years	5,000	1.79 (semi-annually)	-
PTTC307A	Jul 2, 2020	Jul 2, 2030	10 years	2,000[6/]	2.84 (semi-annually)	-
PTTC318A	Aug 6, 2021	Aug 6, 2031	10 years	8,000	2.37 (semi-annually)	-
PTTC357A	Jul 2, 2020	Jul 2, 2035	15 years	6,000	3.20 (semi-annually)	-

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Unit: THB million

Symbol	Issuance Date	Maturity Date	Tenor	Amount (THB million)	Annual Coupon Rate (%) (payment frequency)	Terms
PTTC457A	Jul 2, 2020	Jul 2, 2045	25 years	7,000	3.74 (semi-annually)	-
PTTC10DA	Dec 2, 2010	Dec 2, 2110	100 years	4,000[7/]	5.90 (semi-annually)	Debenture holders can redeem at the end of 50th and 75th years and other cases as defined in the Indentures.
Total				**124,354**		

Unsecured, Unsubordinated Foreign Debentures

Unit: THB million

Symbol	Issuance Date	Maturity Date	Tenor	Amount (THB million)	Annual Coupon Rate (%) (payment frequency)	Terms
USD Bond 2005[8/]	Aug 3, 2005	Aug 3, 2035	30 years	1,790[11/]	5.875 (semi-annually)	Debenture holders have right to exercise put option in the event that (i) the Thai Government, directly or indirectly, ceases to own and control at least 50% of PTT's issued and outstanding capital stock and (ii) within 180 days from the date of such decrease in ownership, PTT's Credit Ratings is reduced below such Credit Rating immediately prior to the occurrence of such change of control as defined in debentures prospectus and related documents.
USD Bond 2012[9/]	Oct 25, 2012	Oct 25, 2042	30 years	8,079[12/]	4.50 (semi-annually)	• Debenture holders have right to exercise put option in the event that (i) the Thai Government, directly or indirectly, ceases to own and control at least 50% of PTT's issued and outstanding capital stock and (ii) within 180 days from the date of such decrease in ownership, PTT's Credit Ratings is reduced below such Credit Rating immediately prior to the occurrence of such change of control as defined in debentures prospectus and related documents. • PTT has right to exercise call option (Make-whole Redemption) as defined in debentures prospectus and related documents.

Unit: THB million

Symbol	Issuance Date	Maturity Date	Tenor	Amount (THB million)	Annual Coupon Rate (%) (payment frequency)	Terms
USD Bond 2019[8 - 10/]	Oct 24, 2019	Aug 3, 2035	15 years 9 months 10 days	8,229[13/]	5.875 (semi-annually)	Debenture holders have right to exercise put option in the event that (i) the Thai Government, directly or indirectly, ceases to own and control at least 50% of PTT's issued and outstanding capital stock and (ii) within 180 days from the date of such decrease in ownership, PTT's Credit Ratings is reduced below such Credit Rating immediately prior to the occurrence of such change of control as defined in debentures prospectus and related documents.
	Oct 24, 2019	Oct 25, 2042	23 years 1 day	11,089[14/]	4.50 (semi-annually)	• Debenture holders have right to exercise put option in the event that (i) the Thai Government, directly or indirectly, ceases to own and control at least 50% of PTT's issued and outstanding capital stock and (ii) within 180 days from the date of such decrease in ownership, PTT's Credit Ratings is reduced below such Credit Rating immediately prior to the occurrence of such change of control as defined in debentures prospectus and related documents. • PTT has right to exercise call option (Make-whole Redemption) as defined in debentures prospectus and related documents.
USD Bond 2020[10/]	Jul 16, 2020	Jul 16, 2070	50 years	23,515	3.70 (semi-annually)	• Debenture holders have right to exercise put option in the event that (i) the Thai Government, directly or indirectly, ceases to own and control at least 50% of PTT's issued and outstanding capital stock or PTT ceases to own and control, directly or indirectly, at least 99% of PTT TCC's issued and outstanding capital stock and (ii) within 180 days from the date of such decrease in ownership, PTT's Credit Ratings is reduced below such Credit Rating immediately prior to the occurrence of such change of control as defined in debentures prospectus and related documents. • PTT has right to exercise call option (Make-whole Redemption) as defined in debentures prospectus and related documents.
Total				**52,702**		

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Remarks:

1/ PTT engaged in a cross-currency swap from Baht-denominated debentures worth THB 4 billion to dollar-denominated ones worth USD 120.55 million at LIBOR + a fixed rate per year on the dollar-denominated principal. The swap will end on February 25, 2022.

2/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 10 billion at a fixed rate to a lower rate. The swap will end on September 13, 2023.

3/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 2 billion at a fixed rate to THBFIX + a fixed rate per year on the Baht-denominated principal. The swap will end on March 6, 2024.

4/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 6 billion at a fixed rate to a floating rate based on long-term USD reference rate. The swap will end on August 15, 2024.

5/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 3 billion at a fixed rate to THBFIX + a fixed rate per year on the Baht-denominated principal. The swap will end on July 24, 2027.

6/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 2 billion at a fixed rate to a lower rate. The swap will end on July 2, 2030.

7/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 4 billion: THB 2 billion at a fixed rate to a lower rate, to end on December 2, 2027, and the other THB 2 billion at a fixed rate to a lower rate, to end on June 2, 2028.

8/ In 2019, PTT exercised the liability management by repurchasing its USD bonds (USD Bonds 2005) in the amount of USD 244.955 million, and PTT TCC reissued new USD bonds (USD Bond 2019), guaranteed by PTT in the same amount of USD 244.955 million. The current PTT's USD bonds 2005's outstanding is USD 53.297 million.

9/ In 2019, PTT exercised the liability management by purchasing its USD bonds (USD Bonds 2012) in the amount of USD 330.09 million, and PTT TCC reissued new bonds (USD Bond 2019) guaranteed by PTT. The current USD bonds 2012's outstanding is USD 240.51 million.

10/ PTT TCC issued the bonds guaranteed by PTT. The guarantee's maximum liability will be capped at an amount equal to 125% of the outstanding of the PTT TCC's bond. The guarantee amount for USD Bond 2019 series maturity on August 3, 2035 and October 25, 2042 are USD 306 million and USD 413 million respectively. Also, USD 875 million is the maximum guarantee for USD Bond 2020 with maturity on July 16, 2070.

11/ PTT engaged in a cross-currency swap from dollar-denominated debentures worth USD 53.297 million to Baht-denominated ones worth THB 1,749.21 million at a fixed rate to a lower rate on the Baht-denominated principal. The swap will end on August 3, 2035.

12/ PTT engaged in an interest rate swap from dollar-denominated debentures worth USD 240 million at a fixed rate to a floating rate based on the long-term USD reference rate. The swap will end on November 7, 2025.

13/ PTT engaged in an interest rate swap from dollar-denominated debentures worth USD 100 million from a fixed to floating interest rate referenced to LIBOR, which will end on August 3, 2024, and entered into a cross currency swap worth USD 144.955 million to Baht-denominated ones worth THB 4,486.50 million, with a fixed interest rate to THBFIX + a fixed rate per year on the Baht-denominated principal which will end on August 3, 2035.

14/ PTT engaged in an interest rate swap of USD 200 million from a fixed to a floating rate of LIBOR + a fixed rate per year on USD principal and the long-term USD reference rate which will end on November 8, 2028.

Short-term Bills of Exchange

As of December 31, 2021, there was no outstanding of short-term bill of exchange.

1.6 Dividend Policy

PTT

PTT pays out as dividends no less than 25% of its net income after deducting all provisional reserves required by law and PTT. While the net income is based on the consolidated financial statements, dividend payment is subject to future investment plans, necessities, and suitability. Once the Board has decided on annual dividend payment, it must seek approval from the shareholders' meeting. An exception is for interim dividend payment, which the Board can approve and report to the next shareholders' meeting.

Subsidiaries

Each subsidiary may proceed with dividend payment by taking into account its remaining cash flow in comparison with the investment capital. If the cash flow is substantial enough after legal provisions, the subsidiary may consider proceeding with dividend payment on a case-by-case basis.

PTT Dividend Payment

	2019	2020	2021
Earnings per share (THB/share)	3.20	1.32	3.79
Dividend per share (THB/share)	2.00	1.00	2.00
Dividend payout ratio (%)	63	76	53

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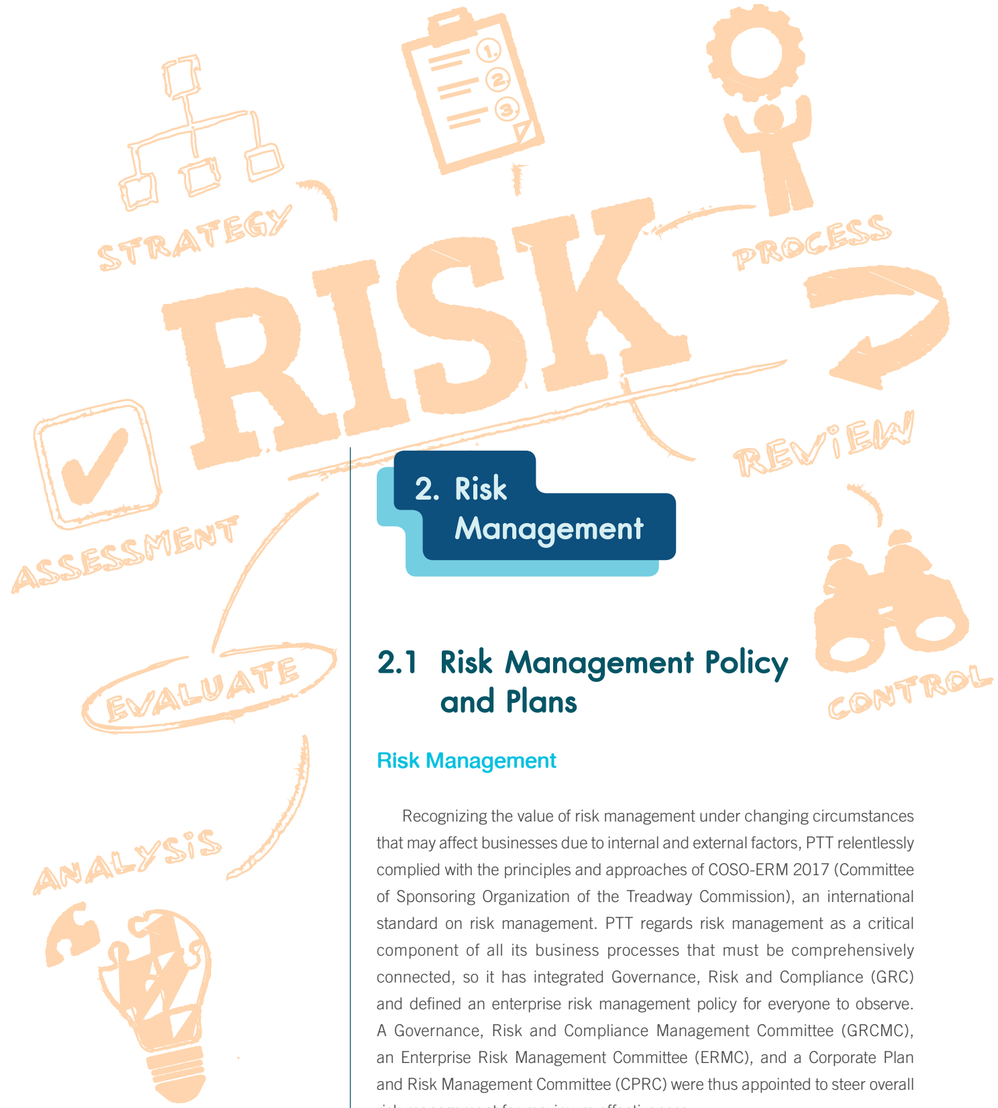

2. Risk Management

2.1 Risk Management Policy and Plans

Risk Management

Recognizing the value of risk management under changing circumstances that may affect businesses due to internal and external factors, PTT relentlessly complied with the principles and approaches of COSO-ERM 2017 (Committee of Sponsoring Organization of the Treadway Commission), an international standard on risk management. PTT regards risk management as a critical component of all its business processes that must be comprehensively connected, so it has integrated Governance, Risk and Compliance (GRC) and defined an enterprise risk management policy for everyone to observe. A Governance, Risk and Compliance Management Committee (GRCMC), an Enterprise Risk Management Committee (ERMC), and a Corporate Plan and Risk Management Committee (CPRC) were thus appointed to steer overall risk management for maximum effectiveness.

Risk Management Structure

Corporate risks are systematically managed through PTT's various management committees. Risk management must be integrated with the formulation of enterprise plans to give risk management plans effectiveness and efficiency in line with corporate goals and strategies. Operational risks fall under the supervision of executives responsible for a given function. All units are responsible for managing and controlling risks to manageable levels and this has been spelled out in the job descriptions of all units.

Risk Management Tools

PTT has studied and applied various risk management tools, including the definition of risk appetite, risk assessment, and risk prioritization using a risk map, mitigation plan key risk indicator (KRI). The Monte Carlo Simulation technique has also been adopted to identify possible impacts on business results, known as Value at Risk (VaR). In addition, it monitors key changes in external factors and emerging risks to develop proactive risk management measures before such risks harm PTT's business.

Risk Management Culture

PTT cultivates risk management awareness among all its employees along with nurturing risk management ambiance and culture, focusing on due resource allocation and provision of assorted supports by integrating risk management with key processes to promote effective risk management. For continuous improvement of corporate risk management efficiency, an organization-wide risk management manual has been published on a website accessible to all employees, along with communication sessions and risk management training courses, as well as an annual survey of personnel's opinions and understanding of corporate risk management.

2.2 Risk Factors Facing PTT's Businesses

PTT analyzes internal and external circumstances as well as various trends (economic, social, political, technological, industrial, competitor, and others) to arrive at corporate risk factors grouped as follows:

2.2.1 Current and Emerging Risks Facing Businesses of PTT or PTT Group

Strategic Risks

Strategic Direction

With dynamic innovation or technological progress resulting in disruptive technology as well as global environmental awareness, creating energy transition concepts from conventional energy consumption to new forms of clean energy that changes customers' needs and current business flows, PTT values the determination of PTT Group's business strategic directions to accommodate changing directions of the economy, society, energy, technology, and consumers' behavior that align with global megatrends. If PTT's strategies cannot promptly cater to such changes, it could suffer from impacts on businesses and performance.

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LNG Value Chain and New S-Curve business strategies have therefore been devised to pursue opportunities and develop new business models to handle upcoming changes. For example, investments in EV business, renewable energy, life science; the preparation of human capital to efficiently accommodate business expansion and emerging shifts. A new set of vision, direction and future business strategies has been mapped out by an annual Top Executive Thinking Session (TTS) and a Strategic Thinking Session (STS) among senior PTT Group executives. The resulting business strategies then translate into five-year business plans, which are then integrated with risk management plans. In addition, PTT holds a meeting of PTT Group executives every month to monitor all affiliates' performance and share ideas to modify short-term business plans and strategies to ensure planned performance outcomes.

As for Environmental, Social and Governace (ESG) risks, PTT requires assessment of material issues for the corporation each year, embracing risks and their likelihoods while considering the severity of impacts of all stakeholders' decisions and those on the company. Such material issues are then managed by various processes and mechanisms, namely corporate strategies and corporate risk management processes and regular processes of process owners.

Investment Risks

PTT not only continuously grows its businesses but also seeks new investment schemes for itself and PTT Group. Doing so exposes PTT to risks of lower-than-targeted returns on investment, project delays, and project cost overruns.

PTT has therefore developed criteria for investment and investment budget management by PTT and PTT Group and applied PTT's affiliate governance approach to screen decisions, monitor, and steer PTT's and PTT Group's investment. The process is known as SIM (Strategic Investment Management), in which a Strategic Investment Management Committee, made up of executives with assorted expertise, screens investment, monitors, and reports on PTT's investment to support decision-making by the PTT Management Committee (MC) and the Board. Investment with massive value or those with significant risks must be presented to the ERMC for comments before the Board's decision.

Once a given investment has secured the Board's approval, monitoring takes place for reporting to the Strategic Investment Management Committee, the MC, and the Board every quarter to ensure PTT's most useful and efficient capital. In addition, PTT regularly monitors and analyzes PTT's and PTT Group's investment portfolios to improve performance and revise investment plans while valuing critical path management to minimize project risks so that projects are completed in time, within budget, with suitable characteristics, and in due compliance.

Personnel Development to Sustain Business Growth

PTT has been experiencing swift expansion due to the growth in investment here and abroad together with its pursuit of new business opportunities through new business investment, the introduction of advanced technology and innovations to drive business operations. As a result, unless PTT can groom skillful, experienced personnel in time and in adequate supply, this could harm its businesses and long-term goal achievement.

Digital technological reform affecting business disruptions in several industries has prompted PTT to encourage and urge employees to be aware of and understand technology/ digital trends and cybersecurity as well as supporting the adoption of various technologies in the work.

PTT has adjusted its Core Competency to be in line with the vision, strategy, and direction of the organization, such as adaptability, customer orientation, etc. PTT Group Leadership and Learning Institute (PLLI) is responsible for developing the potential of employees with such competency through various training courses, including functional competency development of each business through the Functional Academy. The redevelopment program provides training and in-depth skills of each business with on-site practical training.

In addition, to accommodate the execution of strategic directions by each business unit, PTT has laid down a structure supporting work and allocated personnel required to meet the needs of each business unit. At the same time, personnel management proceeds through the mechanism of career path management. Each career path features a manpower review where key positions are identified along with individual development plans to develop specialized skills for each career path as well as leadership development and promotion of overall learning for PTT Group. These moves ensure that PTT will constantly command an adequate supply of quality executives and employees.

However, for new businesses in which PTT personnel do not have enough experience or expertise, PTT will recruit knowledgeable and experienced personnel from outside with direct expertise in that business to add more troops for faster and more efficient business operation and expansion.

Climate Change Risks

Today's investors have included risk management and opportunities related to climate as an investment factor in businesses affecting the environment amid the global community's keener awareness of climate change, as seen in the Paris Agreement, an accord under the United Nations treaty on climate change defining measures to lower carbon dioxide emissions in the 26th Conference of the Parties (COP), in which Thailand declared the Net Zero GHG Emission. In PTT's case, the policy has been passed on via the Ministry of Energy, and as our focus is on hydrocarbon-based energy businesses, PTT's measures to control and mitigate impacts consist of the following:

- Definition of Low Carbon Society strategic direction and Clean Growth goal, which is one-third of our long-term goals in line with the new vision, with clear greenhouse gas reduction target and efforts aimed at Net Zero greenhouse gas emissions.
- Consideration of various projects to manage the greenhouse gas emissions, such as production efficiency enhancement and energy conservation, forest planting and maintenance project to raise greenhouse gas sequestration, carbon dioxide capture project for storage or use, hydrogen energy application projects.
- The application of the Carbon Price Mechanism in investment considerations can help increase the likelihood of investment decisions in projects that contribute to reducing greenhouse gas emissions and promote environmentally friendly investments.
- Modification of investment criteria in support of greenhouse gas reduction projects or for more control of projects with greenhouse gas emissions.
- Study and implementation of the Task Force on Climate-related Financial Disclosures (TCFD) to assess impacts of climate change strategic implementation or various climate scenarios on PTT before transparently disclosing information to investors.
- Changing the direction of business operations focusing on future energy business or businesses other than energy, such as expanding investments in renewable energy businesses and other low-carbon businesses according to PTT's vision, etc.
- Establishment of cooperation within PTT Group and with external agencies to urge greenhouse gas reduction through clean energy technology.

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Reputation Risks

Rapidly changing internal and external environments with greater interconnections make actions inevitably affect each other and may pose a risk to the reputation of the organization if PTT fails to respond appropriately and timely to the expectations of all stakeholders.

In looking after stakeholders under its mission, PTT efficiently manages stakeholders and relentlessly revises and develops its implementation by pushing through stakeholder engagement by the AA 1000 SES international standard and the State Enterprise Assessment Model (SE-AM), which takes into account comprehensive stakeholder engagement. PTT also spells out stakeholders' key issues and addresses issues of importance to stakeholders according to the SE-AM for PTT's sustainable growth whilst gaining the trust of the society.

PTT compiles and analyzes stakeholders' needs and expectations by surveying and researching stakeholders along with megatrends to serve as key data in developing crucial issues among stakeholders. Once these issues are captured, PTT assigns related units to develop a stakeholder management plan and then report the outcomes to the ERMC every quarter so that its comments and recommendations may find their way into work improvement. Around the year-end, PTT assesses stakeholders' engagement for a review before the following year's activities.

This year PTT revised its plans to embrace transformation in stakeholders' expectations due to constant change in circumstances to address their needs faster while lowering risks to its reputation and promote the good image of the organization as well as reflecting the determination to contribute to society in all dimensions side by side with the country to get out of the crisis well through the implementation of various projects. For instance, the Same Breath project which provides comprehensive assistance to those affected by the COVID-19 pandemic; the Restart Thailand project which has helped communities and 25,489 new graduates through employment that focuses on creating jobs, generating income, and building professional skills for new generations in every region; Smiling Innovation of PTT Group by applying network, knowledge, innovation, technology, public relations channels to support farmers in 25 areas (20 provinces), as well as develop and upgrade more than 250 SKUs of community products across the country to meet international standards.

Operational and Business Risks

Diminishing Natural Gas Outputs and Continuity of Gas Production

After more than 30 years of production, reserves of natural gas from production fields in Thailand and Myanmar have been largely depleted. Some fields have gradually entered the "Post-Plateau" period, the period stipulated in the Gas Sales Agreements where producers are permitted to slash the daily contract quantity or the daily amount of natural gas to be delivered. Under these circumstances, the chance of getting the same delivery volume as written in the agreements is getting slim. In addition, the gas sales agreements for the Bongkot (G2/61) and Erawan (G1/61) fields will end in 2022 - 2023, respectively, with the government bidding the G1/61 and G2/61 under the Production Sharing Contract (PSC) regime, which stipulates a minimum combined delivery volume of 1,500 MMSCFD for the entire agreement period of 10 years. PTTEP Energy Development Co., Ltd. (PTTEP ED) (operator) won the bid and was granted the right for petroleum exploration and production. Negotiation with the new PSC bidding winners is underway to conclude the gas sales agreements from both blocks. The agreement for G2/61 is expected to be signed within the first quarter of 2022 while PTT and PTTEP are finalizing the draft agreement for G1/61, with projected signing within the first quarter of 2022. However, as the concessionary of G1/61 block has been changed to PTTEP, the concession block handover may deviate from plans. There could be impacts on the continuity of gas production from the gas fields, which would affect the business performance of PTT.

In addition, instability overseas such as the unrest in Myanmar may result in the risk of natural gas delivery disruption from fields in Myanmar to Thailand. PTT has thus arranged risk management and business continuity plans by establishing a team to work with relevant agencies to monitor the situation, set operating guidelines, including continuously reporting the situation to the Ministry of Energy. This will ensure that natural gas supply and delivery will not be interrupted, or the volume may not be continuous or may be decreased. PTT has prepared for additional liquefied natural gas (LNG) procurement to replace natural gas that may reduce. Currently, PTT is constructing the LNG Map Ta Phut Terminal 2 (LMPT-2) at Ban Nong Fab, Map Ta Phut Sub-District, Mueang District, Rayong to support the increasing LNG procurement. PTT has sought new natural gas resources and additional natural gas from the Gulf of Thailand and the Thai-Malaysia Joint Development Area to maintain gas supply and delivery without affecting the power sector and the country's energy security.

Risks of Significant Changes in Prices and Volumes of Petroleum and Petrochemical Sales

Domestic and international factors affecting petroleum and petrochemical demand, including economy, catastrophes, epidemics, and trade war, directly impact prices and sales volumes, in turn affecting PTT's and PTT Group's performance results. In addition, our raw material and feedstock prices and sales prices of natural gas, condensate, crude oil, petroleum products, petrochemicals, alternative energy, and the spreads between product and raw materials/ feedstock prices - domestic ones and overseas - are subject to high volatility of the world market. This could compromise our performance and returns on future investment.

To mitigate such risks, PTT has defined a risk mitigation plan to efficiently sustain the impacts of volatile energy prices. It formulated scenario planning for various oil prices to promptly handle future changes and uncertainty. PTT Group management has appointed a Price Strategy and Risk Management team under the Petrochemical and Refining Integrated Synergy Management (PRISM), tasked with analyzing world oil price movement and jointly carrying out price hedging management among companies in PTT Group to obtain the greatest benefit. Today, to manage price risks, the group engages in hedging through derivative contracts in both petroleum and petrochemical prices. To this end, meticulous, prudent data analyses are conducted while suitable risk management tools are chosen to fit periods and objectives.

Also in place is a structure and process for supervising risk management with checks and balances of international standards by the International Trading Business Unit. Similarly, a Value at Risk (VaR) is defined for each commercial transaction. A risk status summary report is regularly required for relevant executives and units to control and monitor PTT Group's price risks beyond what is acceptable.

Compliance with Applicable Policies, Laws, and Regulations

The complexities of laws and regulations relevant to PTT's operations e.g. laws on trade competition and the Public Procurement and Supplies Management Act, new and amended government policies, laws, and regulations of concern are budgeting laws, state audit laws, laws concerning public-sector financial discipline, laws on anti-corruption, Personal Data Protection Act, laws on cybersecurity, and laws whose interpretation is unclear can affect the business performance of PTT as well as its corporate image and reputation, thus causing a discrepancy in compliance.

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To fully comply with relevant laws, PTT is committed to its Compliance Policy, which governs all activities' compliance with state laws and PTT's rules and regulations, and the Compliance Framework, an operating guideline to ensure full compliance with state laws and regulations of PTT. Regular reviews are in place to align with the business and execution context as well as changes in laws. PTT has also created a Risk Appetite Statement to define the risk level that the company is willing to take. Non-compliance risk associated with PTT's business operations is one of the risks that are focused on for their prevention. A responsible unit of PTT closely monitors the development of new laws with proactive participation, including analyzing and clarifying issues of doubt or obstacles to PTT and occasionally seeking clarification on certain legislation to align PTT's business with these new laws and regulations to be enforced in the future. Also in place now is the Compliance Department's process, working alongside the 2nd Line of Defense Alliances. PTT has also integrated Governance, Risk and Compliance (GRC) so that its business may command good governance in line with the corporate governance code, adequate internal control, comprehensive risk consideration, and compliance of operation to lower non-compliance risks. Performance reports are duly made to the GRCMC and the Corporate Governance Committee respectively. PTT continuously promotes the culture of the PTT Group Way of Conduct to all staff throughout PTT Group to have all activities performed in the same conduct, same standard, and same direction, including compliance.

Risks Arising from Public and Applicable Government Agencies' Policies

The National Energy Policy Council (NEPC) endorsed an approach to promote competition in the natural gas business on July 31, 2017, to give natural gas users improved service, to breed more efficient competition in gas supply procurement while stimulating procurement efficiency. In addition, prices of natural gas, a key component of national energy cost, could drop in line with the prices of fuels. The Ministry of Energy has divided the operations of this competition promotion policy into 3 phases. To achieve this, the NEPC endorsed phase 1: pilot project execution (trial phase) by assigning the Electricity Generating Authority of Thailand (EGAT) to get prepared to become a new shipper; and the Ministry of Energy completed Phase 1 in 2020.

On April 1, 2021, the NEPC approved Phase 2 implementation guidelines and assign relevant agencies for further detailed implementation with tangible practices. The structure of the natural gas business phase 2 is divided into 2 groups: (1) Regulated Market: the group under the supervision of the Energy Regulatory Commission (ERC) under the guidelines prescribed by the NBTC and the NEPC, consisting of natural gas users from Old Supply and shipper licensees who supply liquefied natural gas (LNG) for use in the electricity sold into the system, and (2) Partially Regulated Market: the LNG supplier group to use with power plants that do not sell electricity into the system, industry and its own businesses. Natural gas procurement in Phase 2 structure is divided into 2 groups: (1) Old Supply Group, or natural gas supplier for the country's energy security, the NEPC has assigned PTT to be the operator, and (2) New Supply Group is a group of new shippers who import LNG only for their own power plants or industrial plants. On August 4, 2021, the NEPC approved the natural gas price structure to promote competition in Phase 2, including setting a time frame for the enforcement of the natural gas price structure. As a result, at present, Thailand's natural gas business has entered a transition from promoting competition in Phase 1 to Phase 2. In Phase 2, many natural gas operators will enter the LNG supply competition, while the ERC previously approved natural gas procurement and wholesale licenses (Shipper License) to 7 new operators.

The Phase 2 natural gas business structure may shrink PTT's domestic gas market share. Yet, PTT is managing such a change to remain the steward of energy security by procuring enough fuels for domestic demand and raising its competitiveness with new operators in addition to planning business growth. An instance is its internal restructuring to accommodate PTT's roles and duties for business agility and competitiveness with new players together with business growth to accommodate regional demand, notably the LNG Regional Hub. In addition, for the greater competition to be among the New Supply players in Phase 2, PTT Group was granted a shipper license from the ERC. Thanks to over four decades of experience in the natural gas business, PTT will retain its competitiveness in gas procurement amid volatile fuel market circumstances and public policies. In 2021, PTT exported LNG Commercial Reloading Cargo to Japan and sold LNG ISO Tank Container to China and Cambodia, exhibiting the company's operational flexibility and growing competitiveness.

Disruption of Production and Business Operations

With its several sites worldwide, PTT is exposed to disruptions of production and business operations resulting from human errors, malfunctioning machinery, catastrophes, threats of political instability, together with terrorist activities, epidemics, and other hazards. All these could prove detrimental to PTT and could wreak damage to its major infrastructure. PTT, therefore, values process safety management (PSM) by focusing on systematically managing and controlling operating risks through the introduction of engineering technology and sophisticated international standards, application of suitable tools and management systems, and preparedness for emergencies and incident management. An instance is the PTT Group Oil Spill Remediation Guidelines, formulated to prevent and mitigate environmental impacts and rapidly restore the ecology and biodiversity, resulting in the ability to do business even if such incidents occur. To lower the likelihood and impacts of such threats, PTT activates PTT Group Security, Safety, Health and Environmental Management Standard and the PTT Group Business Continuity Management System Standard (BCMS) for all business units and PTT Group to leverage in developing and linking up with both common systems. PTT not only safeguards value-adding activities at sites but does so in every stage of work to prevent disruption and prevent value-adding activities under PTT's business chain from being disrupted. In addition, PTT reviews, amends, and develops BCMS to ensure a practical connection between business units and stages integrated corporate BCM drills, human resource preparation plans (process to locate key personnel), backup office preparation plans, and information system preparedness plan to ensure BCMS recertification under ISO 22301.

Following best practices in the petroleum and petrochemical industries, PTT has taken out insurance policies to protect its core business assets from business disruption, in addition to further insurance coverage for operation suspension. Such a subscription may not be all-inclusive since no insurance company offers such comprehensive insurance. Alternatively, sometimes it could prove uneconomic to buy excessively high-coverage insurance. While PTT believes that its affiliates have insurance policies that are of industrial standards, PTT cannot control the ceilings of PTT Group's insurance policies to cover possible damage. In other words, should properties not be significantly or fully covered, or should insurance companies face severe financial problems causing them to go out of business due to such events, PTT's financial position, business performance, and business opportunities could face grave repercussions.

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Risks from Work-Related Accidents

PTT focuses on the management and control of safety risks for its operations systematically and continuously by setting long-term goals to control accidents that cause losses, affect people, property, and the environment. Targets for accidents that cause injuries to employees and contractors until work stoppage; safety, production, and transportation accidents must be zero. Risk control processes from hazard indications, risk assessments, risk control measures, and impact reduction are defined by setting work standards equivalent to international standards, creating a safety culture for employees and contractors through education and activities to raise awareness of safety. Engineering principles and tools following international standards are adopted to prevent serious accidents in manufacturing processes, together with safety assessment to find risk points, hazardous points, and corrective actions before an accident. Safety management systems such as production process safety, transportation safety are fundamental to the organization-wide and continuous improvement of operations.

Cybersecurity Risks

Cybersecurity threats are rapidly on the rise these days, with impacts seen in various forms, including data breach, ransomware, cyber extortion, image and reputation loss, and possibly disruption to business interruptions.

PTT continuously prioritizes cybersecurity as a corporate risk with close monitoring and outcome measurement, as well as plans to increase efficiency to reduce risk and impact levels on an ongoing basis. The plans include investment in technology, increasing process efficiency, as well as raising awareness of cyber threats to employees, such as enabling two-factor authentication (2-FA) for access to e-mail and in-house systems, educating and phishing test campaign to create awareness of cyber threats to employees. Vulnerability assessment and penetration tests are regularly performed to find and close loopholes, covering both Information Technology (IT) and Operation Technology (OT) at the same time.

PTT assigns PTT Digital Solutions Co., Ltd. to operate and provide cybersecurity services to PTT Group, with the Cyber Security Operation Center (CSOC) responsible for monitoring abnormalities from cyber attacks, providing PTT Group 24 hours a day service with high-technology monitoring tools such as machine learning, along with personnel with international certifications, and Security Incident Response, including coordination with the Thailand Computer System Security Coordination Center (ThaiCERT) and other international communities to exchange the latest information of the cybersecurity incidents.

Risks Arising from COVID-19

The spread of COVID-19 and relevant public-sector measures have shaken the petroleum and petrochemical industry. PTT Group has short- and-long-term business continuity management plans to maintain competitiveness and strength of PTT Group through PTT Group Vital Center with the following measures:

Performance Results and Financial Strength

- Strategic Moves: Built strategic partnerships within PTT Group, improved work efficiency, including monitoring results and expense reduction directions of each company to maintain the financial strength of PTT Group.
- Cash & Credit Securement: Focused on maintaining cash and liquidity for PTT Group through both short- and-long-term funding plans together with credit risk management and close follow-up of financial risk factors to ensure that PTT can keep the credit rating at the Investment Grade.

Supply Chain and Business Process

- Supply Chain Management: Collaborated within PTT Group in jointly operating petroleum and petrochemical businesses, aiming to develop and improve management processes throughout the supply chain for optimum efficiency and benefits.
- Customer Engagement: Improved communication formats with customers e.g. electronic meetings and communication via video conference and developing online video training programs.
- Workforce Protection: For business continuity management, PTT set up PTT Palungjai Center to manage the overall situation of PTT Group by formulating the Work from Home Policy for all employees as deemed appropriate and supporting the use of digital equipment for work efficiency.
- Cybersecurity: PTT commands a roaming security system designed to ensure safe work from employees' computers accessed from their residences or other work sites. The virtual private network (VPN) boasts a network with high protection and privacy; to access the network, computers must pass PTT's security standard and self-authentication each time. In addition, software for conference calls is graded standard or nonstandard.

Personnel Health and Safety

- PTT COVID-19 Monitoring and Surveillance Center (PTT Palungjai Center) manages personnel's physical and mental safety. Stringent preventive and control measures are in place for COVID-19 infection together with regular provision of news and information along with easy access to the hub, including the procurement of "Sinopharm", an alternative vaccine to build immunity for employees and their families by continuously monitoring the number of infected people and people at risk.

Financial Risks

Volatility of the Baht

Changes in the exchange rate between the Baht and the US dollar directly and indirectly affect the bulk of PTT's revenue because prices of natural gas, petroleum, and petrochemical products are tied to the world (USD-linked) market prices. In other words, PTT's revenue varies with the value of the Baht. Yet, changes in the Baht value also affect PTT's margin since the majority of its profits are fixed in the Baht currency, whereas costs are in the dollar denomination, which is tied to world market prices, as are prices.

Fluctuation of the Baht affects PTT's net book profit/loss because of PTT's and subsidiaries' outstanding foreign loans. Yen-denominated loans leverage participating swaps to convert loans into dollars to agree with dollar-denominated revenue. That way, PTT manages to counter most of the risks of yen fluctuation against the dollar.

To ease risks of Baht fluctuation, PTT balances its foreign currency loans with its foreign-currency revenue (that is, taking a natural hedge) while managing its foreign-currency deposits and purchasing forward foreign currencies for smart repayment and commercial transactions, including imported natural gas and crude oil, trading of domestic products in Baht but USD-linked in value, and appropriate product exports. PTT has also developed a finance policy as an efficient, uniform guideline for itself and PTT Group, which includes terms for various risk management practices which could affect PTT's financial position.

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Financial Support to Affiliated Companies

To promote relentless growth, PTT invests in new projects, grows its businesses, or adjusts its operations. Sometimes such investment is undertaken through new companies or linkups with strategic partners or through PTT Group companies, or all of these. Some of these companies may still be starting up projects or may not yet be financially strong, so shareholders and PTT still need to extend cost overrun support to allow them to operate under the strategies and business policies of PTT Group as a whole. Some may need cash support during commercial operations, which may result from force majeure or business down-cycles, thus calling for financial help from shareholders. Such financial help may be provided through sponsor support agreements, subordinated debt, equity, trade credit, shareholder loan, or a combination of these.

PTT will consider extending loans or commercial credit, or both, to individual affiliates in the hope that such a policy and action would foster sustainable strength for PTT and PTT Group. PTT subscribes to such policy and actions.

In extending such financial support to these affiliates via subordinated loans, commercial credit, or loans from the shareholders, PTT cannot guarantee that these companies will be able to repay such loans or credit, that they will not face financial woes again, or that they will not need financial support from PTT again. Any such possibilities could hurt PTT's performance and financial position. Besides, if PTT or any member of PTT Group becomes a default party under any agreement on shareholder support, some creditors may accelerate debt repayment. Therefore, PTT cannot guarantee that it will not raise its own shareholding or raise its shareholding to more than half or take over such a company if such action is considered more beneficial. If any of this should happen, the Thai financial reporting standards require PTT to consolidate the financial statements of the company in question with those of PTT, effective from the date of such control. In short, such consolidation could undermine PTT's overall financial position.

At any rate, PTT commands a process to screen and approve its investment together with close monitoring of PTT Group's performance through various committees, including the Investment Committee and the finance and accounting cooperation management committee. PTT Group Way of Conduct is cascaded to all in PTT Group to ensure uniform management under international standards and guidelines, timely risk management, and minimized impacts on PTT Group.

Securing of Funds

The businesses of PTT and PTT Group require massive pre-paid capital investment. Although PTT closely monitors and manages business risks, the actual investment capital required could deviate from project plans.

Thanks to PTT's and PTT Group's business conduct that focuses on fostering long-term growth and corporate governance, PTT plans to invest in prudent business growth with due regard for sources of capital, particularly capital structuring to duly maintain crucial financial ratios on a par with peer companies. Continuous monitoring of factors for investment capital sourcing has assured PTT that it can secure sufficient funds for future business expansion at a suitable cost of funds.

2.2.2 Investment Risks for Shareholders

Risks from the Major Shareholder's Management

As of December 31, 2021, the Ministry of Finance was PTT's major shareholder with 14,598,855,750 shares, or 51.11% of all issued and paid-up capital, which entitles it to vote at the AGM. Yet, most significant agenda items are required by PTT's Articles of Association to pass with three-quarters of the AGM votes, including amendments to the memorandum of association and the articles of association, capital increase or decrease, debenture issuance, company mergers, company liquidation, company sale or transfer (whole or partial), acquisition or transfer of other companies (public or private), engagement in, amendment, or termination of lease agreements for entire or partial company business, delegation of other parties to manage the business, mergers with other parties to share profits or losses, and voting to dismiss any director ahead of term completion. If an agenda item concerns a matter in which the ministry as a major shareholder has vested interests, including related transactions, acquisition or sale of assets from or to the ministry, the ministry cannot vote on such item. In addition, PTT has required independent directors to account for at least half the Board; it currently has 10 out of 15 on the Board, who must command expertise and useful experience to PTT and must engage in no conflicts of interest with PTT. It also appointed the Audit Committee (made up of three independent directors without vested interests in PTT) to monitor its business and look after shareholders' interests so that the business may proceed transparently in line with PTT's corporate governance code.

Risks of Uncertain Returns on Investment for Shareholders

PTT's share prices may rise or fall in a volatile fashion, subject to several factors beyond its control, including

- Prices of petroleum, petrochemicals, or other reference product prices
- Change in policies, regulations, requirements, or terms affecting the industry
- Economic situation, crisis, or abnormal situation, including COVID-19 and the oil price war.

These factors could depress share prices below what investors paid for or higher than their sold portions, or both, thus putting investors at risk from uncertain returns on investment.

Risks from Dividend Affordability below Investors' Expectation

PTT's affordability is subject to several factors, including capital budget and capital reserve for business growth, loan repayment, and cash flow from operating activities. If these factors affect PTT's affordability of the annual dividends or interim dividends, or both, it could risk payment of dividends at lower rates than investors' expectations. Yet, PTT's dividend policy is that at least 25% of net profit after deducting all reserves under the law and company regulations.

2.2.3 Risks Facing Investing in Foreign Securities (If the Issuer is a Foreign Company)

-None-

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3. Driving Business for Sustainability

Key Sustainability Performance

Environment

Absolute Greenhouse Gas Emission (Scope 1 and Scope 2) of PTT Group was at

33.15 million tons of CO_2 equivalent, in accordance with the target

Targets

- Reviewed **long-term greenhouse gas emission target (Scope 1 and 2 including national and international operations) to be 15% reduction within 2030** compares to greenhouse gas emission in 2020
- Set a target to **achieve carbon neutrality within 2040***
- **Net Zero GHG emission by 2050***

*Enabled by the supporting from the public sector

Social

Operated PTT Group's Giving Breath Project at over THB 1,896 million to support and mitigate impacts for communities and society from COVID-19 pandemic, as well as establishing screening units and field hospitals (End-to-End) to increase the capacity of patient treatment

Total Recordable Injury Rate (TRIR) for employees and contractors was at 0 and 0.038 respectively per 200,000 working hours, in accordance with the target

Product vehicle accident rate per 1,000,000 kilometers was at 0 per target, equalled by compares to 2020

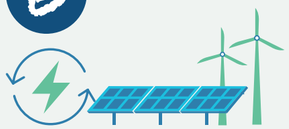
Proportion of public donation budget is at 27.32* of the social project budget

*In the case of included budget on support and mitigate impacts from COVID-19, the budget proportion is at 56.39

Human Capital Index (HCI) in accordance with the target **82 scores**

Zero Lost Time Accident (LTA) for both employees and contractors

Governance



Set a growth target for net profits from new energy businesses and beyond the energy industry will account for more than 30% of total profits by 2030 and enhance renewable energy production capacity by 12 gigawatts by 2030

No cases of legal, regulatory or protocol non-compliance with significant impact

94.26 scores

Participated in Integrity and Transparency Assessment (ITA), and was assessed at 94.26 scores ranking at level A

Awards & Recognition

Member of Dow Jones Sustainability Indices Powered by the S&P Global CSA
Sustainability Award Gold Class 2021 S&P Global
THSI Thailand Sustainability Investment 2021
SET Awards 2021
Honor Sustainability Excellence
LCSI

ESG Rating

MSCI ESG Ratings A
SUSTAINALYTICS RATED
- Moody's
- S&P

3.1 Sustainability Management Policy and Targets

According to significant sustainable issues collected internally and externally, and assessing impacts on the Company and stakeholders, PTT incorporated them for policies, goals, strategies, strategic direction and business plan throughout indicators for assessing executives and employees in order to drive business towards sustainable growth and providing shared value to all stakeholders as follows;

Sustainability Management Policy

READ MORE

The full PTT Sustainability Management Policy is available at www.pttplc.com under the section of Sustainability, Governance heading, and PTT Group's Sustainability Management System sub-heading.

PTT has announced the "PTT Sustainability Management Policy" signed by the President and Chief Executive Officer to demonstrate commitment in sustainability management fully integrated into business operations. The policy focuses on three dimensions, which are the environment, social, and governance. However, PTT annually reviews policy to ensure alignment with the changing corporate contexts and material issues. Following reviews in 2021, it appears that the current policy continues to thoroughly address material issues of 2021 as well as this policy has been approved by the Board of Directors.

Corporate Sustainability Management Targets

Sustainability management is considered as a part of PTT business operation strategic framework, by assurance, the PTT by PTT (Powering Thailand's Transformation by Partnership & Platform, Technology for All, Transparency & Sustainability), within the section of Transparency & Sustainability. PTT focuses on creating transparency and developing business to foster sustainability, promoting performance align with Sustainable Development Goals (SDGs). PTT places an emphasis on fairly responding to the needs and expectations of all stakeholder groups and has established "Sustainability Strategic Direction" in its "2021 - 2025 Master Plan on Sustainability Management, Social and Environmental Responsibility". It comprises three dimensions, of which indicators, short/ medium/ long term targets, as well as implementation strategies to drive for success, have been established. All are in alignment with the 20-Year National Plan and facilitate the following SDGs.

Environmental Strategic Direction: Sustainable Production and Consumption
- Develop towards low carbon society and environmentally friendly business operations
- Drive resource utilization based on the principle of circular economy

Social Strategic Direction: People's Well-Being
- Promote safe working environment and respecting human right principles
- Co-create values and enhance society and community's quality of living
- Enhance employee's readiness to facilitate future business growth

Governance Strategic Direction: Corporate Governance and Performance Excellence
- Operate with good governance and integrity
- Adapt readily to changes, accelerating business growth to drive the economy

Key Enables for Success: Promotion of Innovation and Technology | Supply Chain Management | Stakeholder Management

Additional information on performance in accordance with strategies, as well as managing key material issues in key performance table, page 130 - 131 and section of 3.3 Sustainability Material Issues Management

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Supporting the Sustainable Development Goals

In 2021, PTT reviewed priority ranking of sustainable development goals related to business operations to treat it as input for strategic direction and enterprise plan formulation. The review process comprises of three steps, as follows;

1. Surveying significant internal and external factors comprises vision and new strategic direction, corporate sustainability material topics, policies, sustainability strategic direction, operational plans, as well as trends and sustainability shifts at a global scale impacting businesses throughout the value chain, including stakeholders' needs and expectations.

2. Prioritization of ranking and responsiveness towards sustainable development targets, referencing international-scale handbook on sustainable development goals, such as **SDG Ambition Integration Guide, UN Global Compact's SDG Compass, Mapping the Oil and Gas Industry to the SDGs: An Atlas by International Petroleum Industry Environmental Conservation Association (IPIECA), SDG Sector Roadmaps by The World Business Council for Sustainable Development (WBCSD), and Accelerating Action: An SDG Roadmap for the Oil and Gas Sector by IPIECA in collaboration with WBCSD,** to name a few. References are also made with consideration on alignment to Thailand 20-year National Strategy (2018 - 2037) and the 12th National Economic and Social Development Plan (2017 - 2021) relevant to PTT's operations. Ranking of sustainable development goals were then conducted by categorizing into two categories, which are the ten goals to be Integrated into Core Business, and the other seven goals to be Collaborated with Other Stakeholders. Notably, goal 17 is one facilitating and supporting other goals to become fruitful.

3. Justify prioritization and management approach to relevant departments for development into consideration framework feeding into development of state enterprise plan, work plan, and projects supporting sustainability material topic, as well as engagement plans with stakeholders in tasked areas.

Support to Sustainable Development Goals

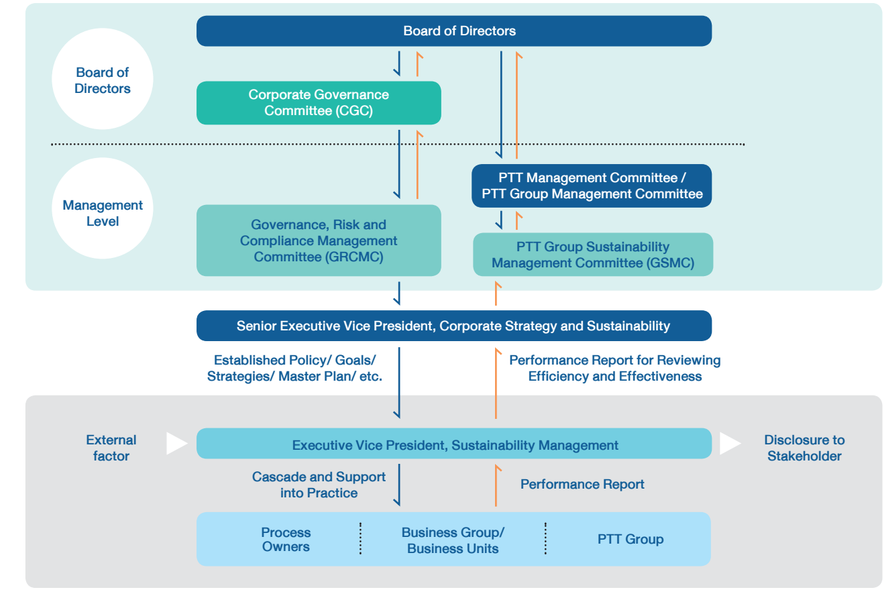
Integrated into Core Business
3, 6, 7, 8, 9, 12, 13, 14, 15, 16

Collaborate with Other Stakeholders
1, 2, 4, 5, 10, 11, 17

Details regarding support to all 17 sustainable development goals can be read in detail in relevant sustainable material issues

Sustainable Governance Structure

PTT clearly established governance structure to drive business towards sustainability for all levels, from Board of Directors, Management, Executives, and internal departments, to drive, support, monitor, and review overall sustainability management, achieving targets effectively and efficiently as illustrated.



- **Corporate Structure,** at the level of Executive Vice President, Sustainability Management, supervised by Senior Executive Vice President, Corporate Strategy and Sustainability that is directly responsible in sustainability management; tasked in stipulating policies, strategies, and driving various departments for relevant operations.
- **PTT Board of Directors and Management Committee** comprises
  - Governance, Risk and Compliance Management Committee (GRCMC) oversees the entire sustainability performance, finetuning the details prior to presenting for considerations of Corporate Governance Committee (CGC) afterwards.
  - PTT Group Sustainability Management Committee (GSMC) considers, drives and supports sustainable operations of the PTT Group.

In sustainability material topic management, each topic has a clear designated owner department. This includes governance by the Board, both at the management level and PTT Board of Directors, as detailed in sustainability material topic table page 140 - 143. In 2021, there was corporate re-structuring, shifting sustainability management department to be within the responsibility of Senior Executive Vice President, Corporate Strategy and Sustainability. The shift reflects PTT's determination to integrate sustainability in alignment with business operations, from strategic direction, enterprise plans/ business plans, as well as corporate risk management. The aim is to cascade the commitment to actions in business groups/ units and departments tangibly, enabling PTT to grow stably and sustainably, with competitive capacity and adaptivity, and to share values with stakeholders in the long-run.

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Key Performance

Sustainability Strategic Direction	Performance Target: Indicators		Performance Target: Short-term within 2021	Performance Target: Long-term	Performance against 2021 Targets	Performance Progress per 2021 Target	Support 20-Year National Strategy	Support SDGs: Integrated into Core Business	Support SDGs: Collaborate with Other Stakeholders	Link to page/ website
Environment: Sustainable Production and Consumption	Develop towards low carbon society and environmentally friendly business operations	Limit PTT Group's greenhouse gas emission, both scope 1 and scope 2	Not exceeding 35.5 million tonnes of CO_2 equivalent	• Reducing emission 15% by 2030 compares to 2020 greenhouse gas emission • Achieving Carbon Neutrality by 2050 and Net Zero emission by 2065[1]	33.15 million tonnes of CO_2 equivalent	On track	National Strategy 5: Fostering growth on eco-friendly quality of life	7.1, 7.2, 7.3, 13.1, 13.2, 13.3, 15.2, 17		Page 146 More information
	Drive resource utilization based on the principle of circular economy	Apply the principle of circular economy in the PTT Group's business operations to achieve the level of Circular Economy application desired, per the British Standards Institution: Framework for implementing the principles of the circular economy in organizations – Guide (BS 8001:2017)	Level 1.5	Level 3 within 2030	Level 2.24 - 4	On track	National Strategy 5: Fostering growth on eco-friendly quality of life	6.3, 6.4, 6.5, 6.6, 12.2, 12.5, 17		Page 154 More information
Social: People's Well-being	Promote safe working environment and respecting human right principles	Lost Time Accident (LTA) – Employees	0	0 within 2030	0	On track	National Strategy 4: Create opportunities and social equality	3.6, 8.5, 8.7, 8.8, 5.1, 5.2, 17		Page 160 More information
		Lost Time Accident (LTA) – Contractors	0	0 within 2030	0	On track				
		Total Recordable Occupational Illness Rate per 200,000 working hours – Employees	0.066	0 within 2030	0	On track				
		Total Recordable Occupational Illness Rate per 200,000 working hours – Contractors	0.080	0 within 2030	0.038	On track				
		Catastrophic Process Safety Incidents per API RP 754 – Tier 1	0	0 within 2030	1	Not achieved				
		Catastrophic Process Safety Incidents per API RP 754 – Tier 2	1	0 within 2030	0	On track				
		Human rights complaint	0	0 within 2030	0	On track				
	Co-create values and elevate society and community's quality of living	Social project's budget compares to net profit	1 - 3%	1 - 3% by 2025	2.25%[2]	On track	National Strategy 3: Develop and foster human capital National Strategy 4: Create opportunities and social equality	3.8, 3.b, 6.1, 1.1, 1.5, 7.1, 7.2, 8.3, 8.5, 8.6, 8.9, 2.3, 2.4, 9.5, 12.b, 4.1, 4.3, 4.4, 13.3, 14.2, 10.1, 10.2, 15.2, 11.6, 11.7, 11.a, 17		Page 172 More information
		Portion of public donation compares to overall social project's budget	Not exceeding 30% of the overall budget	Not exceeding 30% of the overall budget by 2025	27.32%[2]	On track				
		Assess social returns and social returns on investment compares to the financial budget	Achieve target or surpassing financial budget	Achieve target of surpassing financial budget by 2025	-	In progress				
	Enhance employees' readiness to facilitate future business growth	Human Capital Index (HCI)	No less than or equal to 78	No less than or equal to 80	82	On track	National Strategy 3: Develop and foster human capital	8.2, 8.5, 4.4, 5.1, 5.5		Page 167 More information
Governance: Corporate Governance and Performance Excellence	Operate with good governance and integrity	Legal, regulatory, or protocol non-compliance or recurrences	PTT: Zero case	PTT and the PTT Group: Zero cases by 2025	No cases of legal, regulatory or protocol non-compliance with significant impact	On track	National Strategy 6: Balancing and developing the public sector management system	16.5, 16.6, 16.10, 17		Page 182 More information
	Adapt readily to changes, accelerating business growth to drive the economy	Foster growth by increase portion of investment in energy business of the future and beyond	-	Net profits from new energy businesses and beyond the energy industry will account for more than 30% of total profits by 2030	-	In progress	National Strategy 2: Build competitive capacity	7.2, 8.1		Page 180 More information
		Increase renewable energy production capacity	-	12 Gigawatt by 2030	-	In progress				

1 The 2030 long-term target of greenhouse gas emission limit has been reviewed and revised in 2021, with a target set to achieve carbon neutrality and net zero GHG emission. Enabled by the supporting from the public sector, as approved by PTT Board of Directors

2 In case included budget on support and mitigate impacts from COVID-19, social project's budget compares to net profit is at 3.75%, and portion of public donation compares to overall social projects budget is at 56.39%

Remarks: Achieved; In progress; Not achieved; More details within this report; More details in website

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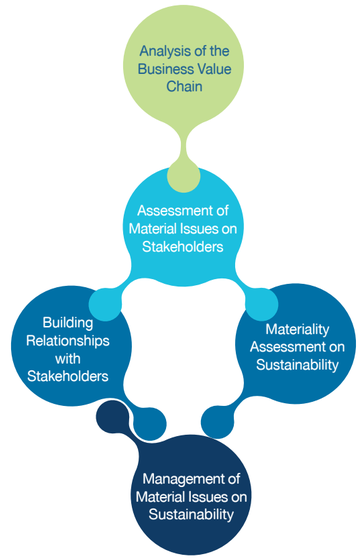
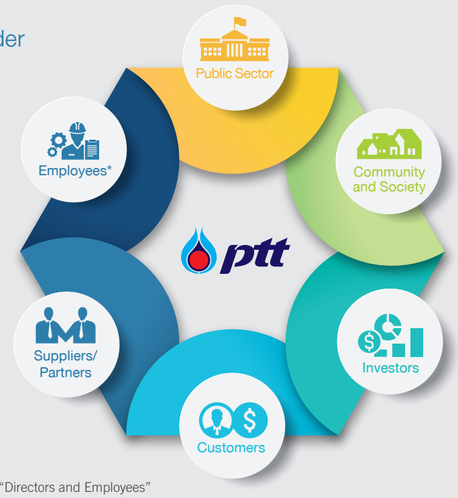
3.2 Analysis of Stakeholders within the Business Value Chain

Impact Management to Stakeholders in the Business Value Chain

PTT recognizes that business operations and activities, from past, present, to future, both from PTT and from stakeholders within the business value chain, may induce both positive and negative impacts on stakeholders. PTT has thus stipulated the approach to analyze and manage issues/ impacts with regard to stakeholders and sustainability, as follows.



PTT's six stakeholder groups



* In 2022, Employees change to "Directors and Employees"

Analysis of Business Value Chain

PTT analyzes the value chain of the three business groups and support functions, in total of thirteen business lines, This enables identification of PTT's internal and external stakeholders, thus bringing forth each stakeholder group's needs, expectations, and concerns in their entirety. The business functions utilize stakeholder groups and issues at the corporate level as a consideration guideline and business groups' issues. The process can be further read upon in details on PTT website. The 2021 analysis of each business line's value chain can be summarized as follows;

PTT Issues comprise nine issues, as follows;

Safety, Health & Environment
Safety, Occupational Health, and the Environment

Brand & Trust
The term 'Brand' refers to PTT's image and the stakeholders' perception towards PTT, or products and services; whereas the term 'Trust' refers to certainty, confidence, and belief

Customer Experience
Interactions between customers and PTT, inclusive to business relationship, as well as awareness-building, training, supports, purchasing and services.

Financial Performance
Finance-centric performance of operations

Energy Transition
Shifting towards new energy infrastructure

Compliance/ Transparency
Compliance refers to adherence to laws and regulations; while Transparency refers to clarity of corporate disclosure, whether positive or negative

Organization & Employee
Organizational and employee development

Climate Change
Climate change whether induced naturally or from human activity

Information Security & Data Privacy
Information Security refers to safeguarding of information; and Data Privacy refers to protection of data privacy with protection and practices in accordance with the laws

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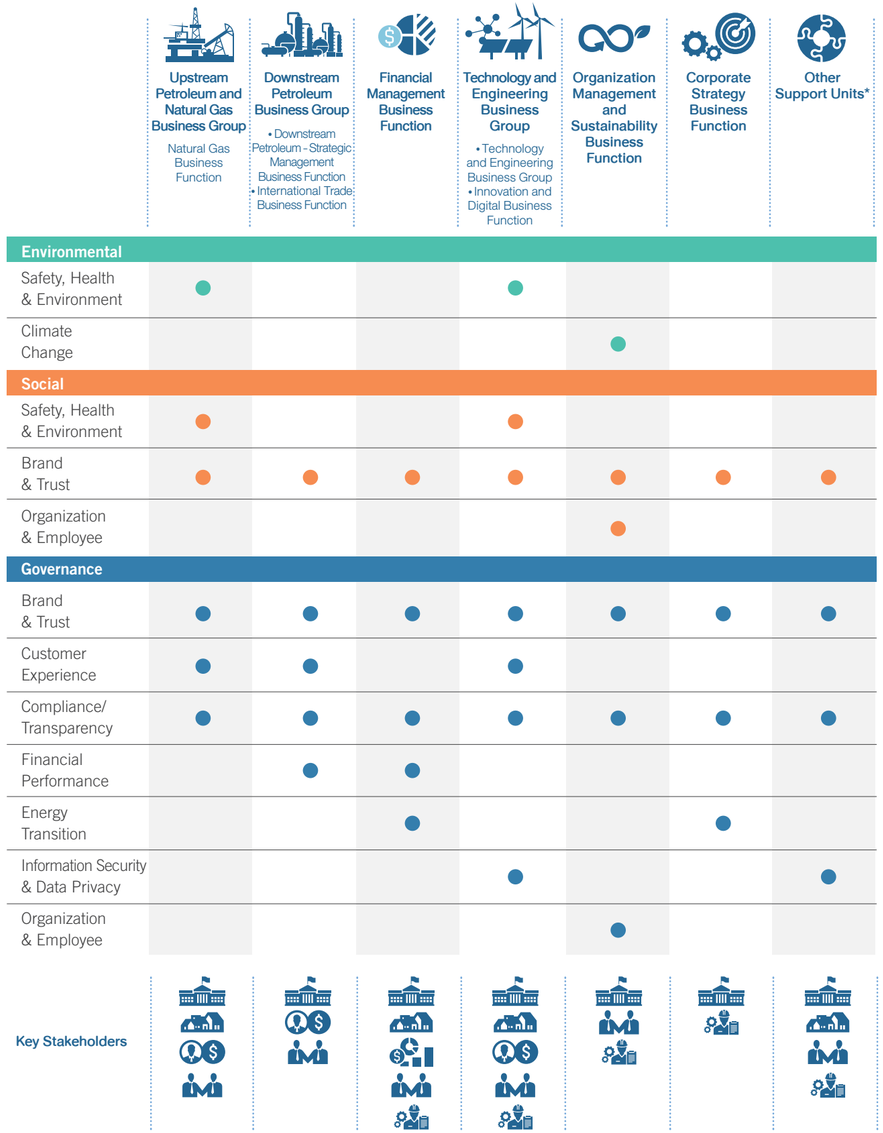


* Remark: Other support functions include Corporate Governance and Regulatory Affairs Function, Legal Office, and Internal Audit Office. Notably, PTT has adjusted the Group's organizational structure, effective from the October 1, 2021, to ensure alignment with PTT's new vision. Thus, 2022 stakeholder management will reflect the new organization structure, shifting from 13 business functions to 15.

Stakeholder Engagement

For stakeholder and respective issue analysis across 13 business lines' value chain, there is additional information brought out for further consideration, such as results of stakeholder survey, conducted at least once annually, analysis of practices, global trends and directions, business plans, and recommendations of Enterprise Risk Management Committee (ERMC) to ensure the identification of stakeholders' needs, expectations, and concerns, as well as support for sustainable development goals. In 2021, ERMC has suggested prioritizing needs and expectations in order to act on urgent issues. This led to the development of social enterprise action plans, including helping the community and society during the country's difficult situations. In addition, the committee has also recommended providing training on procurement regulations for employees to prevent unethical practices.

Upon identification of stakeholders and issues relevant to business lines, each business line would develop stakeholder engagement plans, stipulate objectives, scope, stakeholders, issues, clear indicators, and report stakeholder engagement progress to the executive on a quarterly basis. This allows reviews and recommendations to be implemented for further business function-level improvement. There is also an overview summary of stakeholder engagement progress in corporate concerned issues presented to the Corporate Plan and Risk Management Committee (CPRC), as well as the Enterprise Risk Management Committee (ERMC) on a quarterly basis. In 2021, details on stakeholder engagement results are as follows:

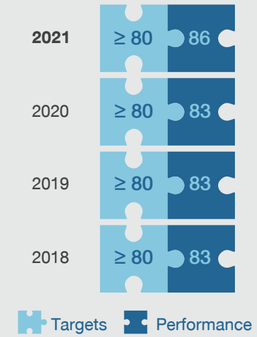
Key issues monitored at corporate level, comprises

1) Safety Health & Environment
2) Brand & Trust
3) Customer Experience

In 2021, the ERMC made crucial recommendations, as follows;

- Collaborated with every sector to resolve various crises within the country, to demonstrate PTT's commitment to contribute to society across all dimensions, aiding Thailand to deftly overcome challenges.
- Considered entry points to Gen Y & Gen Z groups through modern social media such as video clips from Thailand's Ministry of Education, and dissemination through community activities.

Stakeholder Engagement Score



The achievement of stakeholder management is determined by s takeholder engagement score. The target score in excellence level is greater than or equal to 80. The average score from 2018 to 2021 was at 84, which is above the target. This reflects that, overall, PTT has been remarkably and continuously responsive to stakeholders.

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Stakeholder Engagement Results

	Public Sector	Community and Society	Investors	Customers	Suppliers and Partners	Employees
Stakeholder Engagement Channels	• Monthly consultation meetings with the public sector • Quarterly update meetings with the public sector • Information disclosure via PTT website and other online media	• Community visits to engage with communities • Public hearing for communities per work plans • Online media such as PTT Group, PTT News/ We love PTT/ GODJI, @pttplc_official, godji_pttgroup • 1365 Contact Center • PTT website or e-mail: pttvoice@pttplc.com • Organized social project to foster good quality of life for those affected by COVID-19	• Online meetings • PTT Group's operation site visits • Annual general meeting of shareholders • Opportunity Day • Digital Roadshow	• Online meetings • meeting with customer to raise awareness and understanding of business conduct • PTT NGV Station Application • 1365 Contact Center • Online media such as LINE: PTT Natural Gas and PTT NGR Website: Customer Service Center	• Annual Supplier seminar • Grievance on corruption-related issues communicated via e-mail addresses: grchelpdesk@pttplc.com or pttvoice@pttplc.com	• Monthly Relation Affairs Committee meetings • Joint social activities between executives and employees • Online seminar of Business functions
Stakeholders' Needs/ Expectations	**Compliance/ Transparency** • Energy security and national policies support • Adequate and timely information disclosure • Thoroughly and clearly issues explanation • Promoted fair competition and free trade **Safety Health & Environment** • Controlled and complied according to safety standards • Environmentally friendly business operation and pollution reduction **Climate Change** • Collaborated and demonstrated leadership in greenhouse gas emission management	**Brand & Trust** • Develop the society and the environment, building good quality of life • Promote and contribute to solving the country's economic issues **Safety Health & Environment** • Human and property security • Explained and resolved community's issues promptly	**Financial Performance** • Appropriate investment plan and enabling growth in the future • Good performance **Energy Transition** • Performance reflecting changes in the future energy business	**Customer Experience** • Received quality products and services • Convenient and prompt work system	**Brand & Trust** • Co-developed business operation capacity in the long run **Compliance/ Transparency** • Adhered to laws and regulations stipulated	**Organization & Employee** • Career security and career progression, as well as fair welfare and remuneration. • Telent retention meets business needs and targets • Communicated openly and transparently **Information Security & Data Privacy** • Security in data storage and usage • Accurate understanding and compliance of Personal Data Protection Act (PDPA)
Highlight Performance	**Compliance/ Transparency** • Conducted meetings/discussions with the public sector for receiving practical/ useful suggestion and feedback of projects • Managed information and deliver to the governing public sector upon request immediately, such as segregation of data and disclosure **Safety Health & Environment** • Organized a public hearing for receiving opinions from governmental agencies related to PTT projects, and utilize suggestions for operation development • Corporated with governmental agencies and community leaders to open for community concerns and suggestion and fairly follow up on solutions **Climate Change** • Participated in development of assessment and certification of greenhouse gas storage/ reduction volume from forest and green space-related • Supported technical information, innovation, tools, and technology to ensure the public sector has sufficient information to develop the assessment effectiveness • Promoted the environmental and community development continuously through relevant projects	**Brand & Trust** • Supported "Restart Thailand" campaign, to support communities and new graduates at 25,000 vacancies through workforce employment, emphasizing on job opportunities, income generations, and vocational skills enforcement in all regions • Conducted innovation project called "Smart Farming Smart Marketing", by applying society networks, knowledge, innovation and technology to foster farmers into Smart Farmers; including elevating community products nation-wide to be standardized and meet international standards • Communicated to foster understanding and managed issues that stakeholders were interested in through social media channels, such as PTT News, PTT Group Line • Conducted the "Giving Breath Project" by providing medical equipment, setting up field hospitals, and proactively disseminating mobile vaccination units, as well as setting up screening units and one-stop service field hospitals with free of charge **Safety Health & Environment** • Site-visit to raise community's understanding of safety measures implemented in PTT operations • Met/ Discussed with community leaders to monitor grievance systematically, promptly, and fairly, as well as acknowledge opinions and boost community's confidence through crisis-readiness preparation measures • Communicated information and construction plans to communities prior to construction commencement, and get recommendations and concerns	**Financial Performance** • Communicated PTT strategy to build investor's confidence via annual general meeting and various online channels **Energy Transition** • Communicated directions and performance of PTT's new energy development efforts	**Customer Experience** • Elevated customer care by identifying business weak points in operations to continuously identify area for improvement • Visited and communicated to customers, as well as organized online trainings upon their requests • Provided medical masks and alcohol gel to customers during COVID-19 pandemic	**Brand & Trust** • Communicated performance 1) Investment plans that support future growth 2) Maintained performance despite the slowdown economy and the COVID-19 pandemic 3) Managed collaboration within the Group's company through supply chain management **Compliance/ Transparency** • Communicated transparency in procurement in the annual supplier seminar • Developed PTT Vendor Management consistently	**Organization & Employee** • Reviewed employees' skills, knowledge, and capability in alignment with the new businesses. • Enhanced human capital management/ communication skills, as well as building opportunities and expanded communication channels **Information Security & Data Privacy** • Provided information and raised awareness to employees regarding cyber threats • Educated employees regarding compliance to Acts, such as Personal Data Protection Act, and ensure information is managed in accordance with laws

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Materiality Assessment

PTT stipulated materiality assessment process in accordance with the Global Reporting Initiative (GRI) Standards' Sustainability Reporting Guidelines and International Integrated Reporting Council's (IIRC) framework to identify environmental, social, and governance issues that have significant impact towards the organization's value creation, through business operations throughout the value chain, as well as impact towards the stakeholders' needs, expectations, and decision-making. The materiality assessment process is conducted annually from identifying, assessing key sustainability issues, and reporting to the Board of Directors for endorsement. Details of each step are as follows:

Identification of Material Issues for the Organization

The issues are identified with consideration to factors relevant to corporate context and strategy including sustainability standards, requirements, guidelines, global risks & trends, and peers' material issues. Furthermore, other factors taken into account consist of stakeholder needs, expectations, and concerns pertaining to the value chain analysis of the 13 business functions and annual corporate stakeholder survey of 6 key stakeholders.

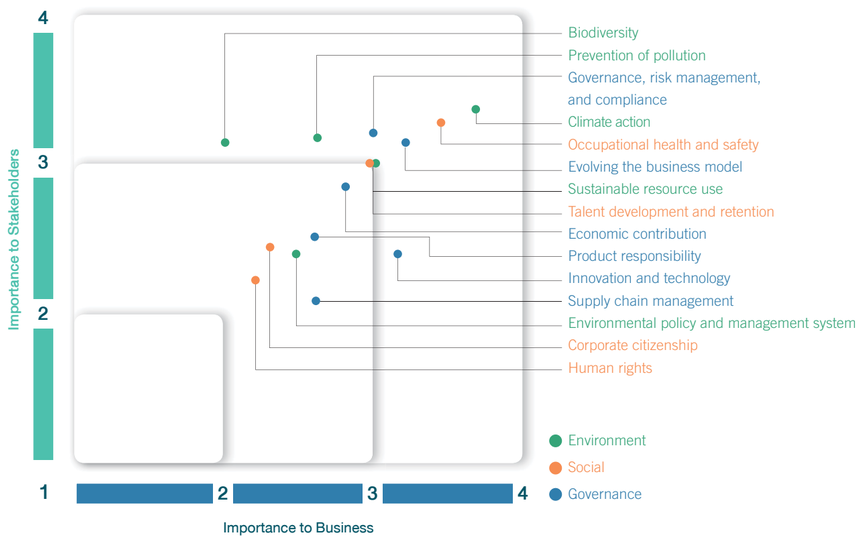
Prioritization

The prioritization criteria of the material issues are based on the two factors: significance to PTT's operation towards value creation and significance to the stakeholders. This assessment encompasses finance, business and operations, corporate reputation and impacts to customers, suppliers, and employees. The materiality assessment results in 2021 are depicted in the table.

Verification and Assurance

PTT reviewed materiality assessment results in conjunction with the relevant departments and reported the results to the management committees, namely the Governance, Risk and Compliance Management Committee (GRCMC) and the Corporate Governance Committee (CGC). In addition, external independent assurer has been engaged to verify the assessment processes and stakeholder engagement with emphasis on completeness, accuracy, credibility, and transparency. PTT considers continually implementing processes for improvements and disclosures in respect to observations and recommendations from external parties including systematic improvement on performance monitoring in alignment with stakeholders' need and clearer disclosure of performance in response to the Sustainable Development Goals (SDGs) etc.

Materiality Assessment Results



The 2021 materiality assessment discovered a shift in key issues from the previous year in addition to a total of 15 issues, whereby six issues are high priority, which are;

1) **Climate action:** The issue remains an urgent agenda critically important to all sectors in an endeavor to fulfill greenhouse gas emissions reduction goals on a global scale and determine strategic direction. This approach reflects PTT's commitment to business model transformation during the transitional shift towards future energy-oriented businesses and ventures beyond energy.
2) **Occupational health and safety:** The COVID-19 pandemic situation and ensuing manifestation towards daily life in addition to the natural gas pipeline leak towards the end of 2020 have driven this issue to high priority.
3) **Evolving the business model:** Aligned with PTT's novel business vision lie increasing challenges and opportunities in the pursuit of commercial growth beyond energy and energy security backed investments purposed as a hedge for potential changes and entailing impact.
4) **Governance, risk management, and compliance:** This issue has ranked higher due to PTT's increasing focus on risk management, strict compliance with laws and regulations during the ongoing crisis and the maintenance of proper corporate governance.
5) **Sustainable resource use:** The application of circular economy concepts in accordance with relevant international standards is implemented in a more systematic approach.
6) **Talent development and retention:** This matter has been elevated to high priority as a measure to augment skills and manpower in accordance with business operation directions according to new organizational vision.

PTT manages sustainability material issues through five mechanisms or approaches to ensure that all issues are considered in strategic planning and systematic management.

Mechanisms and Approaches	Key Performances in 2021
1 Integration of strategic direction determination and corporate planning	Climate change dependent risks and opportunities are among new input factors influencing determination of long-term organizational goals for 2030 in addition to strategic directions formulation and the 2022 - 2026 Enterprise Plan.
2 Integration of Sustainability Management Master Plan to reflect PTT's social and environmental responsibility for 2021 - 2025	Material issues including climate action, sustainable resource use, corporate citizenship, human rights, occupational health and safety, talent development and retention, corporate governance, risk management, and compliance have been included in the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025"
3 Corporate risk management integration	Material issues are input factors regarding process risk identification, assessment and formulation within the 2022 Corporate Risk Management Plan.
4 Management by respective departments according to the organizational structure	All material issues have appointed corresponding units responsible for determining management approaches as well as key performance indicators for corporate or functional level.
5 Determination of performance indicators according to SE-AM KPI and Corporate KPI	Goals and plans for managing various material issues have been classified as SE-AM KPI indicators, which are part of PTT's President and Chief Executive Officer performance indicators, as well as Corporate KPIs, which measure executive performance including the Senior Executive Vice President level and Functional KPI deployed towards the relevant function.

Further details on management of each issue can be found in the 56-1 One Report and on the PTT website under the sustainability section.

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Climate Action

- Climate change adaptation
- Climate change mitigation
- Energy efficiency
- Energy mix

SDG 7: 7.1, 7.2 | SDG 13: 13.1, 13.2, 13.3 | SDG 15: 15.2 | SDG 17: 17

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Supervisory Board
Management Level
- Governance, Risk and Compliance Management Committee (GRCMC)
- PTT Group Sustainability Management Committee
- PTT Management Committee

Board Level
- Corporate Governance Committee (CGC)

Sustainable Resource Use

- Water conservation, consumption, and accessibility
- Efficient use of raw materials
- Circular economy

SDG 6: 6.3, 6.4, 6.5, 6.6 | SDG 12: 12.2, 12.5 | SDG 17: 17

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Prevention of Pollution

- Waste management
- Toxic and hazardous chemicals utilization and disposal
- Waste water and effluent
- Air pollution
- Oil and chemical spills
- Other pollutants inclusive of light pollution, vibration magnetic interference, radiation, etc.

SDG 12: 12.2, 12.4, 12.5 | SDG 14: 14.1

More information

Environmental Policy and Management System

- Environmental management: commitments, policies, and practices
- Revision, verification, certification, and performance appraisal
- Environmental impact management from business activities and project operations

SDG 15: 15.2

More information

Biodiversity

- Biodiversity protection
- Ecosystem restoration
- Sustainable land and natural resource use
- Environmentally conscious development of urban and rural areas

SDG 3: 3.8 | SDG 6: 6.1 | SDG 9: 9.5 | SDG 12: 12.2, 12.4, 12.5 | SDG 14: 14.2 | SDG 15: 15.2

More information

Occupational Health and Safety

- Occupational health and safety, work environment management issues causing injury/ illness to employees and workers
- Process safety management
- Travel/ land and sea transport safety management
- Community safety management
- Emergency, crisis and business continuity management effectively to prevent adverse effects toward business, society, community and the environment

SDG 3: 3.6 | SDG 8: 8.8

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Supervisory Board
Management Level
- Governance, Risk and Compliance Management Committee (GRCMC)
- PTT Group Sustainability Management Committee
- PTT Management Committee

Board Level
- Corporate Governance Committee (CGC)

Talent Development and Retention

- Employment
- Working conditions maintenance and social protection
- Negotiation between government representatives, employers, and employees
- Employee development and on-site training
- Employee engagement management
- Motivation and talent retention
- Performance appraisal and career management

SDG 3: 3.8 | SDG 4: 4.4 | SDG 5: 5.1, 5.5 | SDG 8: 8.2, 8.5

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Supervisory Board
Management Level
- Human Resources Management Committee
- Human Resources Management Committee of PTT Public Company Limited
- Structural, Work Costs and Manpower Committee
- Employee Potential and Scholarship Management Committee
- Human Resources Collaboration Executive Committee

Board Level
- PTT Board of Directors

Corporate Citizenship

- Relationship fostering and engagement with the society and community
- Conservation/ promotion of culture and education
- Employment and skill development
- Developing and supporting community access to technology
- Assistance and support for health promotion and public health campaigns
- Community living condition improvement oriented social investments

SDG 1: 1.1, 1.5 | SDG 2: 2.3, 2.4 | SDG 3: 3.8, 3.b | SDG 4: 4.1, 4.3, 4.4 | SDG 6: 6.1 | SDG 7: 7.1, 7.2 | SDG 8: 8.3, 8.5, 8.6, 8.9 | SDG 9: 9.5 | SDG 10: 10.1, 10.2 | SDG 11: 11.6, 11.7, 11.a | SDG 12: 12.b | SDG 13: 13.3 | SDG 14: 14.2 | SDG 15: 15.2 | SDG 17: 17

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Supervisory Board
Management Level
- Governance, Risk and Compliance Management Committee (GRCMC)
- PTT Group Sustainability Management Committee
- PTT Management Committee

Board Level
- Corporate Governance Committee (CGC)

Human Rights

- Human rights due diligence to identify, prevent and proceed upon human rights impacts
- Avoidance of complicity
- Resolving grienances
- Discrimination and vulnerable groups
- Maintaining and protecting civil and political rights
- Maintaining and protecting economic, social, and cultural rights
- Implementation and treatment on fundamental principles and workplace rights

SDG 5: 5.1, 5.2 | SDG 8: 8.5, 8.7, 8.8

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Remarks:
More details within this report | More details in website

Scope of Impacy: Internal — PTT and PTT Group Employees; External — Public Sector, Society and Community, Investors, Customers, Suppliers and Partners

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Evolving the Business Model

- Determination of business operations direction in response to future changes including energy consumption patterns, climate change, etc.
- Business development to enable competitive advantage.
- Eliciting business opportunities from global changing trends

SDG 7.2, 8.1

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More information

Supervisory Board
Management Level
- Enterprise Plan and Risk Management Committee
- Downstream Petroleum Group Strategic Planning Committee
- Investment Management Committee
- PTT Group International Business Development Executive Committee
- PTT Management Committee

Board Level
- Corporate Risk Management Committee

Governance, Risk Management, and Compliance

- Process management and governance structures
- Fair competition
- Anti-corruption and transparency
- Risk management
- Compliance with applicable laws, regulations and relevant constraints
- Participation in legislating government regulations and policies

SDG 16.5, 16.6, 16.10, 17

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Supervisory Board
Management Level
- Governance, Risk and Compliance Management Committee (GRCMC)
- Enterprise Plan and Risk Management Committee
- PTT Group Corporate Governance Committee (CGC)

Board Level
- Enterprise Risk Management Committee (ERMC)
- Corporate Governance Committee (CGC)

Economic Contribution

- Shareholder treatment
- Outstanding business performance and investment plans

SDG 8.1

More information

Supervisory Board
Management Level
- PTT Management Commitee

Board Level
- PTT Board of Directors

Innovation and Technology

- Innovation development processes and extension to business development management
- Promoting innovation and technology application in production, products and services
- Digital technology application to transform intraorganizational business processes and activities
- Cybersecurity breach

SDG 9.4, 9.5

More information

Supervisory Board
Management Level
- PTT Research and Innovation Screening Committee
- PTT Innovation Management Committee
- PTT Group Technology Committee
- PTT Group Digital Committee
- PTT Management Committee

Board Level
- Enterprise Risk Management Committee (ERMC)

Product Responsibility

- Fair marketing, truthful and nondeviant information dissemination and compliance with fair agreements
- Consumer health and safety protection
- Consumer complaints and disputes service, support and settlement
- Consumer data and privacy protection
- Education and awareness raising
- Responsibility towards impact and risk management from products or services delivered to customers
- Meeting customer demands

SDG 12.6

More information

Supervisory Board
Management Level
- PTT Customer Excellence Committee

Supply Chain Management

- Supply chain stability management
- Managing sustainability risks arising from supplier procurement processes and operations
- Engaging and creating value with suppliers and contractors within the value chain
- Procurement according to government policy and green procurement

SDG 12.7, 16.5

More information

Supervisory Board
Management Level
- Procurement Strategic Alignment Committee
- Approved Vendor List Committee
- Procurement Supervisory Committee

Remarks:
More details within this report
More details in website

Scope of Impacy
Internal: PTT and PTT Group Employees
External: Public Sector, Society and Community, Investors, Customers, Suppliers and Partners

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Sustainable Value Creation

Input

Financial Capital

- 28,562,996,250 shares of issued and paid-in capital
- THB 1,615,665 million in revenue from products and services in 2020
- THB 225,672 million from EBITDA (Earnings Before Interest/ Tax/ Depreciation) in 2020

Manufactured Capital

- Production and research facilities
- Infrastructure such as natural gas pipelines and petroleum terminals, etc.
- Six Gas Separation Plants with a total production capacity of 2,870 million cubic feet per day (In 2020, Natural gas separation capacity of Gas Separation Plants is 2,850 million cubic feet per day according to the natural gas quality from the Gulf of Thailand (Carbon dioxide ratio))
- Natural gas pipeline network spanning approximately 4,830 kilometers

Intellectual Capital

- Intellectual properties
- Licensed technology, innovation, and other initiatives
- Research funding of THB 644 million

Human Capital

- 3,551 PTT employees
- Skills and experiences of our people, suppliers, and partners
- Average training for executives and employees: 37.13 hours
- Average training cost for executives and employees: THB 13,485 per person
- 38.50% of female executives and employees out of total employees

Social Capital

- Relationship between PTT and our stakeholders
- Brand and reputation
- Investment in social development: THB 1,271 million
- Stakeholder engagement

Nature Capital

- Renewable and non-renewable natural resources
- Investment in natural capital: THB 459 million

PTT Business Operations

Environmental Strategic Direction: Sustainable Production and Consumption

Social Strategic Direction: People's Well-being

Governance Strategic Direction: Corporate Governance and Performance Excellence

Upstream Petroleum and Natural Gas Business Group

Downstream Petroleum Business Group

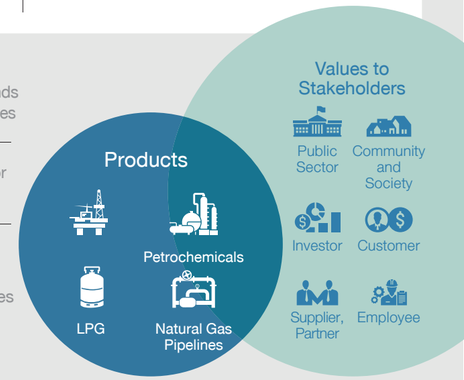
New Business and Infrastructure

Business Support Functions

Global Trends and Changes

Enablers for Success

Emerging Risk and Opportunities



Value Creation

- Sales and service income: THB 2,258,818 million
- EBITDA: THB 427,956 million
- Net debt to EBITDA: 1.37 times
- Earnings per share: THB 3.79 per share
- Annual dividend payment: THB 57,125 million
- Income tax payment considered as government administration or national development: THB 46,391 million

- Production and research facilities — ALL
- Infrastructure such as natural gas pipelines and petroleum terminals — ALL
- Six Gas Separation Plants with a total production capacity of 2,870 million cubic feet per day (In 2021, Natural gas separation capacity of Gas Separation Plants is 2,740 million cubic feet per day according to the natural gas quality from the Gulf of Thailand (Carbon dioxide ratio)) — ALL
- Natural gas pipeline network spanning approximately 4,830 kilometers — ALL

- Developed 15 new products and registered 27 patents and petty patents
- Direct and indirect revenue from research and development: THB 542 million

- Human capital return on investment: 240 times
- 80% employee engagement score
- Employee turnover rates: Male employee: 0.37 Female employee: 0.45
- 100% succession rate

- 100% engagement with communities in operational areas
- Stakeholder engagement score at 86 — ALL
- No community conflicts

- Direct greenhouse gas emission (Scope 1) at 11.37 million tonnes of CO_2 equivalent — ALL
- Indirect greenhouse gas emission (Scope 2) 0.28 million tonnes of CO_2 equivalent — ALL
- 6.32% of recycled and reused water against total volume of PTT's freshwater withdrawal
- One million Rai of reforestation project in honor of His Majesty King Bhumibol Adulyadej to offset an average of 2.14 million tCO_2e per year, valued over THB 280 million per annum

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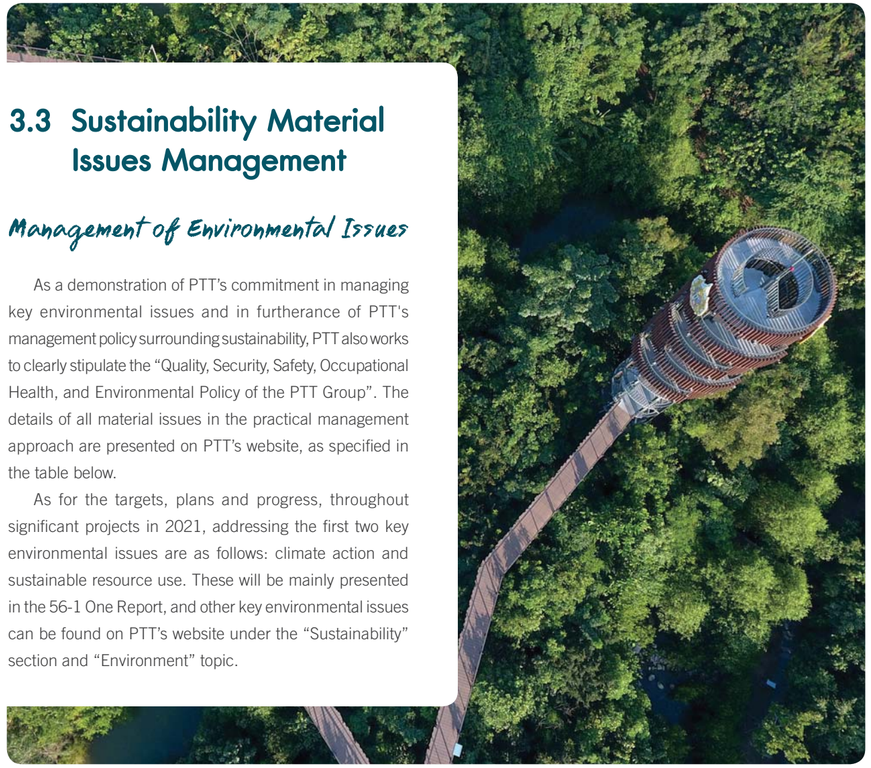

3.3 Sustainability Material Issues Management

Management of Environmental Issues

As a demonstration of PTT's commitment in managing key environmental issues and in furtherance of PTT's management policy surrounding sustainability, PTT also works to clearly stipulate the "Quality, Security, Safety, Occupational Health, and Environmental Policy of the PTT Group". The details of all material issues in the practical management approach are presented on PTT's website, as specified in the table below.

As for the targets, plans and progress, throughout significant projects in 2021, addressing the first two key environmental issues are as follows: climate action and sustainable resource use. These will be mainly presented in the 56-1 One Report, and other key environmental issues can be found on PTT's website under the "Sustainability" section and "Environment" topic.

Climate Action

7.1 7.2 7.3 13.1 13.2 13.3 15.2 17

Opportunities and Challenges

From the Intergovernmental Panel on Climate Change's Report, "The Physical Science Basis", it can be seen that efforts to limit greenhouse gas emissions have been insufficient to meet the target goals under the Paris Agreement. All sectors are thus joining hands to raise the greenhouse gas emission reduction targets that are more challenging than ever. This includes specifying carbon neutrality targets and the target to set net greenhouse gas emission levels to zero, both at the national level and organizational level, to collectively control the rise in global temperatures. Thailand, as a signatory to the United Nations Framework Convention on Climate Change, has expressed its stance of full commitment to elevate the level of its efforts in resolving climate change. It announced that it will aim to reach carbon neutrality by 2050 and achieve a net zero in greenhouse gas emissions by 2065.

Issue Management

Performance Targets			Performance against Short-term Targets
Indicators	Short-term within 2021	Long-term	
Direct and indirect control over the level of greenhouse gas emissions of PTT and the PTT Group • Performance indicators according to the State Enterprise Assessment Model (SE-AM KPI) and Corporate KPI* • Relevant Functional KPI (Functional KPI) • Strategic environmental indicators for PTT's "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025". • QSHE target indicators in 2021 ** SE-AM KPI and Corporate KPI measure performance in the form of Eco-Efficiency which calculates the volume of greenhouse gas emissions and product units specific to PTT.*	The PTT Group: Not exceeding 35.5 million tonnes of CO_2 equivalent.	The Group: Reduce 15% within 2030 compared to the greenhouse gas emissions in 2020. Limit in form of Carbon Emission Budget in 2022 - 2026: - For PTT to not exceed 59.13 million tonnes of CO_2 equivalent - For PTT Group to not exceed 234.45 million tonnes of CO_2 equivalent.	33.15 million tonnes of CO_2 equivalent.

Key Action

- Revise the PTT Group's long-term greenhouse gas emission targets
- Increase the efficiency in the manufacturing process, and the energy conservation projects
- Install systems to generate electricity from solar in the areas of PTT's operation
- Research and study the Carbon Capture and Storage (CCS) technology and study the feasibility in applying carbon dioxide for commercial benefit at PTT's Rayong Gas Separation Plant and Innovation Institute.
- Compensation of greenhouse gas emissions within PTT's Group from the reforestation areas of PTT and to introduce one million Rai of land area for the Low Emission Support Scheme (LESS).
- Advance the processes to compensate greenhouse gas emissions within PTT's Group and financial mechanisms

Value Creation to Stakeholders

PTT remains committed to conservation of forests through PTT's Eco-forest Rayong Wanarom Project. Greenhouse gases are expected to reduce in volume by 1,083 tonnes of CO_2 equivalent per annum. In 2021, one project in the Thailand Voluntary Emission Reduction Program was registered. Namely, project to generate electricity from solar for the smart shuttle bus stops and the security building at the Wangchan Valley Smart City. Greenhouse gases are expected to reduce in volume by 39 tonnes of CO_2 equivalent per annum.

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Key Performance

Reviews of Greenhouse Gas Emission Reduction Targets and Alignment with Domestic and Global Directions and Targets

Climate change management is a material issue that introduces significant opportunities and challenges to PTT's sustainable business operations for the future. Thus, it is incorporated as one of the key inputs for situational analysis and evaluation in determining the strategic direction, long-term targets as well as appropriate corporate plans. In 2021, greenhouse gas emissions reduction targets by 2030 was thus reviewed, including the carbon neutrality and 'net zero' greenhouse gas emissions targets, to ensure alignment with Thailand's direction and goal to move towards a low-carbon society. Further, it aligns with the new organizational vision, which are as follows;

- Specifying a Clean Growth target to reduce the PTT Group's greenhouse gas emissions (scope 1 and scope 2 including operation in domestic and international) in 2030, as a 15% reduction compared to the 2020 levels of greenhouse gas emissions.
- Adjusting PTT's targets and disseminating the targets to the companies in PTT's Group, to have further clarity, and in the form of the PTT Group Carbon Emission Budget to limit greenhouse gas emissions, directly and indirectly, in 2022 - 2026 for PTT and PTT's Group to not exceed 59.13 million tonnes of CO_2 equivalent and 234.45 million tonnes of CO_2 equivalent, respectively.
- Demonstrating the intention in the announcement for PTT's plans to reach carbon neutrality by 2040, and aim for a 'net zero' in PTT's greenhouse gas emissions by 2050, as well as, carbon neutrality target by 2050 for PTT's Group and a 'net zero' in the PTT Group's greenhouse gas emissions within 2060, made possible enabled by the supporting from the public sector.
- Adjusting the strategy, long-term strategic targets for 2030, as well as the 2022 - 2026 Enterprise Plan, by specifying the shift in the business model to the country's target industries, which includes investing in the future of energy, such as renewable energy, energy storage systems, and electric vehicles. Besides, PTT also invests in businesses beyond energy, such as life sciences consisting of medicine, food and nutrition, medical supplies and others, logistics and infrastructure businesses, artificial intelligence and robotics businesses, and digital technology businesses, In addition, the petrochemical businesses will expand to high-value products with advanced technology. The oil business will be transformed into a mobility and lifestyle model. On the other hand, environmentally polluted businesses will be diluted such as coal, which is clearly specified in the long-term targets and corporate plans. These can be found in item 1.1.1, page 40, for further reading.
- Integrating the climate scenario to correspond to the business scenario, which can be separated into Cloud, Clean, and Clear Scenario so that it could be incorporated into the strategic plan, and assess the related financial impacts through the financial estimates and financial planning, pursuant to the approach of the Task Force on Climate-related Financial Disclosures.

As for managing the greenhouse gas emissions in the supply chain, which mainly comes from incinerating products used by PTT's customers, throughout the years, PTT has continuously been collecting and following up with the data, and according to our mission to remain the steward of the country's energy security as a state enterprise, careful considerations were thus made of the approach to limit and reduce, so as to not significantly affect the stakeholders in all sectors. In any case, because of PTT and the Group's efforts to specify the target to reach carbon neutrality and a 'net zero' in greenhouse gas emissions, including the strategic directions that align with national policies to promote the use of electric vehicles and increase the proportion of renewables in generating electricity, the impact will be a swift and tangible reduction of greenhouse gas emissions throughout the value chain.

Scope of Operations and Mechanisms to Achieve Targets

Various supporting factors and mechanisms to reach the aforementioned targets are as follows;

- Greenhouse gas emission targets have been specified as key performance indicators in the State Enterprise Assessment Model (SE-AM) and corporate KPI which has cascaded to relevant functional KPIs. The progress in performance under the enterprise plan, strategy and KPIs will be reported to the committee per the overseeing structures, both at the management level and as may be specified by the PTT's Board of Director.
- The challenge in managing risks of climate change is one of the risks at a corporate level that requires measures,control plans to reduce consequences, and mitigation plans, as well as the leading/ lagging key risk indicators, where quarterly reports on the progress will be made to the Enterprise Risk Management Committee.
- Lay out the "3P Operating Guideline" to serve as the framework operational approach for PTT and PTT's Group, to ensure alignment and complimentary direction, which includes:

Conducting activities to reduce greenhouse gas emissions in line with Clean Growth target. The activities and projects are carbon capture and storage projects, carbon utilization project, hydrogen energy projects, energy conservation projects, and carbon offsetting with carbon credits.

Adjusting the plans to invest in future energy businesses and beyond energy businesses. This links up with the goals to generate growth from future energy businesses, for which a 32% proportion in the 2021 - 2030 PTT Group investment budget and LNG portfolio of nine million tonnes per annum.

Increasing carbon sequestration levels and natural carbon capture and storage, through reforestation and conservation of forests, as well as various green spaces by planting an additional one million Rai of forests and mangroves by 2030, and continuously implementing plans for conservation.

- Establish the "PTT Group Net Zero Task force: G-NET" comprised of senior executive vice presidents of PTT and PTT's Group, to carry out the duties in setting a clear target to enhance solutions against climate issues, so as to allow Thailand to reach its carbon neutrality targets and a 'net zero' in greenhouse gas emissions in accordance with the policies of the Ministry of Energy. Alongside this, continue to push and monitor the implementation of "the PTT Group Clean & Green Strategy".
- Expand the results of Internal Carbon Pricing (ICP) by utilizing it in the investment screening process in projects to reduce greenhouse gas emissions both direct and indirect at USD 20 per tonnes of CO_2 equivalent, and in projects to dispose of industrial waste and introduce the energy for reuse, a process by which the heat leftover from industrial waste is reused to produce steam. When compared to waste landfills, which can reduce greenhouse gas emissions by 17,734 tonnes of CO_2 equivalent per year, and by using Internal Carbon Pricing, the project sees to gain benefit equivalent to THB 11,704,470 per year, which is expected to be considered for final investment decisions in 2022.

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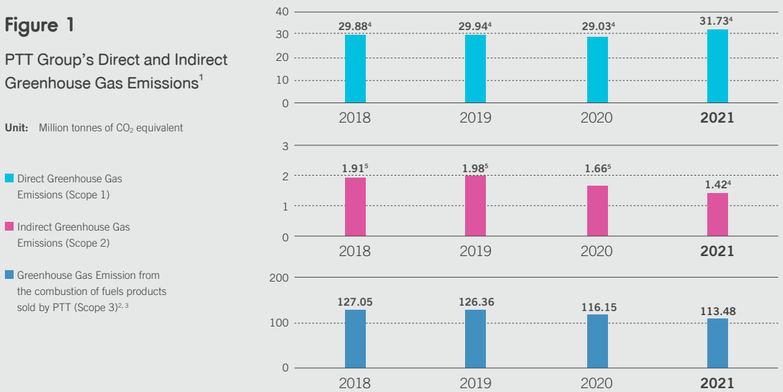
- Establish a framework for PTT's 'net zero' greenhouse gas emissions to serve a guideline in considering the determined scope, calculations, and assessment of various operations, which are relevant pursuant to the international standards, and which can be adapted to various levels, such as, corporate level, business unit, and business area etc.

- As a result of the implementation of the production and energy consumption plan, direct and indirect greenhouse gas emissions in the PTT Group reached 33.15 million tonnes of CO_2 equivalent in 2021, which is the target value. It has a greenhouse gas emission intensity, both direct and indirect, of 92.72 kilogram CO_2 per barrel of crude oil equivalent.

Figure 1

PTT Group's Direct and Indirect Greenhouse Gas Emissions[1]

Unit: Million tonnes of CO_2 equivalent

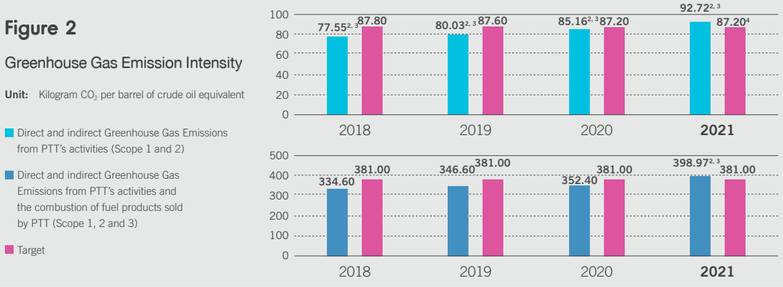


Remarks:
1 The scope of data covers the companies in Thailand in which PTT holds direct shares of more than 20% and as their major shareholder or indirectly shares of 100%.
2 Data for indirect greenhouse gas emissions (Scope 3) covers the combustion of fuel products distributed by PTT and OR (gasoline, diesel, jet fuel, fuel oil, liquefied petroleum gas, and kerosene). PTT manages the volume of its indirect greenhouse gas emissions (Scope 3) by setting a target to reduce PTT's direct and indirect greenhouse gas emissions (Scopes 1, and 2) per unit of PTT products sold, subject to the state enterprise assessment system.
3 The scope of data for indirect greenhouse gas emissions (Scope 3) covers PTT, and OR.
4 The PTT Group's 2018 - 2020 data has been adjusted to account for the increased organizational boundary resulting from the merger of TOP and Thaioil Power, as well as an increase in the Operational Boundary of IRPC reporting of GC, IRPC's Inventory and Tank Yard, and LPG Cylinder Songkhla of OR in 2020, as well as additional LNG-related activities by generators. It's also due to capacity increases and a change in fuel type due to cost control in 2021.
5 PTT's two-year emissions data for 2018 - 2020 has been updated using EPPO 2021 emission parameters.

Figure 2

Greenhouse Gas Emission Intensity

Unit: Kilogram CO_2 per barrel of crude oil equivalent

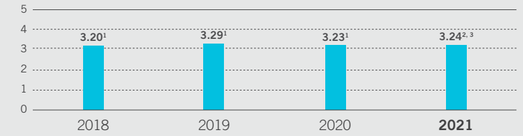


Remarks:
1. The scope of data covers the companies in Thailand in which PTT holds more than 20% of their shares and is their major shareholder or indirectly holds 100% of their shares.
2 The PTT Group's 2018 - 2020 data has been adjusted to account for the increased organizational boundary resulting from the merger of TOP and Thaioil Power, as well as an increase in the Operational Boundary of IRPC reporting of GC, IRPC's Inventory and Tank Yard, and LPG Cylinder Songkhla of OR in 2020, as well as additional LNG-related activities by generators. It's also due to capacity increases and a change in fuel type due to cost control in 2021.
3 PTT's two-year emissions data for 2018 - 2020 has been updated using EPPO 2021 emission parameters.
4 PTT will improve in line with increased activity and reporting in the next years, as stated within the initial scope of action, which excludes the increase in activities as specified in item 2.

Figure 3

Energy Intensity Reduction from Energy Management Projects

Unit: Gigajoule per tonne of product



Remarks:
1 The scope of data covers PTT's Rayong Gas Separation Plant, PTTEP, GC, TOP and IRPC.
2 The scope of data covers PTT's Rayong Gas Separation Plant, PTT Khanom Gas Separation Plant, PTTEP, GC, TOP and IRPC.
3 The energy intensity reduction in 2020 is estimated from Quarter 1 - 3 performance.

Key Activities and Projects

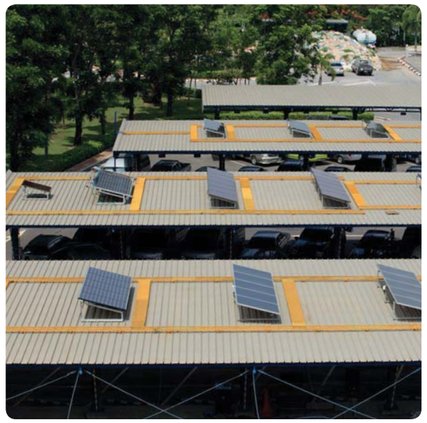
Promotion of Process Efficiency and Energy Conservation Projects

7.3

PTT expanded the scope of data collection on energy efficiency apply in the Khanom Gas Separation Plant to significantly cover energy consumption. Apart from this, the Group also set a goal to jointly increase energy efficiency by reducing the intensity of energy use by 2.4% when compared to business-as-usual operations in 2025, or by reducing the average intensity of energy use by 0.5% per annum when compared to the average percentage each year. Furthermore, internal meetings were convened between the companies in the Group, to continuously monitor the energy performance of each company, together with efforts to share energy conservation best practices, and exchange experiences and guidelines in efficient energy use. In 2021, the intensity of energy consumption is slightly increase from 2020 due to the reduction of refinery's production capacity resulting in lower production efficiency. Additionally, the capacity of high-quality products using higher energy consumption has been increased. However, PTT group continues to strive for energy efficiency improvement projects, such as Innovative Heat Recovery Design for Dehydration System of GSPs (HRD2) (GSP#1) project at Rayong Gas Separation Plant.

Installation of Systems that Generate Electricity from Solar in the Areas of PTT's Operations

7.2



PTT's Innovation Institute began implementing the Smart Energy Project to install systems that generate electricity from solar at the buildings and in the areas of the Institute's operations, located in Wang Noi, Phra Nakhon Si Ayutthaya. Installation was completed in 2021. Apart from this, its operational areas also install solar power generation system, namely, Region X Pipeline Operations Division in Phanom Sarakham district, and Chachoengsao province and Region XI Pipeline Operations Division in Phromburi district, Singburi province. PTT also has plans to install solar system to generate electricity at other areas of operation and office building.

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Research and Study of the Carbon Capture and Storage Technology and the Feasibility Study of Carbon Dioxide Utilization for Commercial Benefit

13.1

PTT's Innovation Institute together with PTTEP prepared the Carbon Capture and Storage (CCS) Technology Roadmap in PTTEP's potential project areas, namely, the Gulf of Thailand, and Lang Lebah, to drive the first CCS pilot project of the Group. In addition, PTT's Innovation Institute had selected products and technology with potential in the carbon dioxide utilization, and conducted a feasibility study in commercial, as a new product, together with its businesses in PTT or PTT Group.

Expansion of Forest Areas to Support the Net Zero Emission Target

13.2

PTT and PTT Group invest in new energy businesses, especially renewable energy, in various projects. Furthermore, we also developed and jointly invested in related businesses, such as energy storage systems, battery plants, an integrated service business in the purchase and sales of certificates for renewable energy, electric vehicle business, and related businesses in a comprehensive ecosystem, etc. These are important in encouraging PTT and PTT Group to achieve long-term greenhouse gas emissions reduction targets, including carbon neutrality targets and 'net zero' emissions. Further details can be found in 1.1.1 Vision, Strategies and Business Directions of PTT Group.

Expansion of Forest Areas to Support the Net Zero Emission Target

13.2 15.2

PTT remains committed to planting, rehabilitating, and conserving forests. This includes efforts to foster mutual cooperation between the public and the private sector, through motivation of sharing the carbon credit from planting, rehabilitating, and conserving in forests owned by the state, in order to support the 'net zero' emission targets, and through mutual discussion with relevant units under the Ministry of Natural Resources and the Environment, in order to continue the reforestation projects. Besides, PTT is in the midst of adding the reforestation project of one million Rai in honor of His Majesty King Bhumibol Adulyadej to projects that support activities that reduce greenhouse gases. In addition, the board of the Thailand Greenhouse Gas Management Organization, referred to as TGO, has resolution to approve the registration of sustainable forestry projects in PTT's Wangchan Valley to be part of the T-VER project as forestry and green space, located in the project area of the Eastern Economic Corridor Innovation, Rayong. The said project is a part of the plan to develop smart cities, which Wangchan Valley has been certified as one of 15 projects that are smart city development areas pursuant to the regulations of the Smart City Development Steering Committee, Smart City Thailand Office.

Collaboration with Public Sector and Various Networks

13.2 17

PTT participated in preparing the proposals at the policy meeting on climate change and Thailand's long-term strategic plan for greenhouse gas emissions, held between the Ministry of Natural Resources and Environment and the Ministry of Energy. This comprised of six main measures, namely, 1) adjusting the fuel proportion in electricity generation and to reduce the use of fuel to a low-carbon state, 2) increasing the proportion of electric vehicles within the country, 3) managing waste landfills to elimination through novel economic models (i.e., Bioeconomy, Circular economy, and Green economy, otherwise referred to as the BCG model), 4) using low-carbon products and services, aiming to achieve a Zero Burn and Smart Farming through the BCG model and digital technology, 5) trapping, storage, utilizing carbon dioxide, and 6) hydrogen technology.

In addition, PTT also became a member of the Thailand Carbon Neutral Network, a network established by the Thailand Greenhouse Gas Management Organization; TGO (Public Organization), to promote cooperation between the public sector, private sector and the localities/communities in increasing the greenhouse gas reduction levels, and to initiate sustainable growth in a climate-friendly society, aiming for 'net zero' greenhouse gas emissions in line with the intentions of the international community echoed as the goals in the Paris Agreement on climate change. PTT became a founding member of the RE100 Thailand Club to propose policies on various subject matters to the public sector, drives Thailand's industry towards 100% renewable electricity (RE100). PTT further participated in the ASEAN Energy Sector Methane Roundtable 2021, which was convened for the first time to serve as a platform driving sustainable methane management in Southeast Asia, as a mutual cooperation on sustainability issues between PTT and Petronas to support the mission of reducing methane leaks from the oil and natural gas industry by 45% in 2025 in comparison to the 2015 figures set by the Climate and Clean Air Coalition's (CCAC's) Mineral Methane Initiative (MMI) under the United Nations Environment Program.

Future Plan

Drive implementation of projects to follow the strategic direction for the environment as prescribed in the Master Plan on Sustainability Management, including the 3P Operating Guideline, in order to short and long-term reduction targets of greenhouse gas emissions, as well as carbon neutrality and net zero emissions, by focusing on augmenting operations throughout the Group's value chain, while also focusing on building a solid and amicable network in the country and abroad, to drive humanity towards the power of the future.

READ MORE

For more information, please visit www.pttplc.com under the "Sustainability" heading, "Environment" sub-heading, and "Climate Change Management" sub-heading.

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Sustainable Resource Use

SDG 6.3, 6.4, 6.5, 6.6, 12.2, 12.5, 17

Opportunities and Challenges

Since Thailand had specified the application of the BCG model, or a holistic approach to economic development, under which the three facets of the economy (Bioeconomy, Circular economy, and Green economy) will simultaneously be developed as the national agenda, where emphasis is made on utilizing resources in ways that incur maximum benefit and the most value, reducing or eliminating waste, including the use of naturally extracted, environmental-friendly raw materials, and the specified Thailand's 2018 - 2030 Roadmap to Plastic Waste Management that aims to reuse 100% of plastic waste by 2027, PTT worked to adjust its strategies and business plan, expanded the development outcomes and extended biological products extracted from natural and environmentally friendly raw materials, through the principle application of the circular economy.

Water resources management is another factor that PTT pushed to emphasize its importance. Because of the increased demand for water from economic growth and urbanization, as well as climate fluctuations that cause water shortages and ultimately floods, or even water pollutants that affect stakeholders of various sectors, PTT thus prioritized holistic water management, a concept that covers various issues from conservation of water resources, maximizing efficiency in water use, reducing water use and increasing reuse, all the way to raising awareness of conscious water use, and monitoring the monthly consumption of raw water to remain confident that the actions of PTT and the Group do not affect the use of water by the communities.

Issue Management

Performance Targets			Performance against Short-term Targets
Indicators	Short-term within 2021	Long-term	
Maturity level of circular economy principle application in PTT Group's operations, according to British Standards Institution: Framework for implementing the principles of the circular economy in organizations - Guide (BS 8001:2017) • Relevant functional KPI • Social strategy indicators according to the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025"	Level 1.5	Level 3	Level 2.24 - 4
Water withdrawal rate at operation sites for storage and usage • Social strategy indicators according to the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025" • 2021 QSHE Indicators	• Production: not exceeding 0.294 million cubic meters per million tonnes of products • Office: not exceeding 144 Liters per person per day	• Production's withdrawal reduced by 12.6% by 2030 compares to 2013 • Office's withdrawal reduced by 10% by 2030 compares to 2013	• Production: 0.251 million cubic meters per million tonnes of products • Offices: 174 Liters per person per day

Key Action

- Pilot project on circular economy at PTT and PTT Group
- Studies and apply international tools and assessment standards to assess water related risks and impacts on PTT Group's business operations
- Studies and development of Greywater Recycle pilot innovation project to treat used water for more usage
- Studies and stipulate control value of freshwater used in PTT Group's production

Value Creation to Stakeholders

Amount of water recycled and reused was at 0.12 million cubic meters, and the volume of waste recycled, reused, and recovery was at 1,599.13 tonnes. In addition, there is no hazardous waste in landfilled. Furthermore, a total of 150 lube containers, equivalent to 50 kilograms of plastic pellets, was recycled into 70 traffic cones. There was a development of a pilot recycling water from wash basins for usage in restrooms. This was pilot at PTT Headquarters' parking building.

Key Performance

PTT prioritizes resource management as part of Quality, Security Safety Health and Environment (QSHE) management, as explicitly expressed in the commitment within **"PTT Group QSHE"** and translated into **"2030 QSHE long-term strategic targets and annual targets."** Circular economy, the crucial tool enhancing operational eco-efficiency of resource usage and waste management, has been designated as part of the strategy within environmental strategic direction in PTT's Sustainability Management Master Plan for Social and Environmental Responsibility.

PTT has cascaded policies, targets, and strategies in the Master Plan into practice throughout the organization. QSHE departments, at working level, supports and drives efforts in business lines and operation sites, and developing work plan. Furthermore, they were also established as performance assessment indicators of relevant business lines, reporting progressing performance according to QSHE and KPI targets to the governance committee at both the management level and the Board of Directors on a quarterly basis.

In 2021, the performance on water and waste management meet all the targets.

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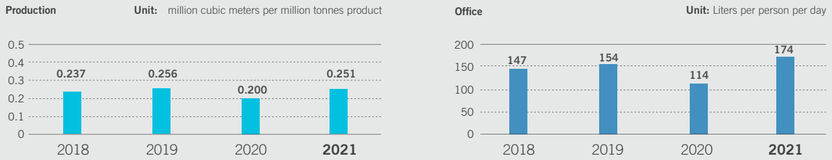
Water Management

Figure 1 The rate of water withdrawal at operation sites for storage and usage



Remarks:
- *Following production cuts, the Gas Separation Plant unit 1 resumed normal operations in 2021 result in increasing the amount of water withdrawal into manufacturing industries for storage and consumption in 2021.*
- *Due to the COVID-19 situation, the higher rate of water withdrawal for storage and consumption in office buildings in 2021 due to PTT introduced Work@Home, which has resulted in a considerable reduction in the number of visitors to the facility. At the same time, water still required for various systems in the building. Thus, it has a larger value when the water withdrawal rate is calculated in terms of water withdrawal intensity, which is the proportion of water consumption per visitor to the building.*

Figure 2
Percentage of water recycled and reused per PTT's total water (freshwater) withdrawal

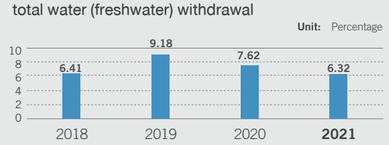
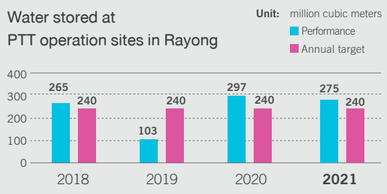
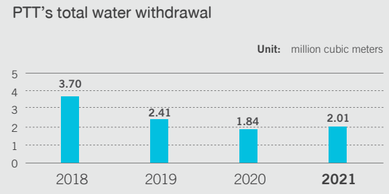


Figure 3
Water stored at PTT operation sites in Rayong



Remark:
The scope of data encompasses the primary three reservoirs in Rayong province, which are Dok Grai reservoir, Nong Pla Lai reservoir and Klong Yhai reservoir.

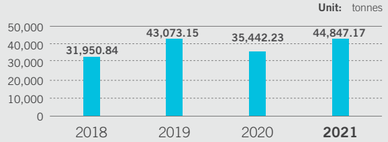
Figure 4
PTT's total water withdrawal



Remarks:
- *In 2020, the overall water withdrawal decreased due to implementation of water consumption reduction projects and reduced production capacity of the 1st natural gas separation unit.*
- *Since 2019, the data no longer includes OR, thus the overall water withdrawal reduced.*

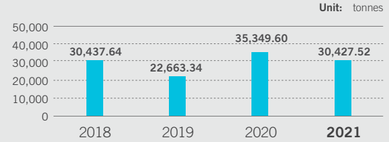
Waste Management

Figure 1
Non-Hazardous Waste Disposal by reused/ recycled/ sold



Remark:
Information reporting scope covers seven companies in the Group, comprises: PTT, PTTEP, IRPC, GC, TOP, GPSC and OR.

Figure 2
Non-Hazardous Waste Disposed by Other Methods beyond reuse/ recycle/ sold



Remark:
Information reporting scope covers seven companies in the Group, comprises: PTT, PTTEP, IRPC, GC, TOP, GPSC and OR. Non-hazardoous waste disposed through other methods includes recovery, energy recovery, incineration, and other waste management that cannot classify disposal method.

Key Activities and Projects

Realizing and Scaling the Circular Economy Project in PTT and the PTT Group

To ensure application of circular economy principle according to British Standards Institution: Framework for implementing the principles of the circular economy in organizations - Guide (BS 8001:2017) within PTT is executed efficiently and allows elevation towards maturity Level 3 of application per 2030 target, annually, a circular economy pilot project is continuously implemented within the PTT Group. The aim is to identify high potential projects with business viability and commercial potential as novel business of products in the future. In 2021, key pilot projects are as follows:

Pilot Innovation in Upcycling Lube Containers to Traffic Cones

12.2
12.5

PTT Innovation Institute collaborates with OR to study and develop pilot innovation to recycle used lube containers as rubber traffic cones. A total of 150 used lube containers, an equivalent to 50 kilograms of plastic pellets, produced 70 traffic cones, replacing traffic cones currently used at PTT service stations, and PTT headquarters. Presently, the product is being further developed for commercial viability.

Studies to Transform PTT Café Amazon's Plastic Waste to Value

12.2
12.5

PTT Group may have a part in single-use plastic packaging consumption, which can leave remnants in the environment. PTT and OR recognize the opportunities to develop novel products, while simultaneously support the public sector's policy via innovating, researching, and developing the pilot Café Amazon's plastic cup upcycling machine. The machine separates and collects "PET" plastic cups, applying QR CODE technology for the separation of Café Amazon's plastic cups to accept and collect cups for further usage, transforming them into tumblers via upcycling. The machine accepts PET plastic cups from Café Amazon's customers, and provides them with points, which can be exchanged for gifts. The machine has been installed at the office buildings in Energy Complex (EnCo). In 2021, a total of 3,250 "PET" plastic cups were collected. This volume can be developed into over 601 tumblers via upcycling, reducing plastic waste by over 51.1 kilograms by reuse. This equates to a 52.7 kilogram CO_2 equivalence of greenhouse gas emission reduction.

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Water Management

6.3 6.4 6.5 6.6 17

PTT set up a corporate water management working committee within the PTT Group, comprises of experts on water management and public facilities of the PTT Group. In 2021, the committee consistently monitored the volume of water in the status quo, rain volume, climate change, water usage regulations and standards. The information is used for water management, risk management, and mitigation of imminent risks. Furthermore, there are efforts to monitor situations and assess water-related risks that potentially affect the community's access to water. PTT collaborates with the Eastern Water War Room, which comprises the public sector, Eastern Water Resources Development and Management Public Company Limited (East Water), and representatives from the relevant private sector. Collaboration and sharing of best water management practices are fostered, substantiated with active monitoring, and driven forth of the government's water management projects in Rayong and Chonburi provinces, as follows:

- Conducting PTT Group Water Risk Assessment to assess PTT Group's water consumption risk, utilizing tools and international assessment standards, such as AQUEDUCT, The Global Water Tool (GWT), and Water Deprivation Test.
- Monitoring of water situation and forecast water budget in the future, through the application of a long-term forecast technology in combination with a meteorological simulation, to estimate the volume of water budget in key reservoirs within Rayong province preemptively.
- Integrative collaboration to enable development, stability, and sustainability in holistic water management in the eastern region. The aim is to control volume of water stored for PTT Group's operation sites in Rayong province, encompassing Namdokgrai reservoir, Nongplalai reservoir and Klong Yhai province, to be at least 240 million cubic meters. This included monitoring and propelling water resource development project in the Eastern Economic Corridor (EEC) to enhance capacity in response to the increased water demand of 1,000 million cubic meters per year, by 2036.
- Elevating the level of water management level per the principle of circular economy, while committed to operate according to 3Rs (Reduce, Reuse, Recycle) to reduce water usage, increase reused water and greywater consumption.

Following monitoring of the water situation and the application of long-term forecast technology, in tandem with meteorological simulation and pre-emptive estimation of water budget at reservoirs, these enable assessment of water consumption-related risks. Without appropriate local water management, PTT Group's water usage-related risks may be at a moderate or high level. Therefore, the PTT Group's water management working committee joined hands with various committees and agencies to drive for suitable water resource management. As a result, in 2021, the eastern region's water situation was considered good, with moderate and large reservoirs storing over 90% of their respective capacity. It is thus estimated that there will be sufficient water for all sectors, with no scarcity anticipated, particularly in agriculture, fisheries, and industries, as well as the PTT Group's business-as-usual operations. There would be no water conflicts, and no community's water rights would be threatened.

Greywater Recycle Pilot Innovation

12.2 12.5

PTT conducted studies and the development of a pilot innovation, the Greywater Recycle Project, treating used water from washbasins and reusing it for restroom flushing. This supports sustainable development goals of effective water consumption and reuse. The project has been piloted at PTT headquarters. The aforementioned innovation can recycle as much as 30 liter of water per hour, at a quality accepted by US EPA Guideline standard.

Effective Waste Management

12.2 12.5

Rayong Gas Separation Plant is committed to improve its management of hazardous waste in tandem with consistently enhancing environmental stewardship effect through application of 3Rs and KAIZEN. This resulted in the plant being awarded "2021 Enhanced effective management of hazardous industrial waste at risks of illegal disposal, utilizing 3Rs and KAIZEN," a total of three awards, comprises 3Rs-centric good waste management award, overall waste utilization award, and effective 3Rs work plan award for creativity, economic returns and effective waste management (3Rs+ Award), at silver medal from the Department of Industrial Works, Ministry of Industry.

The 5th Green Industry – Green Network

Green Industry 5 กระทรวงอุตสาหกรรม อุตสาหกรรมสีเขียวระดับที่

Success in co-creation of sustainability values of Rayong Natural Gas Separation Plant and Kanom Natural Gas Separation Plant

Rayong Natural Gas Separation Plant and Kanom Natural Gas Separation Plant are committed to environmental risk management and opportunities, aspiring to become an environmental-friendly plant. Emphasis is given to co-creating sustainability values between PTT and stakeholders throughout the supply chain as follow:

Customers

Promote customers to elevate their respective environmental management until achieving at least Level 3 or equivalent of Green Industry certification. This is achieved through various projects, such as customer alignment project, open house, promote customers in sustainable packaging usage, and executing social project on environmental stewardship with customers.

Suppliers

Support suppliers of product and service groups whose impacts can be significant to production, to help improve their operations until achieving at least Level 2 green industry certification or equivalent. This is achieved through numerous projects, such as stipulation, reviews and result assessment post-product and service delivery, active facilitation of suppliers in environmental and energy management, environmental day volunteering, and Green Turnaround project.

Communities

Conducted satisfaction survey of communities within the radius of 5-km and took suggestions for continuous operational improvement on an annual basis. Social responsibility is also integrated as part of the business operations through various projects with communities, such as:

Rayong Gas Separation Plant

- **The Winter Plant Research Project** creates added value from excess cooling power from the transition process of liquid gas and carbon dioxide, integrating knowledge between the organization and educational institutes, to develop agricultural technology, promote tourism and generate income for communities. The project is part of Rayong province's tourism promotion plan.
- **Chom-Hae conservation and restoration project** to increase forest space, build environmentally friendly mindset, and expand to become an ecotourism, establishing engagement and enable careers within communities.
- **Projects to support local economy in the vicinity of H.R.H. Princess Maha Chakri Sirindhorn's herbal plant garden,** which came to fruit due to cross-sectorial collaboration between communities, public sector, OTOP, community social enterprises, and private sector.
- **Projects to promote the use of cloth bags and reduce plastic bags**

Kanom Gas Separation Plant

- **PTT RUTS Smart Farming,** through collaboration with universities and district agricultural office of Kanom district, Nakhon Si Thammarat province. As the result, this project creates jobs, building knowledge on innovation, and agricultural technology for communities sustainably.

PTT is committed to promote and facilitate the green network, aligning with the Green Industry project's approach. PTT is ready to foster and elevate environmental performance for stakeholders' sustainably and continuously.

READ MORE

For more information, please visit www.pttplc.com under the "Sustainability" tab, "Environment" heading, and "Circular Economy and Waste Management" and "Water Management" sub-heading.

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Social Issue Management

PTT has taken into account the importance of operating business with responsibility to stakeholders, the community, society, and the country by striving to manage issues that are demanded, expected, or causing significant concern on the basis of respect for human rights, especially to all stakeholder groups.

In human rights management, PTT elaborated policy details through its "PTT Human Rights Statement" and clearly explained its various guidelines. Additionally, further details on the policy and stakeholder practices—including those for employees, suppliers, partners, customers, and the community—through the PTT website. With respect to this 56-1 One Report, the company will present its targets, work plans, progress, and key projects in 2021, including occupational health and safety, human development and retention, and good organization for society. Other details can be found on the PTT website in the social section under Sustainability.

Occupational Health and Safety

3.6 8.8

Opportunities and Challenges

Between 2020 and 2021, PTT faced occupational health and safety challenges in various situations, whether it be the COVID-19 pandemic or stakeholder activities that could impact PTT's equipments or worksites. These affected the business's ability to operate and compete, and also created a wider impact to the country, society, communities, and stakeholders. These challenges have created opportunities for PTT to steadfastly improve its management of security, safety, and business continuity.

Issue Management

Indicators	Performance Targets: Short-term within 2021	Performance Targets: Long-term	Performance against Short-term Targets
Lost Time Accident (LTA)			
Employees	0	0	0
Contractors	0	0	0
Total Recordable Injury Rate (TRIR) per 200,000 working hours			
Employees	0.066	0	0
Contractors	0.080	0	0.038
Total Recordable Occupational IllnessRate (TROIR) per 200,000 working hours			
Employees	0.108	0	0
Process safety incidents			
Tier 1	0	0	1
Tier 2	1	0	0
Total recordable Major Truck Accident Rate per 1,000,000 kilometres	0.014	0	0
Serious security breaches	0	0	0
• Corporate KPI* • Functional KPI • Social strategy indicators according to the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025" • 2021 QSHE Indicators			

** Performance measured through Safety Management Effectiveness, complemented by accidents leading to work stoppage indicators, total work injury rate per 200,000 hours worked, and number of safety accidents in the production process (Tier 1)*

Key Action

- PTT Safety Campaign Project
- Development of Safety Legal Compliance Handbook for PTT
- Occupational health check-up management and health readiness assessment at work
- Implementation of Bow Tie and Barrier Validation principles in PTT Group
- Safety transportation management
- Emergency, Crisis, and Business Continuity Management

Value Creation to Stakeholders

The frequency of accidents, injuries, and sickness has reduced, lowering cost and expenses in medical treatment for employees and contractors, property and equipment repair. Employees and contractors also have better quality of life.

Key Performance

Occupational safety and health management is part of Quality, Security, Safety, Health, and Environment (QSHE) management. The company's commitments are clearly stated in **"PTT Group's QSHE Policy"**. In the alignment, PTT has set **"the QSHE 2030 strategic goals and annual goals"** as well as its resource management. Additionally, the company's **"Safe working environment strategies"** are aligned with its social strategic direction in the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025"

PTT has deployed policies, targets, and strategies in the Master Plan into practice through the QSHE business areas. In 2021, the company has incorporated the following into its corporate KPIs: LTA, TRIR, process safety incidents, and safety related to improve and promote a safe working environment. Performance results are measured at the senior vice president executive, department

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managers, and direct division manager levels. Progress reports of QSHE performance and KPIs are made quarterly to responsible committees, both at the management and PTT Board levels.

In 2021, KPI performance on safety and occupational health for both employees and contractors met targets in all items. This has been achieved because of awareness raising programs for employees, and office employees have mostly worked from home. With respect to safety in the production process, there has been one incident in one of the company's Tier 1 suppliers caused by the incident of crude oil spilling out of the slop tank but in the containment area that is not affecting the community or environment. The incident, which occurred in the area of the railway oil pumping station, Sriracha Oil Teminal, Chonburi Province on September 29, 2020, has been completely investigated and analyzed to identify root causes. It was determined corrective and preventive measures for both human and work factors, and carried out the prescribed measures. In terms of major truck accidents rate, performance has been in line with targets, with improving trends.

Occupational Safety and Health Performance against PTT's targets

Indicators		2018	2019	2020	2021
Lost Time Accident: LTA (persons)					
Target	employees	0 incidents	0 incidents	0 incidents	0 incidents
	contractors	0 incidents	0 incidents	0 incidents	0 incidents
Performance	employees	1	0	1	0
	contractors	6	2	2	0
Total Recordable Injury Rate (TRIR) (Incident per 200,000 work hours)					
Target	employees	not exceeding 0.090	not exceeding 0.080	not exceeding 0.066	not exceeding 0.066
	contractors	not exceeding 0.100	not exceeding 0.080	not exceeding 0.080	not exceeding 0.080
Performance	employees	0.043 or 0.215 per 1 million work hours	0.061 or 0.305 per 1 million work hours	0.089 or 0.445 per 1 million work hours	0 incidents or 0 per 1 million work hours
	contractors	0.061 or 0.305 per 1 million work hours	0.038 or 0.190 per 1 million work hours	0.109 or 0.545 per 1 million work hours	0.042 or 0.210 per 1 million work hours
Process safety incidents: Tier 1* (Incidents)					
Target		0	0	0	0
Performance		1	0	2	1
Process safety incidents: Tier 2* (Incidents)					
Target		N/A	≤ 6	≤ 1	≤ 1
Performance		0	0	0	0
Major Truck Accident Rate (Incidents per 1,000,000 kilometers)					
Target		0.050	0.040	0.027	0.014
Performance		0.007	0.047	0	0

Remark:

** Report of PTT's Tier 1 and Tier 2 process safety incidents referenced specifications of American Petroleum Institute (API) Recommended Practice 754 and Catastrophic and Major process safety accidents, occured on natural gas pipeline, is outside the operational area*

PTT Group process safety incidents: Tier 1

2018	2019	2020	**2021**
0 / 3	0 / 6	0 / 6	0 / 1

PTT Group process safety incidents: Tier 2[1]

2018	2019	2020	**2021**
N/A / 6	6 / 6	5 / 5	≤ 6[2] / 10

Unit: Incidents Targets Performance

Remarks:

1 Information reporting scope covers PTT, PTTEP, TOP, GPSC, IRPC, OR, GC

2 Report of PTT Group's Tier 1 and Tier 2 process safety incidents referenced specifications of American Petroleum Institute (API) Recommended Practice 754. In 2021, PTT Group changed indicators from Tier 2 to Tier 1 and Tier 2.

Key Activities and Projects

Occupational Safety, Health, and Environment Management

8.8

PTT continuously supervises and improves all operational areas to have good occupational health and safety. Currently, all of PTT's operational areas are certified either following the Thai Industrial Standard (TIS) or ISO 45001:2018. The company has also received an award for outstanding workplace safety and health in every country. PTT believes that safety and operational efficiency can take place when employees and operators are cognizant of potential dangers and risks and have a good understand of safety procedures. In 2021, the following key activities took place.

PTT Safety Campaign Project

PTT promotes safety knowledge and awareness through a variety of programs that involve employees, such as Risk Seeker, Risk in Road Safety, Safety Clip Contest, Safety Task Observation, Safety Drive Challenge; and promotes a safety culture underpinned by the 5T principle (Think, Talk, Tour, Teach, Trust). All operators take part in identifying risk areas and reporting them through an accident reporting system, including accidents, near miss incidents, and substandard safety behaviors or conditions. Reported through the Company's intranet system, incidents are recorded and analyzed and investigated for root causes. In addition, PTT has also established online preventive and corrective measures, including sharing information within the organization to guide preventive efforts on future similar incidents.

In 2021, the majority of employees worked from home, but there were 2,696 risks reported and recorded in the system. This figure is lower compared to 2020 numbers. PTT will continue to implement this project in the next year, following employees' return to regular on-site work. Because of the safety awareness raising program for employees. There was no major accident in 2020.

Review and Promotion of PTT's Fundamental Safety Rules into Practice

PTT puts fundamental safety rules into practice by communicating, underscoring, and implementing them as appropriate to the nature of work. Operations monitoring and reviews of operational risk assessments have led to fewer accidents and no Lost Time Accidents (LTA). Under these safety rules, PTT permits employees and contractors to cease work upon discovering unsafe conditions, without being subject to disciplinary measures, while providing them with the rights to stop working when employees or contractors are found performing potentially dangerous work. As a results, there was no the major incident and no non-compliance case in 2020.

Building Awareness for Employees and Contractors

This was achieved through various training programs conducted for all employees and contractors. In 2021, required occupational safety and health training programs were provided to all new employees, supervisors, and management personnel. These trainings included basic occupational security, safety, health, and environmental training (SSHE1 Training). This training was conducted by management and operational level security personnel, the Security, Safety, Health and Environment Committee to a total of 18 cohorts. Basic safety knowledge training pragrams were also provided to all contractors prior to start of work.

Development of Health Performance Indicators (HPIs)

This was developed to raise PTT Group's occupational health proactively. PTT Group's occupational health and safety working group has developed the HPI assessment guideline for implementation. This is to disseminate knowledge on health and continuously improve guidelines for effective occupational health operations. Additionally, the company also conducts health risk assessments of all employees and operators resulting from contact or receipt of various risk factors at work. The company also determined health risk controls and mitigating measures, as well as provided employees with annual health check-ups. Trainings are also conducted to provide knowledge to employees prior to the start of work. In the case of onsite operators who are likely to come into contact with danger, PTT conducts work environment inspections, limits operating hours, and requires the wearing of appropriate personal protective equipment (PPE). Additionally, the company organizes regular health promotion activities to promote good health for employees and contractors.

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PTT Group Bow Tie Analysis and Barrier Validation

8.8

In 2021, PTT developed verification and control processes for Major Accident Events (MAEs). It builds on an adaptation of the Bow Tie Analysis technique, which has continuously been implemented since 2019, in analyzing and addressing safety risks in production processes on operation sites. The objective of this effort is to ensure that MAE control measures are effective and fit for purpose, that equipment malfunction control measures are updated, and equipment is kept in normal working conditions. Effective and fit-for-purpose MAE control measures can not only prevent major accident events, reduce production lost time, and ensure continuous business operations, but also reduce the potential impact on communities and the environment surrounding operation sites. PTT Group Barrier Validation Guideline Handbook was developed and training programs were conducted to transfer knowledge to PTT and PTT Group employees. The handbook was piloted in two locations: GC and PTTLNG. This enabled the company to be aware of detected areas of concern and make needed improvements. This effort is an improvement and elevation of safety standards in the PTT and PTT Group's processes at operation sites.

Product Transportation Safety Management

3.6

Whether petroleum products are transported on land or sea through contractors, PTT gives importance to the implementation of stringent control and supervision of operations that may have indirect negative impacts on activities or processes. This is because there is a high risk of broader stakeholder impact. The company established safety requirements and standards for transportation, which include the following management methods and equipment, and supervision of transportation provided.

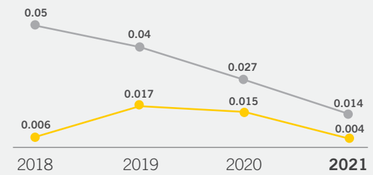
1) Safe Transportation of Petroleum by Truck

All trucks have to follow the PTT Group Road Safety Management Guideline (RSMG) which follows the five pillars principle in managing all of PTT Group's transportation service providers. Providers are expected to adhere to and implement these five pillars: (1) SSHE Management, (2) Organization Management, (3) Vehicle & Equipment Management, (4) Driver Management, and (5) Journey Management.

Additionally, technologies are implemented to strictly track and monitor driving behaviors through a transport control center. Good behavior is promoted through awards for companies and drivers who have achieved the assessment of good driving behavior and never had an accident according to the criteria.

In order to ensure conformance, the company arranges at least one RSMG carrier management audit per year by the service provider. In 2021, the company set up a PTT Group audit committee to take part in transportation management audits with six transport service providers in the PTT Group. This is intended to generate learning and create consistent standards for the RSMG assessments.

PTT Group Major Truck Accidents Rate



Remarks:

- *Information reporting scope covers PTT, PTTEP, IRPC, TOP, GCL, OR, PTTRM, PTTAC*
- *PTT Group's Major Truck Accidents rate incorporates multiple considerations, including Lost Time Accident (LTA), Product Leakage Volume, Death, Community impact, and Organizational image impact.*

2) Safe Transportation of Petroleum Products by Sea

In 2021, the company developed a handbook and PTT Group's marine transportation safety management guidelines for service providers to implement.

PTT has required the adoption of the same handbook for both land and sea transportation as part of the contracting of service providers to ensure that service providers continuously and systematically implement its requirements. The company also required contractor assessments at least once annually. In 2021, All land and sea transport service providers were assessed; assessment results were in accordance with company requirements.

Emergency, Crisis, and Business Continuity Management

8.8

PTT has improved its Emergency and Crisis Management Plan to be in alignment with the National Disaster Prevention and Mitigation Plan. PTT has organized annual emergency and crisis management and business continuity drills in order to help concerned parties understand and be adept at emergency and crisis management processes while ensuring sustained business continuity management.

In 2021, PTT reviewed and improved its business continuity management system, while conducting business continuity management drills. In the event of an incident in which a local LPG transport vessel collides with the Khao Bo Ya bridge and pipeline, product (LPG, C3, C4, Crude Oil, HSD, NGL) receipt and dispensation through the sea ceased on November 11, 2021. The Chief Executive Officer and President presided over the rehearsal, with executives who were identified in the Crisis Management Center (CMC) as participants. The company also connected the CMC with the Emergency Management Center (EMC) through the Video Conference unit, leading to PTT's ISO 22301 certification status retention by the Management System Certification Institute (MASCI). All information and performance are analyzed, and translate into l observations and opportunities for further reviews and improvements.

Occupational Safety and Health Management during the COVID-19 Pandemic

As the COVID-19 pandemic became more severe in March 2020, PTT established a **COVID-19 Monitoring and Surveillance Center ("PTT Palang Jai Center")** to monitor the pandemic and effectively manage the situation within the group company. As employee safety is of the utmost priority, the company issued a work-from-home policy (Work@Home) and made advanced communication available to everyone so that there is a common understanding and that new practices can be implemented effectively. Various technologies were used to aid work readiness and all stakeholders were cared to ensure business continuity and retain competitiveness.

In 2021, PTT and its employees have continued to strictly adhere to and cooperate with the following measures and guidelines.

1. General Measures included monitoring of the pandemic and acting in compliance with measures issued by the Center for COVID-19 Situation Administration (CCSA); the PTT Palang Jai Center; or providing advice on appropriate guidelines for the pandemic through the Call Center, Line Official Account, and the PTT Palang Jai Center email.

2. Employee Welfare Measures included Work@Home; situation-appropriate considerations on employee travel to countries or locations; care for employees traveling from pandemic-sensitive countries or location and support for symptomatic employees in the at-risk category; and response measures to the discovery of any COVID-19 cases in PTT's operating sites, among others.

3. Operation Sites Measures included setting up control and screening areas at entrance-exit points; setting up sanitization areas with alcohol or hand gels; floor sanitization measures; and ozone purification standards established by the area management unit, buildings, and operation sites.

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Corrective and Preventive Measures in the Event of Leakage and Fire in the 2nd Natural Gas Pipeline

Following the leakage and fire incident of the 2nd natural gas pipeline in October 2020, PTT has addressed the cause and rapidly returned the situation to normal. It reduced the impact on the community and the environment. PTT Board of Directors, Chief Executive Officer, the President, and management-level personnel, and employees have site visits to rapidly aid victims and other affected parties. Additionally, PTT accelerated accident root cause investigations by appointing a grand committee to lead the inquiry into the pipeline leak and fire incident at Bang Bo district, Samut Prakan, with the objective to verify and analyze causes of the accident and identify corrective and preventive measures to avert future incidents of a similar nature.

The committee had investigated the cause of the accident by assessing the accident location, inviting involved parties to provide facts, and collecting accident details to assess plausible causes related to internal factors such as architectural design and standards, operations, and maintenance and upkeep of the natural gas pipeline. The committee also assessed plausible external causes, including the activities of external parties surrounding the accident location. The committee is currently awaiting the results of a scientific analysis of pipeline materials from the Thailand National Metal and Materials Technology Center (MTEC), geological research results from related government agencies, and causal analysis results from an external consultant with expertise on gas pipelines.

Additionally, PTT is coordinating with the Department of Energy Business to seek permission to enter the premises to repair the pipeline and return it to normal working conditions. The coordination also includes the elevation of safety standards to provide public confidence in the operations and restoration of the pipeline. These include adjusting natural gas delivery pressure to an appropriate level for community areas; increasing the frequency and application of technology in monitoring gas pipelines; and studying ways to improve isolation procedures in the natural gas distribution system in case of an emergency, among others.

Future Plan

PTT is committed to managing safety, which includes personal safety, production safety, and transportation safety. PTT has a goal of becoming an accident-free organization to give confidence to all stakeholder groups. It also promotes employee and contractor engagement in safety by being committed to building and embedding an organization-wide safety culture through the Incident and Injury Free Project (IIF); implementation of the security, safety, health, and environment management system (SSHE); and establishment of annual strategic goals and goals for continuous control and monitoring of PTT Group's performance and third party assurance. These are important foundations in driving towards organization-wide practice and continuous improvement.

READ MORE

For more information, please visit www.pttplc.com under the "Sustainability" tab, "Social" heading, and "Security, Safety and Occupational Health" sub-heading.

Talent Development and Retention

SDG 3.8 4.4 5.1 8.2 8.5

Opportunities and Challenges

From the latest vision of PTT together with the continuous spread of COVID-19 pandemic, both are key challenging factors to human capital management and development. PTT prioritizes revising, improving, and modernizing its human capital policies, process, and procedures to accommodate the needs and meet the expectations of employees of all generations and to be able to support new business models under opportunities and challenges effectively and efficiently.

Issue Management

Performance Targets			Performance Against Short-term Targets
Indicators	Short-term within 2021	Long-term	
Human Capital Index (HCI) Score • Corporate KPI • Relevant Functional KPIs • Social strategy indicators according to PTT's "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025".	Increased the HCI score by at least 1% annually and reach over 78% in 2021	Over 80% within 2024	82%

Key Action

- Re-adjust ways of working during the COVID-19 pandemic situation.
- Re-structuring and preparing Human Capital towards the future goals
- Realign the recruitment process for alternative new groups of Human Capital to accommodate for new business.
- Develop PTT to become The Learning Organization
- Develop Employee Experience Journey Website
- Pay It Forward Inspirational Executive Role Model Project

Value Creation to Stakeholders

Levels of Competencies, Knowledge, Skills and Experiences at 67%
Levels of Employees' Engagement with PTT at 80%
Job Rotation Rates for Diverse Jobs Learning Opportunities at 98%

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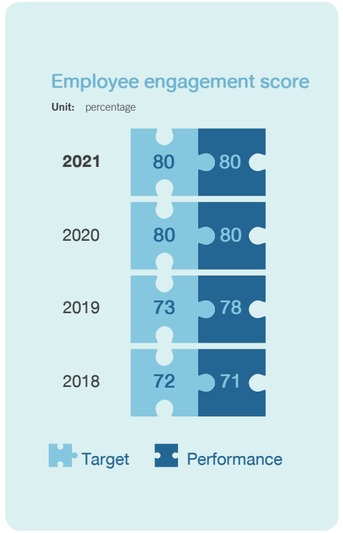
Key Performance

PTT has reviewed and improved the business driving factors and core competency required by the company. These include skills, knowledge, competencies, experiences, and personal attributes for every position of the company, which provide a framework for developing the potential of executives and employees at all levels to align with the new vision, future business directions, and goals, thus enabling the company to thrive and grow sustainably. With the ongoing pandemic of COVID-19, PTT has revised and modernized regulations, processes, tools, and technologies to support new ways of working, maintaining efficiency, and achieving efficiency under the goals of employee engagement and the Human Capital Index (HCI).

Building Employee Engagement

PTT studies and determines critical factors that affect employee engagement and satisfaction annually in both quantitative and qualitative terms, based on field data collection, a meeting with employees, and coupled with surveys of employee engagement and satisfaction, to understand the needs and expectations of different employees in each group and to analyze the results and improve the approach to bonding and satisfaction linked to key business outcomes.

In 2021, PTT has reviewed the PTT Engagement Model and adjusted its questions by adding questions about the effectiveness of COVID-19 management. Moreover, PTT has considered SPIRIT value questionnaires to be included with employee engagement questionnaires so that employees can answer surveys of corporate culture and corporate engagement at once. The 2021 corporate engagement score is 80%, which has three factors that should be improved. 1) Employee and talent management, 2) Coordination and cooperation in the organization, and 3) Performance management. PTT has sent results to related business units in the organization, which continue to develop plans for increasing the level of satisfaction and engagement of each unit and the organization's overalls.



The Success of PTT's Human Capital Index (HCI)

The overall efficiency of human resources management is reflected in PTT's Human Capital Index score, demonstrating the organization's ability to manage human resources efficiently. It consists of three pieces of information: 1) building employee abilities, 2) developing employee engagement with the organization, and 3) creating opportunities for on-site learning, and gaining diverse work experience. Although 2021 was a year of many crises that affected the employees' operations, the HCI score remains on track at 82%. Specifically, the company's level of skill score, which is 67%, is equivalent to the score of leading companies in the oil and natural gas business. The employee engagement score at 80% is higher than the APAC Best Employer in Oil & Gas business counterpart, and the employee's rotation rate at 98% is comparable to that of PTT Group companies that operate in the similar business.

Key Activities and Projects

Re-adjust Work Process during the COVID-19 Pandemic Situation

3.8 4.4

With the COVID-19 Pandemic ongoing in these last two years, PTT has streamlined its way of work, such as adopting Work@Home policies during the severe pandemic period and later adapted into Work from Anywhere policy to become the new normal way of work once the situation has alleviated. These changes are based on Trust and Respect concept, where the organization has consistently laid the foundation for a strong work culture under SPIRIT values.

In 2021, the pandemic became severe once again. PTT remains to prioritize the health care of its employees and workers, surveying and providing vaccines against COVID-19 to employees and helping them access other government vaccines. PTT employees are vaccinated at a rate of 98.6% and are encouraged to change way of working. In the operation workforce provided the lock up plan i.e., shuttle and residential services are provided to employees to reduce the likelihood of COVID-19 infection, the e-Permit system screen, and limit the number of outsiders working in the area, etc. PTT also allocates additional welfare funds and provides support for corporate function employees to Work@Home, all to reduce risks and protect employees. Additionally, in November 2021, relaxing measures level 1 were introduced at PTT Head Office. Supervisors at the manager level or higher are permitted to let employees and personnel, who is vaccinated for at least two shots, work at the office if necessary. These employees also must have been tested negative with Antigen test kit (ATK) or RT-PCR before entering the office. The human resources services have also adapted to the situation, such as online interviews, telemedicine services with online diagnosis and medicine dispensing, electronic medical disbursement, and adjusting the training method from the on-site classroom to the virtual classroom. In order to mitigate the impact on society, PTT Group has launched the "Restart Thailand" initiative, which creates jobs for new graduates and unemployed to revitalize the country's economy and society as a whole.

Re-structuring and Preparing Human Capital towards Future Targets

8.2 8.5

PTT has prepared and implemented measures to meet the latest vision, future business directions and targets effectively and promptly. The details are as follows;

- **Designing business models, structures, job weights, strategic workforce planning, and improving appropriate work processes according to the business direction,** comparing to the counterpart, and developing plans to rotate employees to different structures as to give the organization a competitive advantage through the implementation of a new type of enterprise project, or NE-WAY Project, which has three phases of operation as follows;

Phase 1 Design the business and governance models that suit PTT businesses

Phase 2 Design the organization structure, strategic workforce planning, and improve processes efficiency by implementing digital technology to comply with the business and governance model designed in Phase 1

Phase 3 Create a change management plan to adjust and modify all relevant workflows, achieving the goals

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Recently, results of the phase 2 project have been approved by the PTT board. PTT has completed the restructuring at the N-1 level and will consider further restructuring and improve the issues that can be improved further in 2022.

- **Adjusting the New Core Competency** in line with the organization's latest vision, developing employees' knowledge, skills, and experiences to drive the organization towards its goals. These competencies will be used as foundations for the Success Profile of executives and employees at all levels and all departments of the organization, and as a framework for the development of employee knowledge, skills, experience, and the recruitment of potential new employees to join PTT in the future.

- **Providing end-to-end human resources services** for newly established companies, such as providing human resources policy setting services, for example, regulations/ practices, determining salary structure, and employee benefits. The services also include assistance with HR Shared Services such as recruitment, provident fund registration, social security registration, salary payments, the preparation of various company's practices, and sending PTT employees to assist in various jobs so that the company can continue to operate smoothly during its early stages. Alpha Com, ARUN PLUS, EVME PLUS, and Innobic (Asia) are examples.

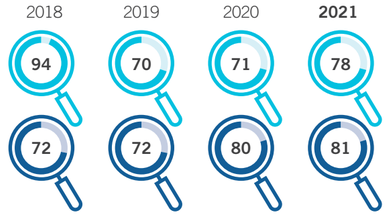
Realign the Recruitment Process for Alternative New Groups of Human Capital to Accommodate for New Business

4.4 8.2 8.5

PTT has a systematic recruitment and selection process. Recruitment is promoted through various channels to match the needs of young applicants and per PTT's vision to achieve the diverse and qualified candidates that the agency needs without gender. These channels are PTT's job website, online job application websites, and Line Official Account @PTT Career. Another method is networking with universities, faculty, and students through activities and projects held by PTT each year, providing lectures, exchanging views, and sharing employees' work. This method promotes the understanding of PTT's operations and what to prepare before entering the job application process. The human resource department cooperates with business units to analyze the requirements, the workforce and capacity needed, and develop a recruitment plan to recruit and select potential candidates that are suitable for the business as much as possible.

Recruitment Rate

Unit: percentage Performance Annual Target



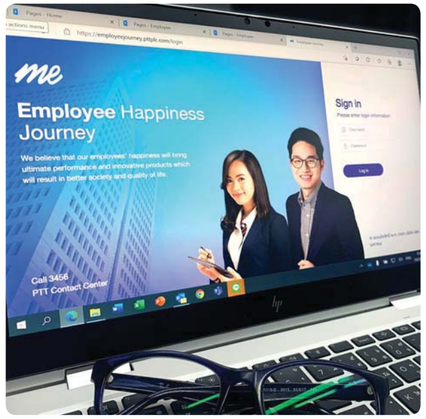
Long-term Target: 100%

Develop Employee Happiness Website

8.2

PTT has developed Employee Happiness Website, a system that uses technology for analyzing and displaying relevant results for each employee, including personal information, information for management, and support information for specific tasks individually. It provides personalized schedule notifications or employee-related information. The website also acts as a public relations channel regarding upcoming activities for employees. These materials are grouped into categories for ease of access for the employees.

In addition, it has cooperated with other PTT agencies to deliver helpful materials, and to improve notification functions to keep employees up-to-date. Employee Happiness Website was awarded by the PTT 5S award 2021 in the Platinum category.



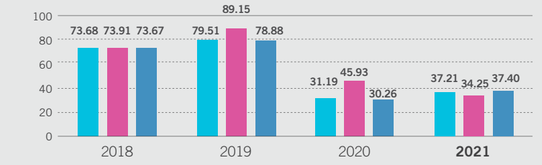
Developing PTT to become the Learning Organization

8.2

PTT focuses on developing employees' capacity at all levels by establishing the PTT Leadership and Learning Institute (PLLI) to promote leadership development and personnel learning through the core curriculum. It consists of leadership development courses and core courses. Training courses are also included to develop knowledge and skills in the profession through courses based on job characteristics to support the current and future business of the organization. The curriculum combines different learning techniques to better suit students according to the principles of adult learning, creating an atmosphere of learning, and exchanging experiences such as generational learning and hands-on learning. Moreover, PLLI uses digital tools to support employees to continue learning outside the classroom. In 2021, 233 virtual classroom training courses have been held in total. PLLI also supports other forms of self-learning to improve oneself and promote unlimited learning such as (1) corporate knowledge e-Learning, (2) Online Learning, a learning resource selected by PTT from outsources in business, technology, skills, lifestyle, and others. (3) PTT e-Library where employees can find, borrow, return books or magazines through the system, and read general books. (4) Podcast, an online audio listing that educates knowledge in various areas which flipped classroom model can build upon. The flipped classroom is a combination of a variety of forms of learning such as virtual classrooms. The employees also have reading recommendations from compulsory course groups to meet the business direction and strategy of the organization, as well as make the most of the development of the potential of employees and modern management. In 2021, there are 2,391 users, 67% of total employees.

Figure 1
Average Number of Training Hours

Unit: hours per annum
Executives & Employees
Executives
Employees



Target: 42 hours per year

Figure 2
Executive & Employees Training Expenses

Unit: THB per person

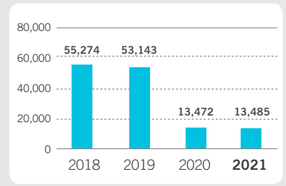
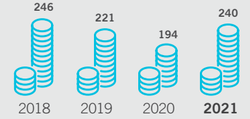


Figure 3
Return on HR Investment

UNIT: Time



Future Plan

With the vision and goals of "To be business partners in human resources and organization development" and to deliver tasks and services that can be adapted according to the situation quickly, multiple plans are proposed. These plans are such as the "Year 1 Modularity HROD Solution" to support the establishment of new companies, a "Support human resources policy" roadmap, and a "Support HR Operations" plan that provides shared services from Business Services Alliance Co., Ltd. (BSA).

READ MORE

For more information, please visit www.pttplc.com under the "Sustainability" tab, "Social" heading, and "Human Resource Management" sub-heading.

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Corporate Citizenship

1.1 1.5 | 2.3 2.4 | 3.8 3.b | 4.1 4.3 4.4 | 6.1 | 7.1 7.2 | 8.3 8.5 8.6 8.9 | 9.5
10.1 10.2 | 11.6 11.7 11.a | 12.b | 13.3 | 14.2 | 15.2 | 17

Opportunities and Challenges

PTT, as Thailand's national energy company, operates business with great devotions not only to ensure energy security and great business performances are being achieved, but also strategize on returning the profits to the community by utilizing its existing capabilities through various processes such as donation and social projects, etc.

Social Projects are aligned with the needs, expectations, and concerns of all stakeholders, gathered through stakeholder engagement with the communities in proximity of the operation areas, the underprivileged, societies, communities, and various networks throughout the nation. PTT's prompt response to any slipups arising from business operations, for example, the leakage of gas pipeline in 2020 providing assistance to livelihood such as relieving victims of natural disaster as well as standing by Thais during the COVID-19 epidemic in the last two years. There were the great challenges and opportunities that PTT had to face in responding to the aforesaid situations in a timely and efficient manner to build relationships, understanding, and create balancing shared values between PTT and the communities, which will ultimately leads to mutual sustainability.

Issue Management

Indicators	Performance Targets: Short-term within 2021	Performance Targets: Long-term	Performance Against Short-term Targets
Number of new hires from Restart Thailand Project	25,000 positions	-	25,489 positions (870 social enterprises positions)
Number of areas developed from PTT Group Smile Giving Project: Smart Farming	No less than 25 areas across the country	-	25 areas across the country
Increase of revenue and decrease of expenses of the communities from PTT Group Smile Giving Project: Smart Farming	More than THB 3 million	-	THB 6.5 million
Budget for investment in social development	At least 1-3% of the net operating profit		2.25%*
Proportion of public donation in relation to the total budget of social operations	No more than 30% of overall budget		27.32%*
Social Impact Assessment (SIA) or Social Return on Investment (SROI)	SROI exceeds WACC		In process
• Functional KPI • Social Strategy Direction Indicators according to the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025"			

Key Action

- Participating in the long-term development of Science and Technology Education through Kamnoetvidya Science Academy (KVIS) and Vidyasirimedhi Institute of Science and Technology (VISTEC)
- Restart Thailand Project
- PTT Group's Smile Giving Project
- Giving Breath Project

Value Creation to Stakeholders : Details to be specified in the implementation of each project

* If the budget for COVID-19 support and mitigation is included, the budget allocation for social investment is 3.75%, and the ratio of public donation to social performance is 56.39%, as planned.

Key Performance

PTT's corporate citizenship projects are still operating on the two dimensions: "People" projects that develop human capital, communities, and society, and "Planet" projects that promote environmental and natural resource conservation and restoration. PTT also continues to encourage community engagement and manage the impacts of business operations to the communities in proximities of such operations, as well as to create the overall shared values for the PTT Group by overseeing the strategies and approaches in leveraging the capabilities and expertise possessed by each company in the PTT Group to assimilate for a holistic approach on social impacts.

In 2021, PTT Group allocated a total of THB 1,271 million, or 3.75% of its net operating profits to social development projects, which is in line with the social development projects budget allocation policy to dedicate at least 1 - 3% of the net operating profit. The budget allocation is as follows: 56.39% for assistances in form of donation; 42.99% for corporate social responsibility projects; and 0.62% for social enterprise projects.

The investment in corporate citizenship for 2021 covered all dimensions as originally planned, but the COVID-19 pandemic caused delays with the project and the overall benefits that the community would have received. Nevertheless, PTT Group is fixated on improving its operation plan to better reflect the situation, and to be able to support all regions to the best of its capabilities throughout the year. The **"PTT Group Giving Breath"** project was launched to aid medical personnel as well as to ordinary citizens to reduce the infection rate and save the lives of those infected in an efficient and timely manner. PTT also initiated projects to help with the economic recovery and the number of hires was increased through the "PTT Group Restart Thailand" project while the "PTT Group's Giving Smile" project developed people's skills for job opportunities. All the above, along with PTT's compliance with the annual control plan, allowed PTT to be placed at number one on the Corporate Reputation indicators, according to the survey conducted by PTT's stakeholders in 2021.

Key Activities and Projects

Developing Human Resource, Community and Society

Participating in the long-term development of Science and Technology Education through Kamnoetvidya Science Academy (KVIS) and Vidyasirimedhi Institute of Science and Technology (VISTEC).

4.1 4.3 4.4 | 9.5

PTT Group funded the longer-term development of science and technology education through Kamnoetvidya Science Academy (KVIS) and Vidyasirimedhi Institute of Science and Technology (VISTEC) from its course launched in 2015 all the way through to 2031, in accordance with the memorandum of understanding. It aims to build the foundation in driving the future of the country by developing research, creating scientific personnel, and international-level technologies.

Benefits to the Stakeholders

- 76 students have graduated from KVIS in 2020 continuing their studies in Thailand and abroad. 71 students have graduated in 2021 (a total of 353, five batches at KVIS).
- 4 Master's degree recipients and 13 Doctor's degree recipients from VISTEC in 2021 (a total of 50 recipients).

ptt Benefits to PTT

348 research projects from VISTEC and PTT Group has employed 22 VISTEC graduates since 2017.

Restart Thailand Project

8.5 8.6

PTT Group assisted with the economic recovery as well as the community by hiring a total of 25,489 workers and employees between 2020 and 2021 with focuses on job creation, generating income and developing job skills for the new generation in all regions.

Benefits to the Stakeholders

1. Hired 22,239 workers through the PTT Group network.
2. Hired 2,595 new graduates/ holders of Vocational Certificate, High Vocational Certificate, Vocational training, and Bachelor's degree who met the criteria to work in their domiciled areas under a 12-month contract.
3. Job openings of 655 positions between 2020 and 2021.

ptt Benefits to PTT

PTT allowed the full potential of new graduates who are residing in various regions to partake in the development of sustainable communities.

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PTT Group's Giving Smile Project

2.3 2.4 7.1 7.2 8.3 8.9 10.1 12.b

PTT partakes in the recovery of the community's economy by increasing income and reducing expenses, as well as promoting the local economy by utilizing the network, knowledge, innovation, technology, and public relations channels as well as the expertise in the two major efforts: Smart Farming and Smart Marketing.

Benefits to the Stakeholders

1. Smart Farming
   In 25 areas across 20 provinces, 25 farmer groups (of more than 200 people) were supported to be Smart Farmers by increasing the earns and decreasing the expenses by more than THB 6.5 million in 2021.
2. Smart Marketing
   - Community products from more than 267 communities (more than 1,500 people) were developed and enhanced in their forms, packaging, and qualities as well as public relations channels and distribution channels.
   - Community tourist destinations in six areas across the nation were arranged so that their standards are recognized on an international level, such as: Bang Luang subdistrict, Chom Thong district and Mae Tha subdistrict, Mae On district, Chiang Mai province; Phi Man subdistrict, Na Kae district, Nakhon Phanom province; Na Haeo subdistrict, Na Haeo district, Loei province; Koh Mak subdistrict, Pak Phayun district and Lam Sin subdistrict, Srinakarin district, Phatthalung province.

For the operation of such projects, 280 new graduates from the Restart Thailand project who were locally domiciled were hired to work on them (144 positions in Smart Farming and 136 in Smart Marketing).

ptt Benefits to PTT

Assisting the local economies of various communities during the crisis.

Natural Disaster Relief

1.5

PTT Group provides reliefs to those who have suffered from various natural disasters with funds, survival kits, and the PTT Group's emergency rescue and response team (PTT Group SEALs), personnel who trained rescue skills and experience to constantly provide aids. In 2021, PTT provided relief kits through the Phalang Thai Jai Asa Club during the flood caused by the tropical storm, Tian Mu, as well as sending in the PTT Group SEALs to assist the victims with various equipment such as emergency vehicles, boat trailers, mechanized boats, and other related safety equipment.

Benefits to the Stakeholders

23,000 natural disaster victims received reliefs from PTT in 2021.

ptt Benefits to PTT

Assisting the communities with better living.

Partaking in the Improvement of Quality of Life of the Underprivileged and Create Economic Opportunities through the Performance of Sarn Palung Social Enterprise Company Limited

1.1 2.3 8.5 10.1 17

PTT Group, which consists of PTT, PTTEP, GC, TOP, IRPC, GPSC, and OR, established Sarn Palung Social Enterprise Company Limited (SPSE) in 2017 to manage and operate the sale of social enterprise products or services of PTT Group in a more centralized and more efficient manner. Performance highlights are as follows:

1. Café Amazon for Chance

The company provided people with learning difficulty permanent income and empowered such groups in the coffee business. Currently, there are eight branches of Café Amazon for Chance, and it has expanded its operation to include delivery channels (via Grab and Lineman), which reduced the operation cost by THB 500,000.

Benefits to the Stakeholders

- Create permanent employment of 23 positions to the underprivileged, 17 of those with hearing difficulties and 3 with learning difficulties and 3 veterans and families.
- 50% in revenue increased or a total of THB 1,932,000.
- Increase the abilities of the underprivileged through the barista training program at Amazon Inspiring Campus (AICA) under the OR's Café Amazon business and training at Café Amazon for Chance. 95% of such employees are also vaccinated again COVID-19.
- Create awareness for the society to learn to live with the underprivileged via interaction at Café Amazon for Chance.
- Social Return on Investment (SROI): 7%

ptt Benefits to PTT

Helping the well-being of the underprivileged. Received the Outstanding Establishment Award for Employment of the Elderly from the Ministry of Social Development and Human Security (MSDHS)

2. Community Coffee Sourcing

Increasing a channel to distribute coffee beans for farmers at a fair price and to promote the cultivation and production of coffee under a sustainable and environmentally friendly system. Developed and promoted skills in the field of coffee cultivation and production of quality coffee as well as promoting strong community integration. Currently, there are total coffee plantation area of approximately 2,700 Rai. In 2021, the company purchased parchment coffee from farmers, processed it as coffee beans, and distributed to Café Amazon for a total of 500 tonnes.

Benefits to the Stakeholders

- 225 households of farmers participated in the project and their household income increased of 10% increase by average, amounting to THB 2,517,170
- Provided training on the processing of Coffea Arabica-quality and cupping, as well as preparing information on coffee bean defects for each individual and how to treat them.
- SROI: 20.7%

ptt Benefits to PTT

Assisting the local economies.

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3. PTT Group Lounge

Opened a lounge and shower rooms at Charoensuk Mongkolchit Cycling Stadium, Suvarnabhumi to support employment of elderly people who still need to earn money to support themselves and build human dignity for being self-reliant.

Benefits for Stakeholders

- Created full-time jobs for five elderly people and THB 780,000 per annum in total. 80% of such employees are vaccinated against COVID-19.
- Build human dignity for being self-reliant.
- SROI: 15%

Benefits to PTT

Assisting the local communities by promoting the well-being of the underprivileged

4. PTT Day Care

Created career and stable income for the Housewives Associate of the State Railway of Thailand and is a model for the government and other private sectors. However, due to the COVID-19 pandemic, it has been temporarily closed as determined by the Ministry of Public Health.

Benefits for Stakeholders

- Created full-time jobs for three underprivileged women and earned an average of THB 13,000 per month per person, and an elderly nurse, or THB 756,000 in total. 100% of such employees are vaccinated against COVID-19.
- Elected by the National Council of Child and Youth Development Organization under the Royal Patronage Her Royal Highness Princess Maha Chakri Sirindhorn to be a model childcare center in the 'Miracle of a Thousand Days' project.
- SROI: 10%

Benefits to PTT

Assisting the local communities by promoting the well-being of the underprivileged

5. PTT Sandbox

5.1 Happy Vegetable Project (Developed from the NGV Marketplace project)

A distribution of organic vegetables and fruits from farms certified by Good Agricultural Practices (GAP) to increase distribution channels and generate income for farmers by using online distribution channels through websites and the LINE application.

Benefits for Stakeholders

- More than 30 farmers participated in the project from seven farms, with them earning an increase of approximately THB 120,000 from selling their products to the project.
- Approximately 935 customers received products that are safe for consumption.
- SROI: 56%

Benefits to PTT

Assisting the local economies.

5.2 Thanyaporn Home for Girls

Promoted and developed working skills for the underprivileged by hiring them to work in restaurants. Products from the Ministry of Social Development and Human Security (MSDHS) are purchased for distribution in the building and the purchase of products from the demonstration plots for use in the cooking and distribution to retail customers. The revenue from previous operation on consignment products was about THB 5,000 per month.

Benefits for Stakeholders

- Employment of two teenagers from Thanyaporn Home for Girls (before the COVID-19 situation was severe again)
- SROI is 20%

Benefits to PTT

Assisting the local communities by promoting the well-being of the underprivileged

5.3 Forest for Chance

It is a green area development service for private customers, using the knowledge and experience of reforestation of the PTT Reforestation and Ecosystem Institute in the form of an enterprise business. Proposals and contracts were signed with four customers with a total testing area of 125 Rai, and total contract value of THB 2,650,590. Began to adjust the first plot area and trees planting was started at the end of the 2020. Once all the plots have been planted with trees, the green area will be increased by 150 trees per Rai, totaling 18,750 trees.

Benefits for Stakeholders

- Employed 45 people from the network of communities and the unemployed as planting workers. The community earned an increase of THB 957,117.89, and purchasing saplings from the community, which increased income for the community by THB 275,465.89.
- Increase the total green area to 105 Rai or 15,750 trees in 2021
- SROI: 108%

Benefits to PTT

Assisting the local communities by promoting the well-being of the underprivileged

Natural Power Project: Clean Energy for the Communities (Hydraulic Ram Pumps)

6.1

To support the water management in highland communities in order to utilize water consumption without a shortage and to reduce the expenses for both households and various agencies. It is also beneficial in preserving the ecosystem, add moisture and prevent forest fires as well.

Benefits for Stakeholders

In 2021, three areas benefited from the project expansion, totaling 38 cumulative project areas. Total raw water delivery capacity at 269,010 cubic meters per annum and the value of water saved at THB 2,690,101 per annum.

Benefits to PTT

Helping with the well-being of the communities and reducing expenses as well as preserving the environment.

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Promoting Environmental and Natural Resources Conservation and Restoration

Partaking in the Increasing and Maintaining the Green Area in Khung Bang Kachao

11.6 11.7 11.a 15.2 17

PTT, the Chaipattana Foundation, network members, inclusive of the private sector, government sector, people's sector, and educational institutions, jointly revitalized the Khung Bang Kachao green area unceasingly. In this regard, OUR Khung BangKachao project by The Chaipattana Foundation and the Royal Forest Department signed a memorandum of understanding for collaboration in the development and restoration of royal green areas under the supervision of the Royal Forest Department Maha Nakhon Central Park Project, Phra Pradaeng district, Samut Prakan province. Besides, the Royal Forest Department and PTT also signed a memorandum of cooperation on green space restoration and learning management projects, Chaloem Phrakiat Park, His Majesty the King's 80th Birthday Anniversary, Song Khanong subdistrict, Phra Pradaeng district, Samut Prakan province, to develop learning a center. In 2021, PTT carried out with such cooperation in developing and managing the learning projects of the Chaloem Phrakiat Park uninterruptedly. As a supporter of the green area operation of the OUR Khung BangKachao project, it has restored 1,200 Rai of royal property green space in the area.

Benefits for Stakeholders

In 2021, 1,200 Rai of green areas were stored

ptt Benefits to PTT

In 2021, 149.8 tonnes of CO_2 equivalent per annum (Carbon Credit) that can be stored (direct and indirect). Good relations form supporting the conservation and restoration of environment with the public and private sectors as well as the people.

Three PTT Nature Learning Centers

13.3 14.2 15.2

Operates through the PTT Reforestation and Ecosystem Institute, which was established to build on the Reforestation Campaign in Commemoration of the Royal Golden Jubilee Project's original mission of one million Rai of permanent forest planting since 1994 by conserving, restoring forests and creating a body of knowledge and distribute the experience of afforestation to the public as well as to create awareness of conservation of natural resources and the environment through the three nature learning centers:

1. PTT Metro Forest, Bangkok. In 2021, received the Thailand Tourism Gold Awards in Tourist Destination for Learning from Tourism Authority of Thailand.

2. Sirinart Rajini Mangrove Ecosystem Learning Center, Prachuap Khiri Khan. In 2021, received the Thailand Tourism Gold Awards in Tourist Destination for Learning from Tourism Authority of Thailand.

3. Wangchan Forest Learning Center, Rayong. In 2021, received the Thailand Tourism Gold Awards in Nature Tourist Destination from Tourism Authority of Thailand.

Benefits for Stakeholders

1,981 visitors for three PTT Nature Learning Centers.

ptt Benefits to PTT

The amount of greenhouse gases that were contained (directly and indirectly) is equivalent to 62,496.12 tonnes of CO_2 equivalent per annum (carbon credits) and good relations in promoting environmental conservation and restoration.

Giving Breath Project

3.8 3.b 17

PTT Group actively supports finding solutions to the COVID-19 pandemic by delivering more than 400 ventilators and high flow oxygen concentrators with liquid oxygen to hospitals in the areas where the pandemic is most severe, whether its Bangkok or the provincial, totaling more than 300 places. It also supported the budget and medical equipment for the establishment of seven field hospitals and collaborated with the Bangkok Metropolitan Administration with organizing proactive mobile vaccine units in four vulnerable and high-risk areas. PTT also gave its full capabilities with assistance during the cooperation with the Ministry of Public Health, Urban Institute of Disease Prevention and Control, National Health Security Office (NHSO), Bangkok Hospital Foundation and Piyavate Hospital in establishing a screening unit and an end-to-end field hospital. PTT Group operates on a "quick examination" method, which is to support the initial examination by using proactive testing to speed up the selection process and quickly isolate infected people from the society; "quick isolation", which encourages green-level infected people to be able to take care of themselves initially at home by providing equipment, medicines, and essential items; and "quick treatment", including supporting medical equipment to increase the capacity of the hospital and increasing the number of beds to accommodate the increasing number of patients. In addition, the project is further extended by establishing the End-To-End Mobile service @1745 to accept people who have tested themselves with ATK test kits and found them to be positive. PTT also stood by to give advice and treatment in comprehensive field hospitals at no cost as well as increasing preventive vaccination services for those who have been tested and found with no infection.

Benefits for Stakeholders

Reduce the chance of infections as well as number of deaths from COVID-19.

ptt Benefits to PTT

Reflects PTT's determination to contribute to society in all dimensions and standing side by side with the nation throughout the crisis, in addition to its role as a national energy company whose main mission is to create energy security for Thai people.

Stakeholder's Comments

Future Plan

PTT remains committed to creating shared values in the PTT Group by utilizing the expertise and capabilities of the PTT Group to jointly solve problems and create values for society. It continues to set guidelines for budget allocation on social investment of at least 1 - 3% of net profit, along with inducing participation and continuously managing the impact of business operations on the communities in proximity to the business operations.

READ MORE

For more information, please visit www.pttplc.com under the "Sustainability" tab, "Social" heading, and "Social Value Creation" sub-heading.

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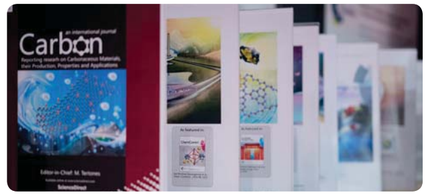
Evolving the Business Model

7.2
8.1

Opportunities and Challenges

PTT monitors and analyzes key global trends such as climate change, technological advancements, population ageing, the growth of new urban economies, changes in consumer behavior and energy consumption, developments in clean energy technology, and government policies to support the transition from fossil fuels to renewable energy, as well as each country's designated pathway to achieving net zero greenhouse gas emissions, are also especially critical to the energy industry. These megatrends are analyzed alongside internal factors such as our new vision and material issues of sustainability, to be inputs in the development of PTT Group's strategy and to seek opportunities to grow our business.



Issue Management

Performance Targets	
Indicators	**Long-term**
Business growth through investments in clean energy and in new businesses beyond energy	More than 30% of profits from new energy businesses and businesses in other industries beyond the energy industry*
Increased renewable energy capacity	12 gigawatts by 2030*

** Long-term targets were defined from the organizational strategic planning done in 2021.*

Key Action

- Seek opportunities to collaborate with different agencies to invest and innovate
- Partner with leading renewable energy companies through joint ventures
- Acquire additional shares in a leading pharmaceutical manufacturer and distributor in Taiwan
- Invest in other relevant businesses.

Value Creation to Stakeholders Increase the share of investment in future energy and beyond

Key Performance

During the strategic planning process in 2021, PTT Group established strategic targets for the year 2030 and adjusted our investment portfolio to align with global trends and our new vision. We aim to increase investment in businesses that respond to the future of the energy industry, such as renewable energy businesses and businesses that support growth in the electric vehicle (EV) market. Moreover, we will explore opportunities in new industries beyond the energy industry that have high growth potential. These include but are not limited to opportunities to apply advanced technologies to extend the petrochemicals business to high value products; opportunities to expand the retail business to better respond to the "new normal" lifestyles of oil and retail consumers; and investment opportunities across the life sciences industry, future food business, logistics and infrastructure business, artificial intelligence and robotics, and digital technology. To realize these goals, we will leverage the expertise and support of our partners in Thailand and abroad. PTT has also established SE-AM KPIs to measure our performance, and in 2021, the indicator for the "Evolving the Business Model" material issue is the percentage of new business investments made by PTT or PTT Group companies that were approved in 2021 compared to the estimate budget for new business investments that are undergoing feasibility studies in 2021.

In line with our new vision, PTT Group developed a five-year, THB 8.6 hundred million investment plan for 2021 - 2025 to support economic recovery, drive forward the development of the target industries of the country, and move towards achieving long-term targets. To that end, we have defined investment portfolio targets and goals that are to be achieved by 2030. We will prioritize investing in assets that deliver high returns while accelerating investment in clean energy businesses and new businesses in order to facilitate the Group's goal to transform our business to support sustainable business growth. Details are presented below;

The strategic direction and targets have been translate d into key enterprise plans. For more information, please see Section 1.1.1, page 40 - 41.

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Governance, Risk Management, and Compliance

16.5
16.6
16.10
17

Opportunities and Challenges

PTT maintains compliance with all relevant rules and regulations, while aligning our practices with national and international good governance principles, in order to respond to changes in external conditions, business context, competition, and government policy, and align our activities with the new vision. To that end, PTT applies corporate governance, risk management, and compliance (GRC) principles across all operations. This includes driving corporate governance integration, managing risks, assessing internal controls as well as anti-corruption, and establishing adequate measures, while following rules and regulations, securing business continuity, and maintaining balance in our roles as a state enterprise and as a publicly listed company. Equally important is our responsibility to secure the confidence of our stakeholders as we drive the organization forward to becoming a role model in good governance, risk management, and compliance, and drive compliance with the policy across all PTT Group companies. In this way, we strengthen the organization's competitive advantage, support sustainable business growth, make certain that our business activities are conducted with transparency and integrity, and put in practice our commitment to oppose all forms of corruption, in order to ensure the fair treatment of all stakeholder groups and build their trust.

Issue Management

Performance Targets			Performance Against Short-term Targets
Indicators	Short-term within 2021	Long-term	
Non-compliance • State Enterprise Assessment Model (SE-AM) KPI* and Corporate KPI • Functional KPI • Governance strategy KPI, according to the "Master Plan on Sustainability Management, Social Responsibility, and the Environment 2021 - 2025" ** Tracks performance in governance of PTT Group companies and compliance.*	Zero incidents in PTT	Zero incidents in PTT and PTT Group	No incident with significant impact

Key Action

- Workplan for good governance, anti-corruption, and assessment of transparency in third-party transactions
- Workplan for risk management, internal controls, and compliance with rules and regulations

Value Creation to Stakeholders Zero non-compliance with significant impact.

Key Performance

PTT established plans and corporate performance indicators for good governance, risk management, and compliance. Key performance in 2021 is detailed below;

1. Corporate governance and anti-corruption:
   - The Board of Director approved the Corporate Governance Policy; the PTT Anti-Corruption Policy; the PTT Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook (CG Handbook).
   - The PTT Management Committee approved the PTT Group Anti-Corruption Policy; PTT's Rule on Complaints and Whistleblowing against Fraud, Malpractice, Misconduct, and Non-Compliance with Laws or Organizational Regulations, B.E. 2564 (2021); PTT guidelines for screening complaints related to fraud and misconduct; and the PTT Fraud and Corruption Risk Assessment Manual.
   - PTT improved the efficiency of corporate governance reporting processes, including processes to report conflicts of interest, asset trading, and gifts received, and the complaint mechanism.
   - PTT participated in the 2021 Integrity and Transparency Assessment for state enterprises. PTT was scored 94.26 points (equivalent to A ranking).

2. Risk management: A review of the internal controls used in the internal processes of PTT and subsidiaries was completed. As part of this review, PTT assessed the efficiency and effectiveness of control measures and developed additional controls to further reduce risks to acceptable levels.

3. Compliance and management of non-compliance incidents: PTT established processes for systematic reporting and management of non-compliance with rules and regulations, which includes complaint investigation and coordination with relevant agencies. These processes serve to correct and prevent non-compliance and minimize the risk of repeated non-compliance incidents. As of present, PTT has not detected non-compliance incidents that had significant impact to the organization.

4. Assessing transparency in third-party transactions: To maintain the trust of our suppliers and stakeholders and strengthen the organization's reputability, PTT developed a framework to assess and manage transparency in third-party transactions. The framework was piloted with two processes – namely, procurement and international trades. The pilot demonstrated that the framework can be applied in practice and is effective in assessing third-party risks.

5. PTT Group Management: PTT relayed relevant policies and management approach to PTT Group subsidiaries, provided guidance and support to help subsidiaries align their practices with communicated policies and approach, continuously monitored performance, and worked to standardize practices across the Group. In 2021, all PTT group subsidiaries according to the governance scope submit implementation evidence for the Strategic Alignment Policy (Must Do Policy)

6. Integration of corporate governance, risk management, and compliance (GRC)
   - PTT promoted awareness and understanding of GRC and advanced organizational GRC culture through organizing corporate communications, trainings, and activities, and enforced strict compliance with GRC policies. Furthermore, PTT emphasized to employees at all levels the importance of whistleblowing and not being a bystander when misconduct is observed.
   - PTT's performance in the organizational GRC culture assessment improved from last year, with assessment scores increasing from 89% to 96% for corporate governance, 88% to 97% for risk management, and 88% to 97% for compliance.

For more information, please see Part 2: Risk Management, Section 1: Business Operations and Performance, and Section 2: Corporate Governance.

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+ 39.8%

Sales revenue of PTT increased from all businesses mainly from International Trading business, Petrochemical and Refining business, and Oil business due to higher average selling prices following the recovered economic activities from last year.

4. Management's Discussion and Analysis (MD&A)

In reading Management's Discussion and Analysis (MD&A), investors are advised to study the supporting documents, including the consolidated financial statements, revised financial information, overall past or revised performance, together with notes to financial statements and this document.

4.1 Management's Discussion and Analysis (MD&A) and Operating Results for Year 2021

Overall Performance of PTT and Its Subsidiaries

Unit: THB million

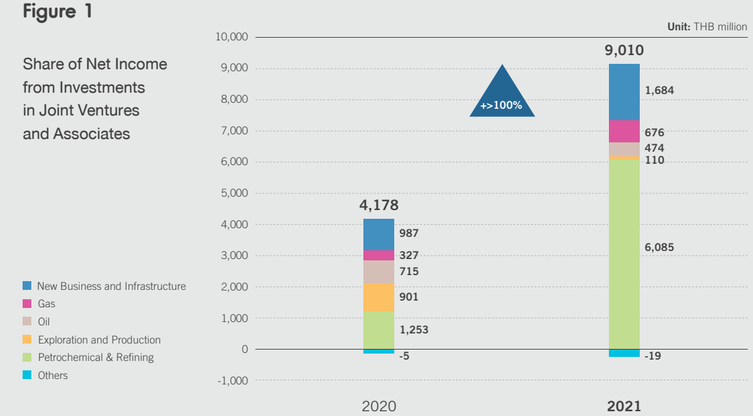
	2020	2021	% Inc. (Dec.)
Sales Revenue	1,615,665	2,258,818	39.8
EBITDA	225,672	427,956	89.6
Net Profit	**37,766**	**108,363**	**> 100.0**
Earnings per share (THB/share)	1.32	3.79	> 100.0

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

EBITDA in 2021 was THB 427,956 million, increased by THB 202,284 million or 89.6%. This was mainly from Petrochemical and Refining business which significantly improved from the increase in Accounting GRM, from loss USD 0.4 per barrel in 2020 to gain USD 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 THB 46,000 million in 2021 following the rise of crude oil price, while in 2020, there was stock loss approximately by THB 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 THB 146,790 million, increased by THB 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.

Figure 1

Share of Net Income from Investments in Joint Ventures and Associates



In 2021, the share of profit from investments in joint ventures and associates was THB 9,010 million, increasing by THB 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.

Loss on derivatives increased by THB 34,224 million, from gain on derivatives of THB 2,266 million in 2020 to loss on derivatives of THB 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 THB 15,739 million from gain on foreign exchange rate THB 9,270 million in 2020 to loss on foreign exchange rate by THB 6,469 million in 2021 mainly due to unrealized loss of US currency loans as a result of THB depreciation compared to THB appreciation in the same period of last year (Thai THB depreciation in 2021 of THB 3.38 per USD, while Thai THB appreciation in 2020 of THB 0.12 per USD).

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In 2021, there was the loss from non-recurring items (PTT's portion) amounting to THB 6,945 million mainly from PTT's Group impairment loss approximately by THB 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 THB 2,900 million and PTT's recognition of Take or Pay approximately by THB 2,700 million together with loss from restructuring of Emery Group of GC approximately by THB 1,000 million. In addition, PTT's write-off on obsolete materials and supplies approximately by THB 700 million while there were PTTEP's gain on bargain purchase in Oman Block 61 approximately by THB 7,000 million, PTT's benefit from discount from production shortfall approximately by THB 1,700 million, gain on disposal of gas pipeline business in Egypt of PTTER approximately by THB 1,400 million and benefit from lawsuit approximately by THB 1,000 million. Meanwhile, in 2020, there was the loss from non-recurring items) amounting to THB 9,478 million mainly from impairment loss on assets approximately THB 9,000 million from PTTGM's coal assets and Mariana Oil Sands Project and Yetagun Project of PTTEP.

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

The corporate income taxes in 2021 was THB 67,590 million, increased by THB 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 THB 108,363 million increased by THB 70,597 million or over 100.0% from the net profit amounting to THB 37,766 million in 2020.

Financial Performance of PTT Group by Business

Unit: THB million	2020	2021	% Inc. (Dec.)
Sales revenue	**1,615,665**	**2,258,818**	**39.8**
Exploration & Production	160,401	219,068	36.6
Gas	403,626	464,038	15.0
Coal	10,779	16,983	57.6
Oil	430,605	513,895	19.3
International Trading	656,218	1,146,564	74.7
Petrochemical & Refining	728,568	1,037,276	42.4
New Business & Infrastructure	76,226	81,262	6.6
Others	3,439	3,558	3.5
EBITDA	**225,672**	**427,956**	**89.6**
Exploration & Production	110,044	164,365	49.4
Gas	54,942	86,497	57.4
Coal	3,176	7,158	> 100.0
Oil	18,098	20,807	15.0
International Trading			
- Excluding effect of FX and derivatives	(766)	10,740	> 100.0
- Including effect of FX and derivatives	3,024	5,436	> 100.0
Petrochemical & Refining	20,638	120,733	> 100.0
New Business & Infrastructure	22,160	20,918	(5.6)
Others	(2,669)	(3,349)	(25.5)
Depreciation and amortization expenses	**139,880**	**146,790**	**4.9**

Unit: THB million	2020	2021	% Inc. (Dec.)
Operating income (loss)	**85,792**	**281,166**	**> 100.0**
Exploration & Production	45,035	94,303	> 100.0
Gas	35,696	67,768	89.8
Coal	1,303	5,404	> 100.0
Oil	12,713	14,899	17.2
International Trading			
- Excluding effect of FX and derivatives	(1,054)	10,536	> 100.0
- Including effect of FX and derivatives	2,736	5,232	> 100.0
: Petrochemical & Refining	(16,554)	81,788	> 100.0
: New Business & Infrastructure	11,703	10,182	(13.0)
: Others	(3,099)	(3,801)	(22.7)
Share of net income from investments in joint ventures and associates	**4,178**	**9,010**	**> 100.0**
Loss on impairment of assets	**11,917**	**13,286**	**11.5**
Gain (loss) on derivatives	**2,266**	**(31,958)**	**< (100.0)**
Gain (loss) on foreign exchange	**9,270**	**(6,469)**	**< (100.0)**
EBIT	**93,652**	**247,821**	**> 100.0**
Finance costs	**28,536**	**28,163**	**(1.3)**
Income taxes	**25,166**	**67,590**	**> 100.0**
Net income	**37,766**	**108,363**	**> 100.0**
Earnings per share (THB/share)	**1.32**	**3.79**	**> 100.0**

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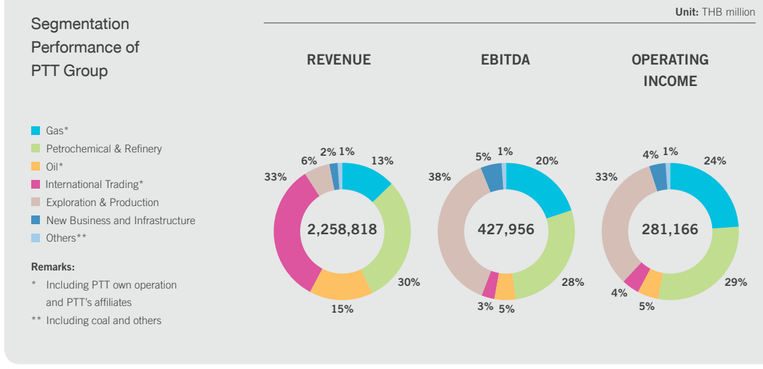
Segmentation Performance of PTT Group

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

Figure 2

Segmentation Performance of PTT Group



Upstream Petroleum and Gas Business Group

Petroleum Exploration and Production Business: PTT Exploration and Production Plc. (PTTEP)

	2020	2021	% Inc. (Dec.)
Average selling price (USD/BOE)	38.9	43.5	11.8
Average sales volume (BOED)	354,052	416,141	17.5

In 2021, sales revenue of PTTEP was THB 219,068 million, increasing by THB 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 USD 38.9 per BOE in 2020 to USD 43.5 per BOE in 2021.

EBITDA in 2021 was THB 164,365 million, increasing by THB 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 THB 94,303 million, increasing by THB 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 THB 10,694 million. However, the income tax increased by THB 22,764 million mainly from better performance and Oman Block 61 Project, loss on financial instruments also increased by THB 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 THB 4,455 million, and impairment loss on assets of THB 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 THB 1,369 million.

Gas Business Group

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

Unit: ton	2020	2021	% Inc. (Dec.)
LPG	2,947,307	3,113,277	5.6
Ethane	2,198,542	2,181,272	(0.8)
Propane	853,025	953,395	11.8
NGL	603,433	617,011	2.3
Pentane	37,161	43,057	15.9
Total	**6,639,468**	**6,908,012**	**4.0**

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

Unit: USD per ton	2020	2021	% Inc. (Dec.)
LPG[1/]	400	639	59.7
LDPE[2/, 3/]	1,010	1,516	50.1
LLDPE[2/, 3/]	867	1,200	38.4
HDPE[2/, 3/]	880	1,182	34.3
Propane[4/]	397	648	63.2

Remarks:

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.

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In 2021, gas business reported sales revenue of THB 464,038 million, increasing by THB 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 THB 86,497 million, increasing by THB 31,555 million or 57.4%. The operating income was reported at THB 67,768 million, increasing by THB 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

	2020	2021	% Inc. (Dec.)
Newcastle index price (USD per ton)	60.4	137.3	> 100.0
Average selling price (USD per ton)	53.8	83.0	54.3
Cash cost (USD per ton)	42.9	49.2	14.7
Sales volume (million tons)	6.4	6.1	(4.7)

In 2021, sales revenue of Coal business was THB 16,983 million, increasing by THB 6,204 million or 57.6% compared with 2020 mainly due to the increase in the average selling prices by USD 29.2 per ton or 54.3% from USD 53.8 per ton in 2020 to USD 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 tons or 4.7% from 6.4 million tons in 2020 to 6.1 million tons in 2021 mainly from cease operating of the Sebuku coal mine since early 2021 despite the increase in Jembayan coal mine following the production plan.

EBITDA in 2021 was THB 7,158 million, increasing by THB 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 THB 5,404 million, increasing by THB 4,101 million in line with the increase in EBITDA. Furthermore, there was an impairment loss on coal assets of THB 8,773 million in 2020, while there was no such transaction in 2021. As a result, the overall performance of Coal business has improved.

Downstream Petroleum Business Group

Oil Business Group

	2020	2021	% Inc. (Dec.)
Average Sales Volume* (Unit: million liters)	**24,400**	**23,145**	**(5.1)**
Average selling prices (Unit: USD per barrel)			
Gasoline	46.7	80.3	71.9
Aviation	44.7	75.1	68.0
Diesel	48.4	76.0	57.0

Remark:
** The average sales volume of domestic oil segment only*

In 2021, sales revenue of Oil business group was THB 513,895 million, increasing by THB 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 THB 20,807 million, increasing by THB 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 THB 14,899 million, increasing by THB 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 liters	2020	2021	% Inc. (Dec.)
Average sales volume	75,527	79,134	4.8

In 2021, sales revenue of International Trading business was THB 1,146,564 million, increasing by THB 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 higher sales volume of crude out-out trading, 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.

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EBITDA, adjusted by the effect of foreign exchange rate and derivatives, in 2021 was THB 5,436 million, increasing by THB 2,412 million or exceeding 100% 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 THB 5,232 million, increasing by THB 2,496 million or exceeding 100% in line with higher EBITDA.

Petrochemical and Refinery Business Group

Unit: USD per barrel	2020	2021	% Inc. (Dec.)
Market GRM	1.0	2.9	> 100.0
Inventory Gain (Loss) excl. NRV	(1.7)	3.3	> 100.0
Hedging Gain (Loss)	0.3	(1.1)	< (100.0)
Accounting GRM	(0.4)	5.1	> 100.0
Refinery Utilization Rate (%)	96.2	95.2	(1.0)

Remark:
** From 3 Refineries: TOP, GC and IRPC*

Unit: USD per ton	2020	2021	% Inc. (Dec.)
Olefins			
Naphtha (MOPJ)	380	646	70.0
HDPE	880	1,182	34.3
LDPE	1,010	1,516	50.1
LLDPE	867	1,200	38.4
PP	992	1,321	33.2
Aromatics			
Condensate	350	596	70.3
PX (TW)	577	859	48.9
PX (TW) – Condensate	227	263	15.9
BZ	485	914	88.5
BZ – Condensate	136	318	> 100.0

In 2021, sales revenue of petrochemical and refining business was THB 1,037,276 million, increasing by THB 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 for 25 days.

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 BZ and PX due to the rise in crude oil price and the increase in sales volume of PX and BZ as economic rebounded.

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

- **Refinery performance** increased, according to the higher Accounting GRM from loss of USD 0.4 per barrel in 2020 to gain of USD 5.1 per barrel in 2021 due to higher stock gain (There was stock gain of USD 3.3 per barrel in 2021 versus stock loss of USD 1.7 per barrel in 2020). Moreover, Market GRM increased from USD 1.0 per barrel in 2020 to USD 2.9 per barrel 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.

New Business and Infrastructure Group

	2020	2021	% Inc. (Dec.)
Power sales volume (GWh)	19,667	20,148	2.4
Steam sales volume (thousand tons)	13,871	15,090	8.8

In 2021, sales revenue of New Business and Infrastructure group was THB 81,262 million, increasing by THB 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 THB 20,918 million, decreasing by THB 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 THB 10,182 million, decreasing by THB 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.

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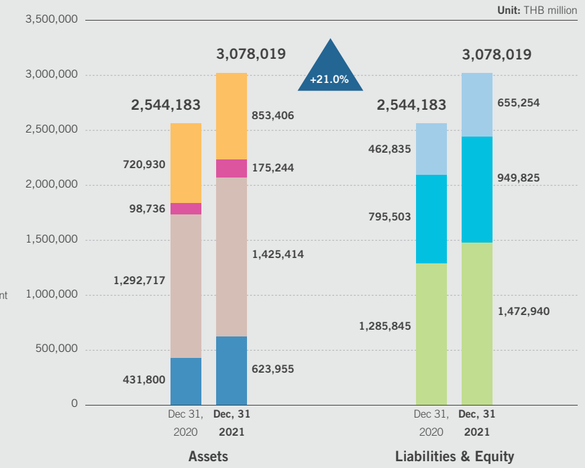
The Analysis of PTT Group Consolidated Financial Position as of December 31, 2021 Compared with December 31, 2020

Figure 2

The Analysis of PTT Group Consolidated Financial Position



Assets

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

- Current assets increased by THB 132,476 million or 18.4% mainly from the following:
  - Cash and cash equivalents and current investments decreased by THB 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 THB 85,715 million mainly from higher average selling prices and sale volume of PTT, GC, PTTT, OR and TOP.
  - Inventories increased by THB 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 THB 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 THB 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 THB 192,155 million or 44.5% mainly from the increase in intangible asset and goodwill of GC from acquisition of Allnex.

Liabilities

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

- Other liabilities increased by THB 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 THB 154,322 million or 19.4% due to the increase in long-term loans and bonds amounting to THB 135,362 million mainly from GC, PTT and TOP. Additionally, short-term loan was increase THB 7,520 million mainly from PTTT and GC.

Equity

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

Liquidity

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

Unit: THB million

	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 THB 322,425 million was derived from THB 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 THB 146,790 million of depreciation and amortization expenses, THB 28,163 million of finance costs, THB 18,978 million of loss on foreign exchange rate. The decrease in net cash flow from operating activities mainly resulted from THB 10,694 million of gain on bargain purchase, THB 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 THB 40,267 million and income taxes paid of THB 50,648 million.

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

- The cash outflow of business acquisition and other long-term investments amounting to THB 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 THB 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 Co., Ltd. (TOP SPP), GC's Olefins Reconfiguration project, LNG receiving terminal at Nong Fab of PTT LNG Co., Ltd. (PTTLNG), and PTT's the 5th transmission pipeline project.
- The cash inflow from short-term investment in financial assets totaling THB 34,304 million, mainly from the investment in fixed deposits, treasury bills and government bonds of PTT amounting to THB 35,741 million.

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

- The net cash inflow of long-term loans amounting to THB 93,760 million mainly from PTT, GC and TOP.
- The net cash inflow of issuance of ordinary shares of subsidiaries amounting to THB 53,800 million mainly from OR.
- The net cash inflow of short-term loans amounting to THB 5,648 million mainly from PTTT and GC.
- Dividend payment amounting to THB 78,469 million mainly from PTT, GC and PTTEP.
- Finance costs paid amounting to THB 29,752 million mainly from GC, TOP, PTTEP, GPSC and PTT.

Managements of the COVID-19 Pandemic Situation

With the new wave of COVID-19 pandemic in 2021, PTT Group manage the crisis in both short and long term, focusing on its competitiveness and resilience through PTT Group Vital Center. The operations covered the following:

1. Workforce Protection: Business continuity management by activating PTT Palungjai Center, to manage the situation of PTT Group by formulating the policy which staff are allowed to work-from-home as appropriate. Work processes have been migrated online, with support of digital tools for efficiency.
2. Strategic Moves: Foster strategic collaboration among PTT Group of companies and improve productivity, including monitoring and adjusting work procedures to further trim expenses of companies, to maintain solid financial standing of PTT Group.
3. Cash & Credit Securement: Focus on maintenance of cash and liquidity of PTT Group by formulating financing plans over short and long terms in tandem with credit risk management and active monitoring of financial risk factors, to reassure PTT's Investment Grade ranking.
4. Supply Chain Management: Collaborated within Petroleum and petrochemicals businesses synergy within PTT Group forging ahead with development and improvement of management across entire supply chain towards efficiency and optimization.
5. Customer Engagement: Improve communications with clients through VDO Conferencing and develop training curriculum for contents to be delivered via VDO Online platform.

In 2021, "PTT Palungjai Center" or "Crisis Management and Business Continuity Plan Center for COVID-19" procured alternative vaccine supply to immunize its workforce and their families. PTT enforced strict disease prevention and control measures inside the PTT complex. Disease surveillance system monitors infection and at-risk individuals. PTT dispatched proactive vaccination units to at-risk community sites to keep infection rates in check, and in support of the country's full vaccination coverage so people can restore normal living as soon as possible.

4.2 Factors that May Impact Future Operations

4.2.1 Factors on Environmental and Social Trend and Impact

PTT frames and assesses material issues in Environmental, Social and Governance Dimension (ESG) that may impact the organization's performance and stakeholders. The process is informed by analysis of internal and external factors, impact analysis of its business on stakeholders throughout the value chain of all business units and divisions, Stakeholder Survey result, standards, regulations, guidelines, along with global trends, directions and risks. These materiality inputs are then incorporated in strategy formulation and risk assessment. In 2021, climate change remains one of the key materiality issues. Particularly after the Prime Minster expressed Thailand's climate commitment at COP26 conference in Glasgow, UK. At the forum, the prime minister announced Thailand's goal to achieve carbon neutrality by 2050 and Net Zero GHG emission by 2065. The pledge deepens the commitment to address climate challenge, and of Thailand's aspiration towards a low-carbon society.

PTT recognizes that managing climate change is a material issue that brings forth both opportunity and challenge, and therefore mainstreaming it as a critical element in strategy and risk management framework through scenarios, defining measures and technology support in risk mitigation and control along with increasing opportunity in new energy business and businesses beyond energy. This is compatible with the direction where Thailand is heading, and with PTT's new vision, as reflected in the consistent commitment of PTT and PTT Group of companies to implement sustainability strategy of "Sustainable Production and Consumption" towards low-carbon society and sustainable business conduct. In 2021, PTT Board of Directors approved PTT's target of Carbon Neutrality by 2040, and Net Zero emission by 2050; and PTT Group's Carbon Neutrality by 2050 and Net Zero by 2060. More details are available under the heading "Driving Business for Sustainability," sub-heading "material issues in sustainability" and "climate measures".

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4.2.2 Financial Support to Affiliated Companies

As of December 31, 2021, PTT provided the following financial support to affiliated companies.

Unit: THB million/ USD million

Company	Currency	Amount	Outstanding Balance		Available Balance
			Shareholder Loan	Others	
Companies with lower than 100% shares					
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	USD	17[1/]	-	-	17
Total	USD	**17**	**-**	**-**	**17**
Wholly owned Company					
PTT Treasury Center Co., Ltd. (PTT TCC)	USD	67[2/]	41	-	-
	THB	215,236[3/]	121,516	-	60,025
Total	USD	**67**	**41**	**-**	**-**
	THB	**215,236**	**121,516**	**-**	**60,025**
Total	USD	**84**	**41**	**-**	**17**
	THB	**215,236**	**121,516**	**-**	**60,025**

Remarks:

1/ According to Construction Cost Undertaking memo among PTT, Petronas and TTM(T) dated November 3, 2010, PTT and Petronas as shareholders must provide financial support pursuant to 50 : 50 shareholding structure in case TTM(T) cannot pay claims filed by project contractor.

2/ According to Shareholder Loan Contract between PTT and PTT TCC dated December 13, 2019, a total of USD 67 million was to support the investment of PTT Group companies.

3/ According to the Shareholder Loan Contracts between PTT and PTT TCC dated November 14, 2019, December 18, 2019, January 4, 2021, April 26, 2021, May 21, 2021, June 22, 2021, July 7, 2021, August 20, 2021, and November 23, 2021, a total of THB 215,236 million was to support the investment of PTT Group companies.

PTT will consider providing financial support in the form of loan, capital and/or trade credit as necessary with conditions comparable to the market, and for long-term benefits of PTT and PTT Group. Such a policy and practice are believed to strengthen PTT Group.

Inter-Company Borrowing and Lending (ICBL)

Unit: THB million

Company	Credit lines PTT can lend to affiliated companies	Credit lines PTT can borrow from affiliated companies	Supported	
			Outstanding balance from PTT	Outstanding balance to PTT
PTT Exploration and Production Plc.	5,000	5,000	-	-
PTT Global Chemical Plc.	10,000	4,000	-	-
Thai Oil Plc.	2,200	2,200	-	-
IRPC Plc.	10,000	1,500	-	-
PTT Oil and Retail Business Plc.	2,000	1,500	-	-
Total	**29,200**	**14,200**	**-**	**-**

As for affiliated companies which PTT has less than 100% stakeholding, PTT has managed short-term liquidity in form of Inter-Company Borrowing and Lending (ICBL) either in THB and/or USD currency under Uncommitted & Unsecured Short Term Loan.

PTT extended ICBL contracts with its 5 affiliates, namely PTT Exploration and Production Plc., PTT Global Chemical Plc., Thai Oil Plc., IRPC Plc., and PTT Oil and Retail Business Plc., after the contracts expired on December 19, 2021, for another period of 1 year starting from December 20, 2021 to December 19, 2022.

4.2.3 Policy and Term of Trade Credit (Credit Term)

Credit management policy of PTT is stipulated with credit criteria and procedures of each business unit that are competitive and comparable to competitors with compatible collection and payment periods and no impact on financial liquidity. Cost and financial risks from foreign exchange are also taken into account.

Financial ratios related to trade credit period during the past 3 years are as follows:

Unit: Day

Financial Ratio	2019	2020	2021	3-year Average
AR days	28.26	31.77	24.95	28.33
AP days	29.37	33.45	30.79	31.20

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4.2.4 Future Investment Plans

The 5-year (Year 2022 - 2026) investment plan of PTT and its wholly owned subsidiaries in an aggregate amount of THB 102,165 million, are detailed as follows:

Unit: THB million

Business	2022	2023	2024	2025	2026	Total
Gas	13,232	17,798	9,989	3,671	821	45,511
Transmissions	9,305	6,974	2,410	1,631	227	20,547
International Trading and Downstream	1,180	383	38	3	-	1,604
New Business and Infrastructure and Head Office	3,862	3,172	660	418	284	8,396
Investment in Wholly Owned Subsidiaries	19,010	2,947	1,546	1,349	1,255	26,107
Total	**46,589**	**31,274**	**14,643**	**7,072**	**2,587**	**102,165**

PTT's investment plan focuses on core businesses for Thailand's energy security, accounting for 65% of total 5-year investment budget. Key projects include Gas Separation Plant (GSP) Unit 7 to replace GSP Unit 1, GSP Unit 8, Liquefied Natural Gas (LNG) Extraction for Ethane and LPG with Ethane Storage and Receiving Facilities to enhance its ethane import capacity), Bang Pakong - South Bangkok Power Plant Transmission Pipeline project, 5th Pipeline, and the investment through its wholly owned subsidiaries i.e. LNG receiving terminal 2 (Nong Fab), Map Ta Phut Industrial Port Development Phase 3, and Laem Chabang Port Phase 3 project.

Additionally, PTT has prepared provisional capital expenditure for the next 5 years amounting to THB 238,032 million mainly for investment expansion into new businesses to align with PTT's vision "Powering Life with Future Energy and Beyond" 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, EV Value Chain project, Life Science (Pharmaceutical, Nutrition, and Medical Device & Diagnostics) to drive life science business in Thailand and ASEAN as well as the investment in Logistics and Infrastructure businesses. Furthermore, there are investments in gas business, the transition fuel, with a focus on the expansion of pipeline network (subject to government approval) and in LNG value chain both in Thailand and overseas.

PTT's sources of fund for investment include net cash flow from operation, debenture issuance or long-term loan. The abovementioned investment plans belong to PTT and its wholly owned subsidiaries. The investment plan of PTT's flagship companies is presented in Section 1.2 Nature of Business/ Supply Procurement/ Distribution.

4.2.5 PTT's Future Major Projects

Transmission Pipeline Projects

- **The 5th Transmission Pipeline (Rayong - Sai Noi - North/ South Bangkok Power Plants)**
  - Total Project Progress as of December 31, 2021: 86.71% (Including 3 phases construction)
  - COD: Year 2022

LNG Receiving Facilities for LNG Procurement/ Import

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 April 11, 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 September 24, 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 Co., Ltd., a new joint venture company between PTT Tank Terminal Co., Ltd. (PTT TANK) and Gulf Energy Development Plc. (GULF) with shareholding of 30%, and 70%, respectively, is to proceed land reclamation with the investment cost of approximately THB 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 THB 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** (Jan 1 - 2: 2 days)			
GSP #3		**TD 70%** (Apr 12: 1 day)	**SD** (Sep 23 - 30: 8 days)	**SD** (Oct 1 - 6: 6 days)
GSP #5	**TD 27 - 50%** (Jan 1 - 9: 9 days)	**TD 50%** (Apr 17 - 27: 11 days)		
GSP #6		**TD 20%** (Apr 13: 1 day)	**Major SD** (Jul 1 - 26: 26 days)	**SD** (Oct 7 - 15: 9 days)
ESP	**TD 40%** (Jan 1 - 2: 2 days)		**TD 60%** (Sep 23 - 30: 8 days)	**TD 60%** (Oct 1 - 6: 6 days)

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Summary Planned Shutdown for Gas Separation Plants in 2022

Plant	1Q2022	2Q2022	3Q2022	4Q2022
GSP #2		**TD** (May 1 - 23: 23 days)		
GSP #3		**TD** (May 1 - 23: 23 days)		
GSP #4			**Major SD** (Sep 1 - 20: 20 days)	
GSP #6				**Major SD** (Dec: 15 days)
ESP		**Major SD** (May 1 - 23: 23 days)		

Remarks:
** TD: Turndown*
*** SD: Shutdown*

Eastern Economic Corridor of Innovation Project (EECi)

The cabinet on June 28, 2016 approved in principle the Eastern Economic Corridor Development Project (EEC) to be ASEAN leading economic zone in order to promote 10 targeted industries as new growth engines in 3 eastern provinces i.e. Chon Buri, Rayong and Chachoengsao. The Ministry of Science and Technology proposed the direction to develop the EEC through technology and innovation with a suitable innovation ecosystem for research and development collaboration among the public sector, the private sector, universities as well as local communities to elevate existing industries and develop new ones in the EEC and other zones nationwide, thereby making Thailand the country of innovation along with the better livelihood of local people through technology and innovation for sustainable development in the future.

The 3,450-rai Eastern Economic Corridor of Innovation Project (EECi) at the Wang Chan Valley has embraced 1,000-rai area for Kamnoetvidya Science Academy (KVIS), Vidyasirimedhi Institute of Science and Technology (VISTEC), and the Wangchan Reforestation Project another 2,450 rai for joint development project between the Ministry of Science and Technology and PTT. Designed to be equipped with science, technology and innovation infrastructure, the Wangchan Valley is prepared to welcome all research, development and innovation in the EECi i.e. Startups and Innovation Center, National Quality Infrastructure, Translational Research Infrastructure e.g. Pilot Plant, Demonstration Plant, Living Lab. To be Thailand's innovation development zone, the Wangchan Valley also contains residential areas, recreational areas, workout areas, hotels and other facilities including international/bi-lingual schools, green areas to accommodate innovators, Thai and expatriate experts, private sector and other target groups.

PTT's Board of Directors on June 15, 2018 approved the investment in infrastructure development project. The infrastructure and public utilities construction was now completed and opened for service in May 2021, with 5 rental space clients. In addition, on January 21, 2021, PTT's Board of Directors approved the investment in EECi Community Zone Phase 1 construction project to support the livelihood of personnel in the area. The EECi project at Wang Chan Valley also officially received the Smart City logo from the Subcommittee on Smart City Driving and Execution on August 13, 2021.

4.3 Important Financial Information

Presented financial position and performance consist of financial performance from consolidated financial statements for the year ended December 31, 2021 audited by certified public accountant, EY Office Ltd., compared with financial position and performance from consolidated financial statements for the year ended December 31, 2020.

4.3.1 Statement of financial position

Unit: THB million

Statement of Financial Position	2019 (Audited)	2020 (Audited)	2021 (Audited)
Assets			
Current assets			
Cash and cash equivalents	292,542.46	332,032.07	312,730.12
Short-term investments in financial assets	-	84,888.67	48,906.98
Current investments	38,263.31	-	-
Trade accounts receivable	167,641.02	110,527.81	196,242.81
Other accounts receivable	49,611.75	51,698.64	64,733.54
Short-term lending	2,669.22	1,718.43	1,579.82
Inventories	117,746.96	93,526.88	168,994.35
Supplies	34,379.14	36,252.19	41,415.83
Current derivative assets	3,686.31	1,629.00	4,072.92
Other current financial assets	6,680.69	1,216.11	2,034.03
Other current assets	3,877.85	4,677.56	9,984.02
Assets held for sale	-	2,763.08	2,711.46
Total current assets	**717,098.71**	**720,930.44**	**853,405.88**

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Unit: THB million

Statement of Financial Position (continued)	2019 (Audited)	2020 (Audited)	2021 (Audited)
Non-current assets			
Other long-term investments in financial assets	-	23,055.49	46,464.44
Available-for-sale investments	6,687.35	-	-
Investments in joint ventures	49,512.82	48,931.85	52,280.02
Investments in associates	25,670.17	26,748.63	76,499.01
Other long-term investments	17,931.83	-	-
Long-term lending	12,474.41	9,631.51	8,623.74
Investment properties	7,987.23	8,026.08	10,458.68
Property, plant and equipment	1,294,979.08	1,292,716.83	1,425,414.44
Right-of-use assets	-	70,830.83	79,420.06
Goodwill	107,197.34	106,994.15	182,651.76
Other intangible assets	79,967.67	68,473.14	144,866.46
Exploration and evaluation assets	87,530.42	86,945.40	104,594.60
Deferred tax assets	47,611.10	54,694.33	63,529.29
Non-current derivative assets	3,810.60	3,514.92	2,594.10
Other non-current financial assets	6,616.48	7,949.89	11,178.89
Other non-current assets	21,889.75	14,739.39	16,037.46
Total non-current assets	**1,769,866.25**	**1,823,252.44**	**2,224,612.95**
Total assets	**2,486,964.96**	**2,544,182.88**	**3,078,018.83**

Unit: THB million

Statement of Financial Position (continued)	2019 (Audited)	2020 (Audited)	2021 (Audited)
Liabilities and shareholders' equity			
Current liabilities			
Bank overdrafts and short-term loans from financial institutions	44,440.53	4,222.87	11,631.87
Trade accounts payable	160,669.13	108,188.92	213,784.47
Other accounts payable	78,396.76	66,684.10	103,079.15
Current portion of long-term borrowings	50,439.93	73,777.91	87,648.75
Current portion of lease liabilities	1,342.43	7,652.91	10,741.80
Short-term borrowings	-	-	111.20
Income tax payable	30,136.90	19,229.93	33,423.50
Short-term provision for decommissioning costs	1,289.37	1,890.06	8,897.75
Current derivative liabilities	2,522.08	3,718.84	4,411.72
Other current financial liabilities	4,163.33	3,863.74	5,928.48
Other current liabilities	6,384.85	7,221.35	11,909.66
Liabilities directly associated with assets held for sale	-	1,575.60	2,085.89
Total current liabilities	**379,785.31**	**298,026.23**	**493,654.24**

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Unit: THB million

Statement of Financial Position (continued)	2019 (Audited)	2020 (Audited)	2021 (Audited)
Non-current liabilities			
Long-term borrowings	555,018.26	664,732.46	786,223.59
Lease liabilities	7,727.51	45,117.01	53,468.02
Deferred tax liabilities	59,199.83	57,904.38	95,944.77
Provisions for employee benefits	32,590.21	34,198.99	36,895.46
Long-term provision for decommissioning costs	90,599.92	96,770.50	84,696.39
Deposits on LPG cylinders	11,656.78	11,873.80	12,157.17
Non-current derivative liabilities	2,702.43	5,428.85	3,714.84
Other non-current financial liabilities	18,948.81	20,073.35	12,222.93
Other non-current liabilities	27,696.28	24,212.22	26,101.70
Total non-current liabilities	**806,140.03**	**960,311.56**	**1,111,424.87**
Total liabilities	**1,185,925.34**	**1,258,337.79**	**1,605,079.11**
Shareholders' equity			
Share capital			
Registered share capital	28,563.00	28,563.00	28,563.00
Issued and fully paid-up share capital	28,563.00	28,563.00	28,563.00
Share premium	29,211.13	29,211.13	29,211.13
Surplus (deficit) from the change in the ownership interests in subsidiaries	(36,250.86)	(31,517.93)	3,095.60
Retained earnings			
Appropriated			
Appropriated - legal reserve	2,857.25	2,857.25	2,857.25
Appropriated - self-insurance fund reserve	1,243.65	1,265.21	1,272.72
Unappropriated	869,016.09	869,260.27	922,091.72
Other components of shareholders' equity	(16,036.15)	(17,598.53)	19,604.80
Equity attributable to owners of the Company	878,604.11	882,040.40	1,006,696.22
Non-controlling interests of the subsidiaries	422,435.51	403,804.69	466,243.50
Total shareholders' equity	**1,301,039.62**	**1,285,845.09**	**1,472,939.72**
Total liabilities and shareholders' equity	**2,486,964.96**	**2,544,182.88**	**3,078,018.83**

4.3.2 Statement of Income

Unit: THB million

Statement of Income	2019 (Audited)	2020 (Audited)	2021 (Audited)
Sales and service income	2,219,738.67	1,615,664.66	2,258,818.49
Cost of sales and services	1,967,529.01	1,446,649.07	1,882,251.51
Gross profit	**252,209.66**	**169,015.59**	**376,566.98**
Other income	20,397.36	18,312.51	28,940.03
Gain (loss) on derivatives	(417.40)	2,266.48	(31,958.11)
Gain (loss) on foreign exchange rates	15,312.83	9,269.53	(6,468.63)
Profit before expenses	**287,502.45**	**198,864.11**	**367,080.27**
Selling and distribution expenses	27,573.73	27,199.41	27,245.59
Administrative expenses	65,002.29	68,791.39	83,044.89
Petroleum royalties	17,882.47	13,398.30	17,978.44
Operating profit	**177,043.96**	**89,475.01**	**238,811.35**
Share of profit from investments in joint ventures and associates	6,007.99	4,177.72	9,010.12
Profit before finance costs and income taxes	**183,051.95**	**93,652.73**	**247,821.47**
Finance costs	27,971.47	28,536.47	28,163.28
Profit before income taxes	**155,080.48**	**65,116.26**	**219,658.19**
Income tax expenses	32,988.88	25,166.50	67,590.57
Profit for the year	**122,091.60**	**39,949.76**	**152,067.62**
Profit attributable to			
Equity holders of the Company	92,950.60	37,765.81	108,363.41
Non-controlling interests of the subsidiaries	29,141.00	2,183.95	43,704.21
	122,091.60	**39,949.76**	**152,067.62**
Basic earnings per share (THB per share)	**3.20**	**1.32**	**3.79**

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4.3.3 Statement of Comprehensive Income

Unit: THB million

Statement of Comprehensive Income	2019 (Audited)	2020 (Audited)	2021 (Audited)
Profit for the year	122,091.60	39,949.76	152,067.62
Other comprehensive income (loss)			
Other comprehensive income to be reclassified to profit or loss in subsequent periods			
Exchange differences on translation of financial statements in foreign currency	(27,899.83)	(828.45)	45,680.23
Gain on measurements of available-for-sale investments	43.16	-	-
Income taxes related to available-for-sale investments	(21.43)	-	-
Loss on debt investments measured at fair value through other comprehensive income	-	(22.00)	(1.94)
Income taxes related to debt investments measured at fair value through other comprehensive income	-	4.40	0.39
Gain (loss) on cash flow hedges	(1,182.55)	(1,487.88)	951.28
Income taxes related to cash flow hedges	(92.55)	447.47	(221.99)
Share of other comprehensive income (loss) of joint ventures and associates	(503.11)	757.89	493.90
Other comprehensive income not to be reclassified to profit or loss in subsequent periods			
Gain (loss) on remeasurements of defined benefits plans	(1,095.55)	(629.88)	4,502.98
Income taxes related to remeasurements of defined benefits plans	408.80	115.58	(1,481.64)
Gain (loss) on equity investments designated at fair value through other comprehensive income	-	(2,906.54)	9,253.35
Income taxes related to equity investments designated at fair value through other comprehensive income	-	66.77	(2,579.07)
Share of other comprehensive loss from joint ventures and associates	(97.64)	(225.87)	76.02
Other comprehensive income (loss) for the years, net of income taxes	(30,440.70)	(4,708.50)	56,673.51
Total comprehensive income for the year	**91,650.90**	**35,241.25**	**208,741.13**
Total comprehensive income attributable to			
Equity holders of the Company	73,509.92	34,485.35	147,818.26
Non-controlling interests of the subsidiaries	18,140.98	755.90	60,922.87
	91,650.90	**35,241.25**	**208,741.13**

4.3.4 Statement of Cash Flows

Unit: THB million

Statement of Cash Flows	2019 (Audited)	2020 (Audited)	2021 (Audited)
Cash flows from operating activities			
Profit before income taxes	155,080.48	65,116.26	219,658.19
Adjustment of profit before income taxes to net cash provided by (used in) operating activities:			
Depreciation and amortization expenses	133,204.18	139,879.64	146,789.78
Loss on disposal of assets	31.18	318.04	121.50
(Gain) loss on disposal of investments	221.28	(1.96)	1,153.21
Gain on change in status of investments	-	-	(503.79)
Gain on bargain purchase	(31.48)	(125.06)	(10,693.78)
Loss on impairment of assets	291.12	11,907.83	13,287.04
Loss on impairment of investment	(434.02)	9.45	-
Share of profit from investments in joint ventures and associates	(6,007.99)	(4,177.72)	(9,010.12)
Provision for employee benefits	7,063.16	2,554.02	3,397.66
(Gain) loss on exchange rates	(8,259.06)	(3,682.98)	18,977.89
(Gain) loss on derivatives	3,123.61	3,605.66	(1,703.37)
Unrealized (gain) loss on fair value of commodity contracts	-	837.92	268.86
(Gain) loss on investments measured at fair value though profit and loss	-	156.28	(52.67)
(Reversal of) expected credit loss of accounts receivable	(77.02)	600.05	(1,603.92)
Write-off exploration assets	2,368.68	1,943.21	6,763.91
Reversal of allowance for changes in value of inventories	(3,079.36)	(468.65)	(163.40)
Allowance for obsolete supplies	453.01	610.67	1,437.61
Dividend income	(383.03)	(620.39)	(457.21)
Interest income	(7,836.97)	(3,933.50)	(2,522.34)
Finance costs	27,971.47	28,536.47	28,163.29
Others	4.46	223.81	31.23
Profit from operating activities before changes in operating assets and liabilities	303,703.70	243,289.05	413,339.57
Net operating assets (increase) decrease	26,662.91	19,155.94	(40,266.64)
Cash received from operating activities	330,366.61	262,444.99	373,072.93
Income taxes paid	(65,259.23)	(43,853.24)	(50,648.24)
Net cash provided by operating activities	265,107.38	218,591.75	322,424.69

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Unit: THB million

Statement of Cash Flows (continued)	2019 (Audited)	2020 (Audited)	2021 (Audited)
Cash flows from investing activities			
Cash payment of property, plant and equipment and investment properties	(144,336.35)	(143,343.98)	(135,677.73)
Cash payment of intangible assets	(2,861.37)	(3,608.60)	(2,466.02)
Cash payment of exploration and evaluation assets	(3,700.25)	(2,929.00)	(4,200.41)
Cash payment of right-of-use assets	-	(457.41)	(280.66)
Cash payment for other long-term investments in financial assets	-	(7,292.63)	(12,242.81)
Net cash payment for business acquisition	(164,377.95)	(1,615.03)	(207,569.37)
Cash payment for contingent considerations from participating interest acquisition in a joint venture	-	-	(1,745.30)
Cash payment of investments in joint ventures and associates	(4,856.29)	(2,569.73)	(50,379.46)
Cash payment of long-term lending	(837.25)	(3.48)	(9,649.61)
Cash payment for derivatives	-	(773.69)	(31.37)
Cash payment of other long-term investments	(2,855.86)	-	-
Cash payment for available-for-sale investments	(241.11)	-	-
Cash proceeds from disposals of property, plant and equipment, intangible assets, investment properties and right-of-use assets	929.64	253.15	372.58
Cash proceeds from disposals of other long-term investments in financial assets	-	15,185.63	4,467.44
Cash proceeds from business restructuring	-	-	1,560.49
Net cash proceeds from asset acquisition	-	-	382.07
Cash proceeds from disposals and capital reduction of investments in joint ventures and investment in associates	488.93	1,182.30	1,774.03
Cash proceeds from disposals of available-for-sale investments	10,693.13	-	-
Cash proceeds from disposal of other long-term investments	28.29	-	-
Cash proceeds from long-term lending	3,490.28	2,274.76	1,221.52
Cash proceeds from derivatives	-	729.98	33.65
Cash proceeds from cancellation of leasehold in gas stations	16.68	1.72	-
Decrease in current investments	108,719.16	-	-
Decrease (increase) in short-term lendings	269.91	-	(12,383.52)
Decrease (increase) in short-term investments in financial assets	-	(53,764.92)	34,304.08
Interests received	6,424.63	2,864.81	2,008.25
Dividends received	4,787.57	5,282.51	5,193.92
Net cash used in investing activities	(188,218.21)	(188,583.61)	(385,308.23)

Unit: THB million

Statement of Cash Flows (continued)	2019 (Audited)	2020 (Audited)	2021 (Audited)
Cash flows from financing activities			
Cash proceeds from issuance of ordinary shares of subsidiaries	18,346.18	267.65	53,800.03
Cash proceeds from resale of treasury shares of subsidiaries	-	-	1,353.93
Cash proceeds from long-term borrowings	174,649.44	210,692.85	207,295.90
Cash proceeds from change in ownership in subsidiaries	3.96	-	-
Cash proceeds from derivatives	-	-	58.28
Cash repayment of long-term borrowings	(101,517.72)	(73,027.21)	(104,120.16)
Cash payment for lease installments	(1,358.24)	(8,371.81)	(9,416.01)
Cash payment for derivatives	-	(481.27)	(179.80)
Cash payment for redemption of subordinated capital debentures	(30,750.89)	(964.92)	-
Cash payment for change in ownership in subsidiaries	(40,806.27)	-	(28.51)
Cash payment for treasury shares	(1,187.60)	-	-
Increase (decrease) in short-term borrowings	(701.55)	(1,124.55)	108.73
Increase (decrease) in bank overdrafts and short-term loans from financial institutions	19,910.18	(40,368.11)	5,539.10
Finance costs paid	(25,462.32)	(26,938.73)	(29,752.34)
Dividends paid	(81,350.83)	(51,624.22)	(78,469.13)
Net cash provided by (used in) financing activities	(70,225.66)	8,059.68	46,190.02
Effects of exchange rates on cash and cash equivalents	(3,075.30)	1,432.81	2,737.22
Exchange differences on translation	(3,230.07)	105.04	(5,014.81)
Cash and cash equivalents classified as held for sale	-	(116.06)	(330.84)
Net increase (decrease) in cash and cash equivalents	358.14	39,489.61	(19,301.95)
Cash and cash equivalents at the beginning of year	292,184.32	292,542.46	332,032.07
Cash and cash equivalents at the end of year	**292,542.46**	**332,032.07**	**312,730.12**

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4.3.5 Financial Results by Business Group: EBITDA and Operating Profit by Segment

Unit: THB million

Earnings before Interest Expenses, Tax, Depreciation and Amortization Expenses, and Operating Profit (Loss) by Segment	2019 (Audited)	2020 (Audited)	2021 (Audited)
Gas business group			
Natural gas procurement, gas transmission and distribution, and gas separation businesses			
Sales and service income	502,110.73	403,626.39	464,037.56
Cost of sales and services	419,035.09	340,201.60	367,916.83
Gross profit	83,075.64	63,424.79	96,120.73
Selling and administrative expenses	12,822.34	9,338.53	10,585.78
Other operating income	1,153.35	855.33	961.68
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	71,406.65	54,941.59	86,496.63
Depreciation and amortization expenses	18,923.61	19,246.05	18,729.02
Total segment operating profit	52,483.04	35,695.54	67,767.61
Petroleum exploration and production business group			
Sales and service income	191,052.73	160,400.68	219,068.07
Cost of sales and services	24,756.76	26,151.93	28,069.32
Gross profit	166,295.97	134,248.75	190,998.75
Selling and administrative expenses	14,210.27	12,577.00	13,963.18
Petroleum royalties	16,944.73	12,798.16	16,994.69
Other operating income	1,712.66	1,170.85	4,324.56
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	136,853.63	110,044.44	164,365.44
Depreciation and amortization expenses	62,810.84	65,009.14	70,062.33
Total segment operating profit	74,042.79	45,035.30	94,303.11

Unit: THB million

Earnings before Interest Expenses, Tax, Depreciation and Amortization Expenses, and Operating Profit (Loss) by Segment	2019 (Audited)	2020 (Audited)	2021 (Audited)
Coal business group			
Sales and service income	15,379.95	10,779.10	16,983.50
Cost of sales and services	10,335.08	6,680.75	7,905.89
Gross profit	5,044.87	4,098.35	9,077.61
Selling and administrative expenses	472.66	378.83	792.83
Petroleum royalties	937.73	600.14	983.75
Other operating income (expenses)	96.98	57.60	(143.02)
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	3,731.46	3,176.98	7,158.01
Depreciation and amortization expenses	2,437.48	1,873.50	1,754.04
Total segment operating profit	1,293.98	1,303.48	5,403.97
Total segment operating profit of upstream petroleum and gas business group	127,819.81	82,034.32	167,474.69
Oil business group			
Sales and service income	579,667.46	430,604.52	513,895.44
Cost of sales and services	542,164.17	395,239.07	475,532.51
Gross profit	37,503.29	35,365.45	38,362.93
Selling and administrative expenses	23,244.82	19,729.63	19,863.47
Other operating income	3,635.34	2,461.94	2,307.80
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	17,893.81	18,097.76	20,807.26
Depreciation and amortization expenses	4,109.28	5,384.88	5,907.80
Total segment operating profit	13,784.53	12,712.88	14,899.46
International trading business group			
Sales and service income	1,085,029.50	656,217.84	1,146,564.16
Cost of sales and services	1,082,185.13	655,525.75	1,133,967.17
Gross profit	2,844.37	692.09	12,596.99
Selling and administrative expenses	9,557.08	11,611.90	6,415.49
Other operating income	6,576.62	10,154.01	4,558.00
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	(136.09)	(765.80)	10,739.50
Depreciation and amortization expenses	118.00	288.39	203.62
Total segment operating profit (loss)	(254.09)	(1,054.19)	10,535.88

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Unit: THB million

Earnings before Interest Expenses, Tax, Depreciation and Amortization Expenses, and Operating Profit (Loss) by Segment	2019 (Audited)	2020 (Audited)	2021 (Audited)
Petrochemicals and refining business group			
Sales and service income	976,149.70	728,567.95	1,037,275.81
Cost of sales and services	908,814.95	688,340.67	888,952.48
Gross profit	67,334.75	40,227.28	148,323.33
Selling and administrative expenses	24,589.89	22,621.98	30,001.98
Other operating income	2,537.72	3,032.96	2,411.92
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	45,282.58	20,638.26	120,733.27
Depreciation and amortization expenses	35,222.68	37,191.67	38,945.25
Total segment operating profit (loss)	10,059.90	(16,553.41)	81,788.02
Total segment operating profit (loss) of downstream petroleum business group	23,590.34	(4,894.72)	107,223.36
New business and infrastructure business group			
Sales and service income	72,685.21	76,226.03	81,262.43
Cost of sales and services	52,586.33	52,442.56	59,699.92
Gross profit	20,098.88	23,783.47	21,562.51
Selling and administrative expenses	2,344.04	2,665.69	3,716.28
Other operating income	734.44	1,041.67	3,071.93
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	18,489.28	22,159.45	20,918.16
Depreciation and amortization expenses	9,229.25	10,456.43	10,735.55
Total segment operating profit	9,260.03	11,703.02	10,182.61
Other businesses group			
Sales and service income	3,403.53	3,439.21	3,557.68
Cost of sales and services	3,569.68	3,422.74	3,758.66
Gross profit	(166.15)	16.47	(200.98)
Selling and administrative expenses	4,824.38	4,170.07	4,716.77
Other operating income	1,986.68	1,484.18	1,568.59
Earnings before depreciation and amortization expenses, finance costs and tax expenses (EBITDA)	(3,003.85)	(2,669.42)	(3,349.16)
Depreciation and amortization expenses	353.04	429.58	452.17
Total segment operating loss	(3,356.89)	(3,099.00)	(3,801.33)
Total segment operating profit before unallocated income (expenses) and intercompany elimination	157,313.29	85,743.62	281,079.33
Add (less) intercompany elimination	(1,545.27)	48.59	87.11
Total operating profit by segment	155,768.02	85,792.21	281,166.44

4.3.6 Financial Ratios

Financial Ratios and Earnings per Share	Unit	2019	2020	2021
Liquidity Ratios				
Current ratio	Times	1.89	2.42	1.73
Quick ratio	Times	1.31	1.77	1.13
Accounts receivable turnover	Times	12.74	11.33	14.43
Collection period	Days	28.26	31.77	24.95
Accounts payable turnover	Times	12.26	10.76	11.69
Payment period	Days	29.37	33.45	30.79
Profitability Ratios				
Gross profit margin	%	11.36	10.46	16.67
Net profit margin	%	5.50	2.47	6.73
Return on equity	%	10.61	4.29	11.47
Activity Ratios				
Return on asset	%	5.04	1.59	5.41
Return on fixed assets	%	10.11	3.09	11.19
Total asset turnover	Times	0.92	0.64	0.80
Solvency Ratios				
Debt to equity[1/]	Times	0.51	0.62	0.64
Interest coverage	Times	12.97	9.74	12.54
Earnings per Share				
Earnings per share[2/]	THB/share	3.20	1.32	3.79

Remarks:

[1/] Debt to equity = Interest bearing debt divided by Total shareholder's equity

[2/] Calculated by the weighted average number of ordinary shares as of December 31, 2019, December 31, 2020 and December 31, 2021 amounting to 28,563.00 million shares.

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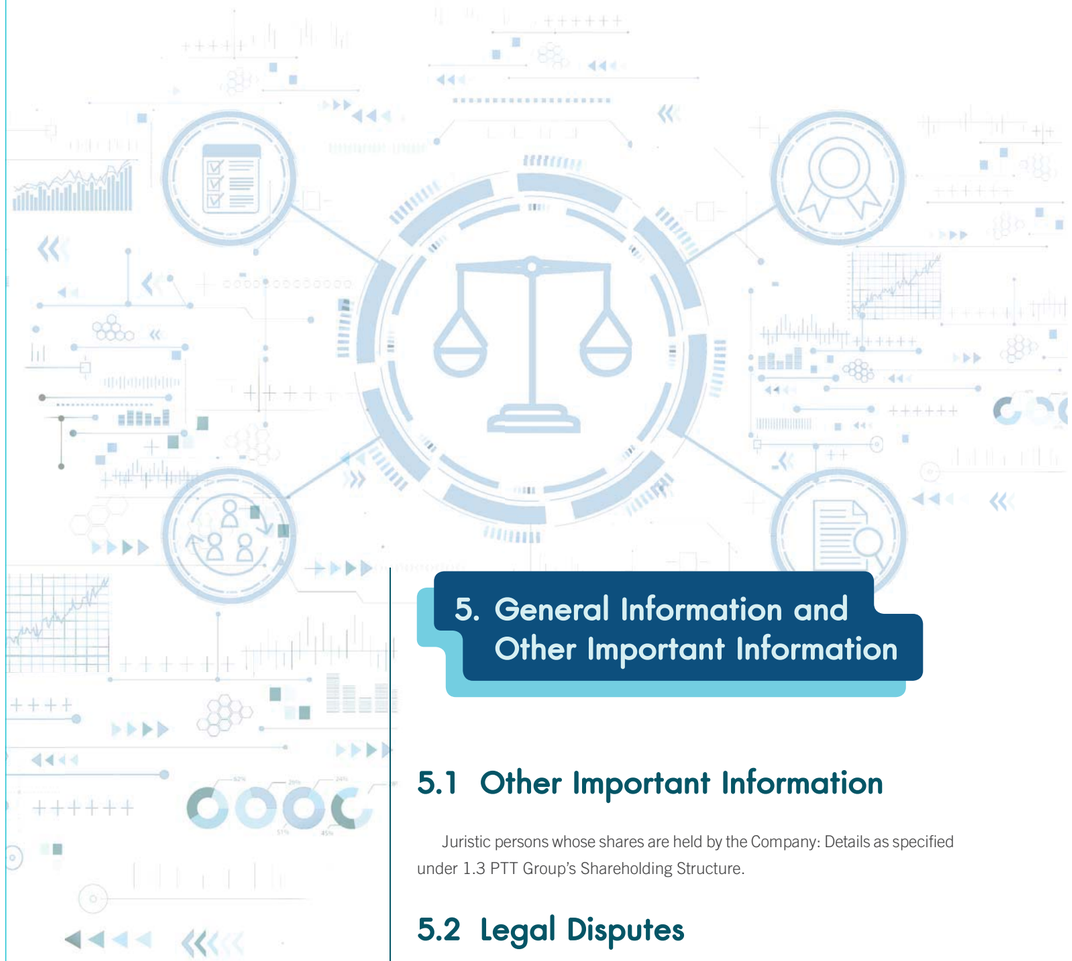

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5.1 Other Important Information

Juristic persons whose shares are held by the Company: Details as specified under 1.3 PTT Group's Shareholding Structure.

5.2 Legal Disputes

As at December 31, 2021, the legal disputes in which PTT is a party in the court cases or arbitration which are lawsuits or disputes that have not been finalized and may have material impacts on the businesses of PTT and which did not arise from the ordinary course of business are as detailed as follow.

5.2.1 Rayong Purifier Plc. filed a statement of claim with Thai Arbitration Center and filed a court case with the Civil Court against PTT Plc. and PTT Aromatics and Refining Plc., demanding compliance with the contract or joint liability for Damages

PTT Aromatics and Refining Plc. had entered into a condensate residue sales contract (CR) with PTT to resell it to Rayong Purifier Plc. (currently RPCG Plc.). The contract term was 15 years with the end of the term being January 31, 2012. The sales contracts were back-to-back contracts. When PTT Aromatics and Refining Plc. had given PTT a notice of non-renewal of the contract, PTT gave Rayong Purifier Plc. a notice of non-renewal of the contract as well. However, Rayong Purifier Plc. viewed that such contract did not specify an expiry date and so Rayong Purifier Plc. submitted a statement of claim with the Thai Arbitration Center and filed a lawsuit with the Civil Court to demand that PTT and PTT Aromatics and Refining Plc. comply with the contract by continuing to sell condensate residue to Rayong Purifier Plc. If the compliance with the contract could not be performed the two parties to be jointly liable for damages. PTT filed a statement of defence with the Thai Arbitration Center and submitted an answer with the Civil Court. Then the Civil Court ordered the temporary dismissal of the case, pending the arbitral award. Subsequently, the tribunal rendered the award that PTT to make partial payment of damages. However, PTT viewed that such arbitral award was erroneous both on factual and legal grounds, and so PTT by the public prosecutor filed a motion to set aside the arbitral award with the Civil Court. On December 16, 2016, Rayong Purifier Plc. filed a motion to enforce the arbitral award with the Civil Court and PTT by the public prosecutor filed an objection with the Civil Court. On September 19, 2019, the Civil Court rendered a judgment to enforce the arbitral award. On March 13, 2020, PTT filed an appeal with the Supreme Court to appeal the judgment of the Civil Court.

On June 23, 2021, the Supreme Court rendered the 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 Rayong Purifier Plc. in the approximate amount of THB 2,200 million within 30 days from the judgment date. On July 23, 2021, PTT exercised right to offset against the amount that Rayong Purifier Plc. was obliged to make payment to PTT in another case, in which the Supreme Court rendered the final judgment that Rayong Purifier Plc. to make the overdue payment for goods to PTT in the approximate amount of THB 2,800 million accordingly. As a result of the offset, Rayong Purifier Plc. will be obliged to make a payment to PTT in the approximate amount of THB 600 million.

Rayong Purifier Plc. sent a letter dated October 28, 2021, to PTT to offer for payment of the remaining debt, allging that such offer was in compliance with the Supreme Court's judgment and the offset agreement dated July 23, 2021. However, PTT considered that the offer was not in compliance with the Supreme Court's judgment and the offset agreement and, therefore, PTT rejected Rayong Purifier Plc.'s offer. However, on November 26, 2021, Rayong Purifier Plc. paid the remaining debt to PTT in approximate amount of THB 618 million which is the full amount according to the Supreme Court's judgment.

5.2.2 NACAP Asia Pacific (Thailand) Co., Ltd. exercised its rights under the contract by submitting a statement of claim in the arbitration process in relation to the Sai Noi – North/South Bangkok Power Plant Gas Transmission Pipeline Contract

NACAP Asia Pacific (Thailand) Co., Ltd. filed claims with the Thai Arbitration Center demanding damages from PTT on the grounds of change orders, additional work, and others under the Sai Noi - North/South Bangkok Power Plant Gas Transmission Pipeline Contract. PTT viewed that such claims were incompliant the contract but also involved assignment of the rights that had not been settled. Then NACAP Asia Pacific (Thailand) Co., Ltd. was ordered by the Central Bankrupty Court to be under absolute receivership and adjudged bankrupt. The official receiver then assumed the proceeding of the arbitral dispute on behalf of NACAP Asia Pacific (Thailand) Co., Ltd. In such bankruptcy case, PTT as a creditor has filed an application for debt repayment. Regarding the arbitral dispute, PTT filed a statement of defence to completely deny all claims made by NACAP Asia Pacific (Thailand) Co., Ltd. together with a counterclaim for damages from NACAP Asia Pacific (Thailand) Co., Ltd. Subsequently, the arbitral tribunal rendered an award that PTT to make partial payment of damages to NACAP Asia Pacific (Thailand) Co., Ltd. However, PTT viewed that such arbitral

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award was erroneous both on factual and legal grounds, and accordingly PTT filed a motion to set aside the arbitral award. NACAP Asia Pacific (Thailand) Co., Ltd. then filed a motion to enforce the arbitral award with the Civil Court. On October 17, 2017, the Civil Court issued an order to enforce the arbitral award with a reduction of the amount to be paid. Nevertheless, PTT filed an appeal with the Supreme Court to appeal the order of the Civil Court. On December 18, 2019, the Supreme Court issued an order not to accept the appeal of PTT. As a consequence, the case became final and PTT therefore was required to pay for damages under the order of the Civil Court. On January 8, 2020, PTT deposited THB 4,543.5 million with the Civil Court for payment of debt under the court's judgment.

5.2.3 Official Receiver in charge of NACAP Asia Pacific (Thailand) Co., Ltd. submitted a statement of claim to arbitration in relation to the Third Onshore Gas Transmission Pipeline Laying Project

As a result of NACAP Asia Pacific (Thailand) Co., Ltd. being ordered by the Central Bankrupt Court to be under absolution receivership and adjudged bankrupt as specified in 5.2.2, the official receiver filed a statement of claim with the Thai Arbitration Center demanding that PTT to make payment for wages and damages on the ground of breaches of contract under the contract of the Third Gas Transmission Pipeline Project (Onshore). PTT viewed that such claims were incompliant with the contract but also involved assignment of the rights that had not been settled and PTT had contentions and claims against NACAP Asia Pacific (Thailand) Co., Ltd. Accordingly, PTT filed a statement of defence to completely deny all claims made by NACAP Asia Pacific (Thailand) Co., Ltd. together with a counterclaim for damages from NACAP Asia Pacific (Thailand) Co., Ltd. Subsequently, on November 30, 2018, the arbitral tribunal rendered an award to dismiss the statement of claim filed by NACAP Asia Pacific (Thailand) Co., Ltd. and to dismiss the counterclaim of PTT. The parties to the dispute had the right to file a motion to set aside the arbitral award with a competent court within 90 days from the date of receipt of a copy of the arbitral award. As for the bankrupty case, PTT has filed an application for debt repayment which is under the process of the bankrupty case. On March 8, 2019, the official receiver of NACAP Asia Pacific (Thailand) Co., Ltd. filed a motion to set aside the arbitral award with the Civil Court and PTT filed an objection. Then on October 6, 2020, the Civil Court rendered a judgment to dismiss the motion to set aside filed by the official receiver of NACAP Asia Pacific (Thailand) Co., Ltd. On January 6, 2021, the official receiver of NACAP Asia Pacific (Thailand) Co., Ltd. filed an appeal with the Supreme Court to appeal the judgment of the Civil Court. On March 30, 2021, PTT, by the public presecutor, filed the defence to the appeal with the Supreme Court. At present, the case is under the consideration of the Supreme Court.

Remarks:

1. *The amounts in dispute are THB 6,576,076,914 and USD 42,574,820.*
2. *The debt for which PTT is seeking repayment in the bankruptcy case under this contract is THB 643,544,641.*

5.2.4 Punj Lloyd Ltd. filed a lawsuit against PTT with the Civil Court on the grounds of termination of the Contract of the Fourth Gas Transmission Pipeline Project

On February 25, 2014, Punj Lloyd Ltd., the construction contractor of the Fourth Gas Transmission Pipeline Project, as a plaintiff, filed a lawsuit against PTT as a defendant with the Civil Court, alleging that PTT had wrongfully terminated the contract and was in breach of the contract, and demanding that PTT pay outstanding wages and damages. PTT viewed that all of its actions had been in compliance with the contract and therefore forwarded the case to the Office of The Attorney General for consideration to arguing the case for PTT and the public prosecutor filed an answer with the Civil Court. Susequently, the Civil Court issued an order to transfer the case to the Central Administrative Court for consideration and judgment because the Civil Court and the Central Administrative Court jointly agreed that this case was an administrative case. The Civil Court has already transferred the case to the Central Administrative Court. At present, the case is under the consideration of the Central Administrative Court. Should the Central Administrative Court rule that PTT was not liable as alleged in the complaint of Punj Lloyd Ltd., the Central Administrative Court shall render a judgment to dismiss the case. On the contrary, should PTT be found liable, the court shall render a judgment that PTT to make payment for outstanding wages and/or wages for additional works and/or damages, the amount of which are within the discretion of the Central Administrative Court.

5.2.5 PTT filed a lawsuit against Punj Lloyd Ltd. with the Central Administrative Court to claim damages under Contract of the Fourth Gas Transmission Pipeline Project

After PTT had terminated the contract with Punj Lloyd Ltd., PTT continued the construction of the Fourth Gas Transmission Pipeline Project until the completion. On June 20, 2018, PTT, represented by the public prosecutor, filed a lawsuit with the Central Administrative Court to demand that Punj Lloyd Ltd. pay damages for breach of contract and abandonment of work under the Contract of the Fourth Gas Transmission Pipeline Project. Then On October 15, 2020, the Central Administrative Court issued an order of joinder that this case to be tried together with the case filed by Punj Lloyd Ltd. (specified in 5.2.4). At present, the case is under the consideration of the Central Administrative Court.

On September 25, 2019, Punj Lloyd Ltd. filed a statement of fact with the Central Administrative Court that on March 8, 2019, the National Company Law Tribunal of India had ordered that Punj Lloyd Ltd. to be under the Corporate Insovency Resolution Process and appointed the Resolution Professional of Punj Lloyd Ltd. in accorddance with India Law. PTT conducted an investigation and found that such statement was true. Subsequently, on November 26, 2019, PTT filed an application for debt repayment with the Resolution Professional in India. At present, the case is pending consideration by the resolution professional of PTT's application for debt repayment. Currently, the Resolution Professional is in consideration of the Company's petition. With regard to the Central Administrative Court's case, the Court is in consideration of the proceedings of the case.

5.2.6 The Office of the Ombudsman filed a lawsuit against the Ministry of Finance, Ministry of Energy, and PTT with the Central Administrative Court regarding division and transfer of properties of the Petroleum Authority of Thailand to the Ministry of Finance under the judgment of the Supreme Administrative Court

On April 4, 2016, the Office of the Ombudsman filed a lawsuit against the Ministry of Finance, Ministry of Energy, PTT and other defendants with the Central Administrative Court as the black case No. 510/2559 requesting the Central Administrative Court as follows:

1) To revoke the Cabinet Resolution on December 18, 2007 and the Cabinet Resolution on August 10, 2010.
2) To order the Minister of Finance, the Minister of Energy and PTT to conduct a separation and transfer of net assets according to the plaintiff's allegation as of September 30, 2001 amounting to THB 68,570 million, including other compensations and benefits.
3) To revoke the separation of public assets and the preferential rights to establish the gas pipeline system according to the plaintiff's allegation.

On May 26, 2016, the Central Administrative Court ordered PTT to submit an answer to clarify the issues relating to the separation of the assets of the Petroleum Authority of Thailand in the part that were public assets to the 1st respondent (Ministry of Finance) in order to confirm whether it has duly complied with the Cabinet Resolution on December 18, 2007 and to what extent. The public prosecutor then submitted the answer and the additional answer with the Central Administrative Court. The court issued an order that the period for fact-finding had ended. On February 25, 2021. The Central Administrative Court rendered the judgment to dismiss the case. The Ombudsman did not file an appeal against the Central Administrative Court's judgment and, thus, the case was final in accordance with the Central Administrative Court's judgment.

5.3 Secondary Market

-None-

5.4 Regularly Contacted Financial Institutions

Bangkok Bank Plc.
333 Silom Road, Silom Subdistrict,
Bang Rak District, Bangkok 10500
Krungthai Bank Plc.
35 Sukhumvit Road, Klong Toei Nuea Subdistrict,
Watthana District, Bangkok 10110
Kasikornthai Bank Plc.
400/22 Phahon Yothin Road, Sam Sen Nai Subdistrict,
Phaya Thai District, Bangkok 10400
Siam Commercial Bank Plc.
9 Ratchadaphisek Road, Chatuchak District, Bangkok 10900
Bank of Ayudhya Plc.
1222 Rama III Road, Bang Phongphang Subdistrict,
Yannawa District, Bangkok 10120

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Corporate Governance

PTT is striving to develop itself into corporate governance (CG) role model. It is convinced that CG under good management will lead to fairness and investors' confidence, create a long-term value for shareholders, boost stakeholders' confidence

Corporate Governance Report of Thai Listed Company (CGR) established by The Stock Exchange of Thailand (SET) and Thai Institute of Directors Association (IOD).

PTT received Excellent CG Scoring.

6. Corporate Governance

6.1 Overview on CG Policy and Guidelines

As the national energy company with a state-owned enterprise and a listed company on The Stock Exchange of Thailand (SET), PTT recognizes its vital mission of good management with transparency, establishing equitability among all stakeholders while striving to develop itself into corporate governance (CG) role model. It is convinced that CG under good management will lead to fairness and investors' confidence, create a long-term value for shareholders, boost stakeholders' confidence, and give the corporation the most suitable, efficient, and effective management system while enhancing its competitiveness for sustainable growth.

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Ever since its privatization into PTT Plc. and distribution of its shares on SET in late 2001, the Board of Directors has adopted CG as its guiding principles by requiring the preparation of business ethics policy and ethics of the Board, senior executives, management, and employees in compliance with CG practices as its code of conduct for organizational standards and proper guidelines. PTT has since issued its CG policy and CG Handbook and delivered to directors, management and employees to sign, acknowledge and comply with. The handbook has been regularly revised to improve the standard of operations to comply with SEC and SET's CG for listed companies (CG Code) as well as comments and recommendations from IOD's CG Assessment Report, including the Organization for Economic Cooperation and Development, the ASEAN Corporate Governance Scorecard (ASEAN CG Scorecard), and the Dow Jones Sustainability Indices (DJSI) together with best practices of leading international companies. The "Corporate Governance, Ethical Standards and Code of Business Ethics Handbook" or CG Handbook is in its 5th revision.

PTT has defined that corporate governance is part of the vision, mission, and values of the organization. The goal is to be a company with sustainable business of continuous growth that drives every life for national economy promotion, according to the vision "Powering Life with Future Energy and Beyond." PTT is ready to meet the future lifestyle, promote the development of innovation and technology (Technology for All) along with creating business cooperation (Partnership and Platform) based on corporate governance (CG), transparency and sustainability.

Corporate Governance Policy

PTT duly reviewed its CG Policy and handbook to suit prevailing laws and good practices, economic and social circumstances and requires all directors, management, and employees to acknowledge it in writing and observe all policies in the course of their work to illustrate the commitment to the practical application of such policy and code of conduct to their jobs. The Board's policy on CG is as follows:

The Board of Directors has adopted CG as its guiding principles by requiring the preparation of business ethics policy and ethics of the Board, senior executives, management, and employees in compliance with CG practices as its code of conduct for organizational standards and proper guidelines.

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1. The Board of Directors (The Board), management, and all employees shall commit to PTT's six Good Corporate Governance Principles, namely Accountability, Responsibility, Equitable Treatment, Transparency, Vision to Create Long-term Value, and Ethics with an organizational structure that fairly balances the roles of the Board, management, and shareholders.
2. The Board shall perform their duties with dedication, responsibility, and independence, and there shall be clear segregation between the role and responsibility of the Chairman and the President & CEO. The Board shall also define the Board's structure, composition, and qualifications for efficient and effective performance.
3. The Board and management shall play a vital role in formulating PTT's vision, strategies, policies, and key plans while taking into consideration risk factors and impacts, and shall oversee, monitor, define and establish appropriate risk management with proper resource allocation, as well as ensure the reliability of accounting systems, financial reports, and accounting audits. PTT shall be engaged in ethical businesses with good corporate citizenship while encouraging innovation to adjust itself amid changes and strengthening sustainable long-term competitiveness.
4. The Board and management shall be the role models for ethics and perform duties under PTT's good corporate governance guidelines as well as oversee and resolve conflicts of interest and connected transactions.
5. The Board may appoint specific committees as deemed appropriate, to assist in prudently reviewing critical matters.
6. The Board shall perform an annual self-assessment to be used as a framework for reviewing the Board's performance.
7. The Board shall establish the PTT's Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook which the Board, management, and all employees must adhere to in parallel with PTT's Articles of Association, regulations, and rules.
8. The Board, management, and employees shall arrange for disclosure of PTT's information, both financial and non-financial, to be carried out adequately, credibly, and timely so that shareholders and all stakeholders may receive such information in a fair and equitable manner. Corporate Communication and Investor Relations shall be responsible for providing the information to investors and the public.
9. PTT's shareholders shall receive equitable treatment and have equal rights to access PTT information and appropriate communication channels with PTT. The Board, management, and employees shall also advocate shareholders' engagement with PTT.
10. The Board shall ensure an appropriate system for the selection and appointment of all key management positions under a fair and transparent nomination process.
11. The Board shall establish an efficient anti-fraud and corruption principle to ensure that the management recognizes and takes anti-fraud and corruption actions, as well as conforming to such measures.

PTT has published the latest version of "Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook" on its intranet and website in Thai and English for the benefit of and reference for Thai and foreign investors and interested parties together with stakeholders.

Policy and Guidelines for the Board

PTT's Board of Directors shall comprise the person who has knowledge, expertise, and experience considered beneficial to the company. They shall devote their time to their duties and endeavor to perform them well. The Board is appointed by shareholders to oversee the company's operations. The Board, in turn, appoints a management team responsible for business operations, the specific committees to oversee the delegated specific matters, the company's auditor, and shall assign the Company Secretary to manage meetings and compliance with laws and regulations. The policy and guidelines for the Board are as follows:

1. Composition, Qualifications, and Appointment of the Board

The Board of Directors, led by the Chairman of the Board, shall direct and control management to ensure the effectiveness and efficiency of operations, achievement of the company's targets and adding value for shareholders, the government, the public, and other stakeholders.

2. Independence of the Board

The Board shall consider, express opinions on, and vote for activities under their authority. If a decision is made under pressure from work, family, or any conflict of interest, it may be made in bias to benefit the directors in question, their family, or other contacts. The independence of the Board must be emphasized to protect the shareholders and the company's benefit. Therefore, any director who is not entirely independent shall not make decisions.

3. Role, Responsibilities, and Authority of the Board

The Board shall act professionally on behalf of shareholders with high responsibility and accountability in order to steer the company in the right direction, make decisions on important matters with care and loyalty, and protect the benefits of all stakeholders. Therefore, the board must perform its duties independently from management. Responsibilities of the Board also include, but are not limited to, overseeing management's operations and results, managing risks, and determining remuneration.

4. Role and Responsibilities of the Chairman

- The chairman is independent from the management and has not been involved in routine management with clear segregation of roles between the Chairman and the management.
- The chairman shall regulate the board for ensuring highly efficient operations. Also, the chairman shall support and provide assistance to the management's operations under the authority delegated by the Board for the achievement of the company's objectives and targets.
- The Chairman shall encourage directors to perform their duties within the scope of duties and authority with due responsibility for shareholders and stakeholders while adhere to PTT's Corporate Governance, Ethical Standards and Code of Business Ethics. The Chairman shall also advocate directors' efforts for promoting a corporate culture of ethics, and good corporate governance.
- The chairman shall determine, together with the President & CEO, the Board's meeting agenda.
- The chairman shall serve as an efficient chairman of the board's meetings and the shareholders' meetings.
- The Chairman shall allocate sufficient time for the management to propose topics and for directors to express their opinions on significant matters in a prudent manner. The Chairman shall also promote constructive relations among directors as well as between the Board and the management.

5. Establishment of Specific Committees

To ensure thorough and efficient examination of the key operation, the Board has established the following five specific committees, namely the Audit Committee, Nominating Committee, Remuneration Committee, Corporate Governance Committee, and Enterprise Risk Management Committee.

6. Board Meetings and Receipt of Relevant Documents and Information

Every board member should attend board meetings on a regular basis. The Office of the President is responsible for coordinating the meetings, arranging the venue, and preparing appropriate documents. Each director shall be informed in advance of the date and agenda of each meeting and receive supporting information.

7. Company Secretary

The Board appoints a Company Secretary, responsible for arranging board meetings and the shareholder's meetings to ensure that they are organized in a transparent way and in compliance with applicable laws and regulations.

8. Evaluation of the Performance of the Board

The Board shall evaluate its performance annually to be used as a framework for evaluating the board's performance, and consider, review and analyze its performance for further improvement.

9. Remuneration of Directors and the President & CEO

The Board and the President & CEO shall not remunerate themselves due to a conflict of interest. However, the board through the Remuneration Committee shall be responsible for determining the remuneration. The remuneration of directors shall propose to shareholders for approval. (Details on remuneration for directors and management are reported under Section 2: **"7.4.2 Policy on Remuneration for Management"** and **"8.1.2 (2) Remuneration for the board"**).

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10. Succession Plan

The Board must ensure that PTT has an appropriate nomination process for key management positions at all levels. The President & CEO will be selected through a nomination process that will consider both internal and external candidates, which follows the Standard Qualifications of Directors and State Enterprise Officer Act. PTT has taken steps to develop its executives and set up Group Leader Development to lay down a succession plan for personnel when the time comes for assuming higher positions that become vacant, namely: the President & CEO, Senior Executive Vice President or equivalent, Executive Vice President or equivalent, and Vice President or equivalent.

11. Directors' Development

PTT desires that the directors shall develop their knowledge, competencies, and skills in terms of business operation, good corporate governance, and other curricula that are beneficial to their performance. To this end, PTT shall support and encourage their training with the Thai Institute of Directors Association (IOD) and other institutions in applicable courses throughout the year, as well as organize regular in-house briefings by inviting experts and consultants to present helpful data for business and directors' performance. For new directors, PTT arranges an orientation program and provides each with a Director's Handbook, documents, and useful information. Lectures on introduction to PTT's business and site visits to PTT's operations are provided within three months of their appointment to establish mastery of the business and various operations' knowledge needed, including policies and practices of good corporate governance.

12. The Criteria for Serving in Various Positions of PTT Group's Executives

Principles for holding a position of director, advisor, qualified person or holding any position in a company, agency or other juristic persons of PTT Group's executives are detailed in accordance with the policies and guidelines of PTT Board of Directors, which are in PTT's Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook, in Thai and English, on PTT Intranet and website.

Governance of Subsidiaries and Associated Companies

Governance Mechanisms

PTT defined a governance policy for PTT Group by preparing the "PTT Way" handbook and the "PTT Way of Conduct" guidelines, which compile work procedures in various aspects of PTT Group so that their work procedures shall be in conformity and unity as a governance tool for PTT and affiliates. All are required to practice and drive toward the same standard across PTT Group through PTT's representative(s) assigned as directors, management, and officers. This way, PTT Group commands unity in action, leading to synergy, enhanced capability, and strength in international competition for PTT Group to in turn lead to joint growth in a transparent and sustainable way.

Below is the scope of PTT Group management, which consists of five governance principles:

1. **Definition of Key Strategic Positions for PTT's executives and employees,** based on the joint agreement of PTT Group or other business terms.
2. **Rules, Regulations, and Policy,** including directives that form part of the governance designed to drive linkages between PTT Group's policy governance and its successful implementation. Such rules, regulations, policies, and directives are to be put into practice and driven toward a uniform standard throughout the group by PTT's representatives assigned to serve in these companies as directors, top executives, management, and officers.
3. **Reporting Line and Performance Management:** PTT Group must report implementation updates under assorted policies to PTT management and/or the Board.
4. **Multi-level Governance:** This is to proceed through governance transfer (PTT Group Way of Conduct) from PTT direct to subsidiaries. PTT authorizes this governance through its executives serving as the top executives there. To this end, such companies must develop their own group governance to convey the PTT Group Way of Conduct concept to its affiliates so that a single standard may govern the entire PTT Group.
5. **Management Committee** such as PTT Group Management Committee (PTTGMC) and other policy committees play a key role in driving the efficiency of PTT Group governance since they represent a forum for consultation and joint definition of business directions. In place is regular performance reporting under PTT Group Way of Conduct by PTT Group to PTTGMC to track business efficiency and effectiveness. PTT also defined the key roles and duties under PTT Group Way of Conduct as follows:

Roles of the Shareholder:

- Appointing the Board to work on their behalf.
- Defining the Company's business direction or deciding on matters of significant impact through shareholders' meetings.
- Attending to exercise their voting rights at shareholders' meetings to appoint or remove directors, appoint the external auditor, and consider matters affecting the company, including dividend payout allocation, definition or amendment of the articles of association or memorandum of association, capital increase or decrease, and approval of extraordinary items.
- Auditing the board's performance.

Roles of the Board:

- Steering the company for sound management by defining objectives and goals, strategies, and policies, and allocating key resources for objective and goal achievement, including monitoring, assessing, and ensuring performance reporting.
- Creating sustainable value for the business, leading to competitiveness and outstanding performance outcomes with due regard for long-term impacts. Engaging in business with ethics and a respect for rights while exercising responsibility for shareholders and stakeholders, among others.
- Ensuring that all directors and management execute their duties of care, loyalty, obedience (compliance with the law, corporate objectives, and articles of associations, resolutions of the Board and shareholders' meetings), and of disclosure (of accurate, complete, transparent, and timely information).
- Assigning explicit scopes of duty to the President and management and monitoring execution as assigned.

Roles of Top Management:

- Managing the company as assigned by the board, specifically by strictly managing the company under the plan and budgets approved by the Board with integrity and honesty, and prudently while acting in the company's and shareholders' best interests.
- Providing linkage of strategies and policies between the company and PTT Group through tangible implementation.
- Executing duties of care, loyalty, obedience (compliance with laws, corporate objectives, and articles of associations, resolutions of the Board and shareholders' meetings), and of disclosure (of accurate, complete, transparent, and timely information).

Policy on Serving as Directors in Other Companies of Directors and Management

This year, PTT had 34 affiliated companies, six of which are SET-listed flagships. PTT, therefore, adopted PTT Group management structure for synergy and alignment of policies. To achieve this, the Board of Directors appointed directors or management team members as directors in these companies to supervise policies and business management which aligned with PTT's policies for the benefit and value addition of all stakeholders. The objectives of such appointments are:

1) To ensure that the management of a given company aligns with the policies of PTT Group, monitor its overall business performance to align with PTT's policy, and institute comparable standards.
2) To establish synergy for the business of PTT Group and add value to all related parties, including Thailand as a whole.

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3) To apply specific expertise in support of business, including financial know-how to improve accounting and financial processes to enable a given company to grow robustly. This includes assistance to companies outside PTT Group. The resulting application of the knowledge and expertise gained from serving in such leading companies will enhance the benefit to PTT and foster cordial relations and business alliances with PTT.
4) This is part and parcel of the responsibility of the directors and management of PTT.

PTT ensures its consideration of executives or outsiders from the Ministry of Finance's (Director's Pool) for appointment within PTT Group, regarded as a state enterprise, based on the act on standard qualifications of state enterprise directors and employees. Chosen directors from the pool must make up no less than one-third of other directors of a given state enterprise. As of December 31, 2021, PTT had 21 members who belonged to the Director's Pool. It also ensures that PTT executives and such outsiders who serve as directors of PTT affiliates serve on no more than three PTT affiliates or other state enterprise affiliates. This is designed to lower risks of conflicts of interest and ensure conformance to applicable laws, as well as to the Cabinet resolution of January 24, 2011, on fraud preventive measures at state enterprises, entitled "The appointment of senior government officials or persons as directors on multiple state enterprises", as proposed by NACC.

In addition, the Board defined guidelines and criteria for serving in various positions by PTT Group's executives. In 2015, the Board decided to adopt them as part of the CG Handbook.

Policy and Guidelines Related to Shareholders and Stakeholders

1) Shareholders' Rights

As the owners, shareholders are entitled to determine PTT's business direction or decide on matters of significant impact. Shareholders' meetings, therefore, serve as their key forums for the expression of views, questioning, and voting apart from the election of directors to supervise PTT's operations on their behalf. Shareholders are entitled to attend shareholders' meetings, take adequate deliberation time, and acknowledge meeting minutes.

Shareholder's Meeting

PTT schedules an Annual General Meeting (AGM) within four months of the annual closing date of its accounting books. For urgent matters that affect or involve shareholders' interests or involve conditions, regulations, or laws that require shareholders' approval, however, it can call an extraordinary meeting of the shareholders (EGM).

This year, the AGM was scheduled for April 9, 2021, at the Bangkok Convention Center, 5th floor, Central Plaza Ladprao, 1695 Phaholyothin Road, Chatuchak, Bangkok 10900 by strictly complying with measures to prevent the spread of COVID-19 and the guidelines of the AGM Checklist of prepared by the Thai Investors Association (TIA), Thai Listed Companies Association (TLCA), and Securities and Exchange Commission (SEC). In 2021, PTT received a full score of 100 points for the 9th consecutive year and no Extraordinary General Meeting of Shareholders was called.

Delivering Meeting Notices

For this year's AGM, the Board meeting No. 2/2564 (2021) on February 18, 2021, resolved to call a meeting on April 9, 2021. Its decision, meeting date, and meeting agenda were disclosed in detail ahead of time by announcing on SET's website to notify shareholders before sending meeting notices. PTT assigned Thailand Securities Depository Co., Ltd. (TSD), its securities registrar, to mail the notices together with agenda details and accompanying documents, supplementary and supporting information for decision-making, opinions of the Board, complete minutes of the last meeting, Form 56-1 One Report, meeting documents, and proxy forms with complete instruction for shareholders more than 14 days before the meeting date. The meeting notices were sent on March 18, 2021, and three days before the meeting, the invitation was announced through one Thai and one English newspaper, each for three consecutive days (March 31 - April 2), to allow shareholders enough time to prepare themselves for the meeting.

The AGM meeting notice and supporting documents were made available at PTT's website (www.pttplc.com) 30 days before the meeting date (starting on March 9).

On the Meeting Date

Before the meeting, the Chairman of the meeting introduced the directors, management, the external auditor, and the legal advisers who served as neutral parties and witnesses. The Chairman then elaborated on the voting and ballot counting for individual agenda items under PTT's Articles of Association as well as voting procedures for each item. Once the information had been provided on each item, the Chairman gave a chance for all attendees to comment or provide recommendations and ask questions, allowing adequate time for debate. This year, for good public hygiene, PTT provided paper and question form online for shareholders instead of using microphones. The Chairman and management answered all questions clearly and precisely, treating all questions with due respect. For the election of directors, individual votes were required.

The Chairman ensured that the meeting proceeded by the order of the agenda and did not add any item without notifying shareholders in advance. If the meeting should decide to change the order of the agenda, it would need, under PTT's Articles of Association, at least two-thirds of the votes of the shareholders in attendance. Alternatively, the shareholders with at least one-third of all subscribed shares may ask the meeting to consider other matters not mentioned in the meeting notice. At the 2021 AGM, the order of the agenda was not changed, and there was no request to consider any other matter.

At every meeting, the minutes must be completely and accurately recorded with the vote tally on each applicable agenda item. As a rule, a shareholders' meeting lasts 3 - 4 hours. The 2021 AGM began at 1:30 p.m., with registration beginning at 11:00 a.m. At the meeting's opening, a total of 1,761 shareholders registered, of whom 126 were shareholders and 1,635 were proxy holders, holding a total of 21,511,481,556 shares, or 75.3124% of the total, which exceeded one-third of all PTT's subscribed shares of 28,562,996,250. Below is a description of meeting attendants and those responsible for issue clarification:

- All 15 PTT directors attended the meeting. The Chairman presided as the Chairman of the meeting with the specific committee chairmen, members, the President & CEO, Chief Operating Officer, Upstream Petroleum and Gas Business Group, Chief of Technology and Engineering Officer, and Chief Financial Officer together provided supporting information on stage and through electronic channel. The Senior Executive Vice Presidents, Executive Vice Presidents, and Management of PTT Group were attended at the front rows to provide information for relevant questions. Independent directors served as proxies for minor shareholders.
- The external auditor from EY Office Limited: Miss Waraporn Prapasirikul.
- Legal advisers from Weerawong, Chinnavat & Partners Ltd. (witnesses in charge of the examination of voting disputes throughout the meeting): Mrs. Veeranuch Thammavaranucupt and Mr. Veerakorn Samranweth.

Shareholder Count (as the AGM adjourned at 3:30 p.m.)

A total of 2,375 shareholders, 152 shareholders and 2,223 proxy holders, attended the AGM, representing a total of 23,539,084,560 shares or 82.4111% of the total shares.

Practical Guidelines for Reporting Conflicts of Interest

As specified in PTT CG Handbook, all directors, management, and employees must prepare reports on conflicts of interest, consisting of annual reporting forms and a new interim reporting format in case of changes. At a given meeting, those with vested interests or conflicts of interest with PTT must inform the meeting to excuse themselves and abstain from voting on each such matter.

At each shareholders' meeting, any director with vested interests or involvement in any agenda item must inform the meeting to excuse themselves and abstain from voting on each applicable agenda item.

Disclosure of Shareholders' Meeting Results

For the 2021 AGM, PTT submitted a summary of AGM resolutions to SET and SEC on the evening of the meeting date (April 9, 2021). It also submitted the minutes of the AGM (each agenda clearly separated, the number of directors in attendance/absence, questions raised by shareholders, and answers from directors, together with the voting tallies of each agenda item) to SET and SEC within 14 days of the meeting. Meeting information, video-recording, photos, and audio-recording are accessible through PTT's website.

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2) Equitable Treatment of Shareholders

PTT treats all shareholders fairly despite their different shareholding proportions and corresponding voting power. Shareholders' fundamental rights are conserved regardless of their gender, age, race, nationality, religion, belief, social status, physical impairment, or political inclination. Information on the shareholders' meeting was announced ahead of the meeting in Thai and English. Directors with vested interests on any agenda item must excuse themselves from the meeting on that item. All shareholders have equal rights to take part in PTT's activities.

Proposing Additional Meeting Agenda Items and Nominating Directors

To enable minor shareholders to take part in business oversight, for the 2021 AGM, PTT has defined the criteria and consideration process for entitling them to propose meeting agenda items or nominate directors in advance, or both, so as to deliberate agenda items that could prove useful to PTT, including the selection of qualified directors to perform their duties efficiently in the best interests of PTT, shareholders, and stakeholders. In practice, shareholders with a combined holding of at least 5% of the total eligible votes or at least 1 million shares held uninterrupted at least one year could propose agenda items or nominate directors before the AGM from September to November 2020, in case the nomination of directors needed the approval of the State Enterprise Policy Committee (SEPC), under the guidelines for the appointment of state enterprise directors under the resolution of the Cabinet of August 6, 2019.

For this year's AGM, PTT posted such criteria on its website and an announcement on SET's website from September 1 to November 30, 2020. However, this attracted no recommendation of such agenda items or nomination of directors, and the Company Secretary duly informed the Board meeting on the matter.

Facilitating Shareholders at the Meeting

Though the AGM was convened under the COVID-19 pandemic, where the safety and health of attendees were crucial, PTT did it best to facilitate all shareholders by manning officers to welcome and take care of them and provided adequate convenience under social distancing measures. Security precautions and emergency contingency plans were in hand. The web-live broadcast was provided on PTT's website. Examination of registration credentials was available seven days in advance. Officers provided photocopying services and verified documents. On the meeting day, registration opened two and a half hours early and extended until the period before the last meeting agenda. A barcode system facilitated registration and voting.

Since most shareholders at the AGM were Thais, it was conducted in Thai. However, for the benefit of foreign shareholders, PTT commissioned the translation of shareholders' meetings, supplementary documents, and relevant documents into English. Its website is also bilingual. It also provided officers with a good command of English on hand at meetings to facilitate foreign shareholders. If shareholders cannot communicate in Thai but want to pose queries or discuss topics at the meeting, PTT arranges for suitable communication and provides translation into Thai both queries and answers for the benefit of other shareholders to preserve their rights and ease communication needs for foreign shareholders.

Appointing Proxies

To maintain the rights of those who could not attend the 2021 AGM in person, they could appoint proxies or delegate their votes to any independent director in attendance. To this end, PTT has specified these independent directors' names on proxy forms defined by the Ministry of Commerce for voting on behalf of shareholders without conditions. PTT treats proxies as if they were shareholders. As a rule, 30 days before each meeting, PTT discloses the proxy form, attached with details and procedures, on its website. Shareholders may make further inquiries about this by phone or through other channels such as PTT's website and e-mail.

3) Roles toward Stakeholders

As the national energy company, PTT accounts for all stakeholders' rights and interests by establishing guidelines for addressing the needs of each group in and outside the corporation, as well as its own responsibility for society and the environment. Stakeholders fall into six groups with a different mission targeted for each group in response to their different needs:

Public Sectors: Ensuring long-term energy security by providing sufficient high-quality energy supply at fair prices to support economic growth.

Societies and Communities: Maintaining an excellent corporate standing in Thai society by exercising environmental stewardship of internationally accepted standards and improve the quality of life for communities and the wider societies.

Investors: Operating profitable businesses that lead to sustainable growth while generating optimum returns.

Customers: Ensuring customer satisfaction and loyalty by delivering world-class quality products and services at fair prices.

Suppliers and Partners: Conducting fair business practice with all partners while promoting trust, good relationship, and cooperation to expand business capability and increase efficiency in long-term business partnerships.

Employees: Promoting capability building professionally and ensuring employees' well-being is level with other leading companies in order to strengthen employee engagement.

Treatment of Six Main Stakeholder Groups

1. Public Sectors

As the national energy entity with a crucial mission to drive Thailand under the national strategies and tasked with a mission to achieve long-term energy security through the supply of energy of sufficient volumes, standard quality, at fair prices, and in support of public policy to promote national economic growth, PTT conducts major operations as listed below.

1) **Energy security:** PTT leverages its investment budget to relentlessly develop energy infrastructure to accommodate rising energy consumption, including growth in gas transmission systems and LNG Receiving Terminal, power plant, and ASEAN LNG trading hub pursuit together with investment in emerging businesses, e.g. battery and renewable energy. In sourcing energy supplies, PTT executes risk management plans for supplies from various sources such as natural gas from indigenous deposits, imports from overseas or power business expansion both domestic and international.

   At the same time, PTT Group established PTT Group Net Zero Task Force (GNTF) to establish a clear target framework for improving climate change solutions to enable Thailand to achieve the Carbon Neutrality goal by 2050 and the Net Zero Emissions target by 2065 according to the policy of the Ministry of Energy.

2) **Continuing and maintaining the existing competitive business and focusing on new businesses that are in line with the future world trends both in energy and beyond,** along with supporting the government's open-country policy, PTT Group has prepared a 5-year investment plan (2021 - 2025) totaling THB 8.6 billion to restore the economy according to the new vision, jointly pushing forward the country's targeted industries (New S-Curve) consisting of investment in future energy such as renewable energy, energy storage system, electric vehicle business, the study of energy from hydrogen, and beyond energy investment such as life science (pharmaceuticals, food and nutrition, medical equipment), expansion of petrochemical business to high-value products with high technology, logistics and infrastructure, including artificial intelligence, robotics, and digital technology.

3) **Public policy support for economic growth and mitigation of COVID-19 impacts** along with support for the national grassroots economy closely with the public sectors. The key actions of 2021 are as follows:

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- **Restart Thailand:** PTT and PTT Group have supported the public policy to restore the economy and help communities and societies through the employment of more than 25,000 positions of labors, staff, and newly graduated at vocational to bachelor's degree levels, focusing on creating jobs, generating income and creating career skills for the new generation in every region, as well as strengthening local communities and Thai economic system. New graduates are employed under a 12-month contract through 3 areas of local community and social development programs: youth education development, local community potential development, and environmental development.
- **State welfare card project - LPG for low-income earners:** Support of partial LPG subsidy, a project under the Ministry of Energy and the Ministry of Finance, was extended to the low-income earners, hawkers, and food stalls with state welfare cards by reducing the cooking gas (LPG) price in the amount of THB 100 per person per month until December 31, 2021, to reduce their cost of living, promote low-income earner business and extend the country's economic breath during the COVID-19 pandemic. PTT has supported that discount since October 2019, a total of 27 months, worth more than THB 11 million.
- **Discount retail NGV prices for public transportation:** Support of discounts of retail NGV prices was extended to operators of public transportation including taxi drivers, mini-buses, BMTA's joint-venture mini-buses, and regular buses, the Transport Co., Ltd.'s joint-venture mini-buses and passenger buses, other mini-buses and tuk-tuks, to help reduce economic impacts of COVID-19. PTT has continuously supported NGV price discounts for over 9 years since 2012, worth THB 18,044 million.
- **Giving Breath Project:** PTT Group alleviated the burden of the government in the fight against the COVID-19 pandemic since 2020 by donating medical equipment to hospitals in severely infectious areas, supporting the budget for the establishment of 7 field hospitals, organized proactive mobile vaccine units, jointly established a free of charge PTT Group end-to-end screening unit and comprehensive field hospital, in the process of "fast screening, fast sorting, fast treatment" with a total budget of THB 1,800 million, with "End-To-End Mobile@1745" hotline.

2. Societies and Communities

PTT is committed to driving Thailand through enhanced national energy security and economic growth in parallel with a better quality of life for society and communities by applying the Sustainable Development Goals (SDGs) of the United Nations, the 2018 - 2037 National Strategies, the result of surveys of PTT Group stakeholders', society's and communities' needs, information on significant economic, social and environmental directions, including anticipated impacts after COVID-19, and PTT Group's expertise as guidelines for social development endeavor. PTT emphasized **implementation in two aspects: human resources, community, and social development** through educational development in sciences and technology fields, including the 21st Century essential skills to support a smooth transition into the future as well as skill development to elevate the life quality of the community to self-reliance through occupational promotion of community projects and businesses, and the promotion of green energy; and **Natural resource and environmental conservation** through increasing and conserving of rural and urban green space and forests with emphasis on community participation in the designing process to maintaining process to reduce impacts of climate change and conserve the eco-system.

Details are as shown in Section 1: Business Operations and Performance **"3. Driving Business for Sustainability."**

3. Investors

PTT remains committed to being an organization that contributes to the economic growth, enhances national competitiveness, develops society, and improves the quality of life while creating innovation and implementing technology in all sectors as well as being a driving force in people's way of life, society, community, environment to move through change under the new vision through the implementation of 4R strategies (Resilience, Restart, Reimagination, and Reform). This would ensure investors of PTT's optimum returns and sustainable growth.

Investors' Activities (Common Shareholders)

Since 2006, PTT has arranged ongoing trips for minor investors to visit its operations, update information, and meet management as well as participate in PTT's CSR activities in Rayong.

This year, due to the continuous outbreak of the COVID-19 pandemic, PTT decided to halt the company site visit to prevent the spread of COVID-19 for the safety of participants.

Shareholders are interested in taking part in the visits next year (2022) can follow project updates and details on PTT's website. PTT reserves the right to invite only those who have never taken part in this activity.

Activities for Institutional Investors and General Investors

In 2021, due to the continuous COVID-19 pandemic, PTT organized activities for institutional investors and general investors via online networks, using modern technology systems for the convenience, speed, and efficiency of 24-hour information access of analysts and institutional investors.

Investors' Activities (Debenture/ Bond Holders)

PTT has issued and offered debentures to shareholders since 2003. This year, PTT redeemed a total of THB 15,230 million debentures. At year-end, PTT's Baht-denominated debentures holders numbered 18,774. Since 2010, PTT has staged ongoing debenture holders' activities to serve as a channel for maintaining cordial relations with them and repay them for the confidence in PTT bonds over the long term. This year's activities were modified to align with the COVID-19 pandemic for the safety of participants by maintaining a diversity of activities to meet the needs of debenture holders, and advanced technology was used. This year activities included:

- Activities to build relationships through online channels by live streaming covering bondholders' interests in various fields such as health, dharma, tourism, etc. Workshops were organized by delivering equipment to bondholders for their participation in the activities at home to reduce the risk of COVID-19 spreading.
- The "Happiness" quarterly magazine is a communication channel of corporate information, energy knowledge, and edutainment articles, which can be followed online.

PTT continues to strive to increase efficiency and enhance the satisfaction of bondholders by developing the service through PTT Debenture Line Chatbot and Mobile Application to be able to send personal notifications when interest payment or redemption is due. In addition, a new privilege program for bondholders has been added. It was completed in October 2021, attracting a lot of interest from bondholders.

4. Customers

PTT divides its market into domestic and overseas with two major groups of customers: Business to Business (B2B), which consists of customers in gas, international trading, and infrastructure businesses, and Business to Customer (B2C), with customers in the vehicles and gas business, where the core products are natural gas, crude oil, petroleum products, petrochemicals, and chemicals.

PTT listens to customer needs and expectations to analyze them through assorted channels, including customer visits, seminars both of onsite and online, opinion surveys, and customer information via online channels which also provide information on competitors, state of competition and technology, customers' behavioral trends and lifestyles, market environment, and future needs of customers. All input is reviewed together with other information, namely situations, and trends of energy economics, public policies, regulations, technological innovations, financial and economic information for the design of products and services that match the needs and expectations of current and future customers.

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PTT constantly developed supporting systems to facilitate and ensure customers' accurate, timely and correct transactions with PTT, including Robotic Process Automation (RPA) in the e-Billing and e-Payment, SMART Deal Recap to support trading processes, and added a new communication channel (LINE Official) to ease contact. In addition, an online training platform was developed for knowledge sharing and experience exchange, where customers can attend various courses online at any time. The Internet of Things (IOT) has been introduced with energy management and energy use enhancement for customers. All of these can foster good relations with customers, leading to repurchases and words of mouth, resulting in engagement with PTT.

PTT also developed a service standard manual and procedure manual that are comprehensive, including manuals on service station standards, gas customers, pipeline emergency response plans, gas pipelines for industrial factories, and procedures for gas metering. It provided its services in compliance with the standard controlled by the Energy Regulatory Commission of Thailand and regularly reported its operations to the commission as required or, in the case of violation of the standard, within the specified period.

In place is PTT satisfaction, dissatisfaction, and engagement assessment versus competitors via the annual satisfaction survey, featuring constant query development. Customers' satisfaction and dissatisfaction have been regularly compiled and analyzed for product and service proposals or prompt problem-solving.

The impact of the COVID-19 pandemic directly affects the implementation of normal customer relationship plans, such as visiting each country, trade discussion, international trade seminar participation, and annual customer seminars. PTT has thus modified relationship fostering activities by focusing on online meetings and communication, together with the policy for employees to meet and build relationships with customers on a regular basis as well as follow-up on solving various problems for customers instead of direct meeting with customers due to cross-country travel restrictions. Video clips were created to express concern and good wishes for customers to maintain a high level of their satisfaction.

PTT classifies complaints by severity of impact, by defining service level agreements for each type of complaint. Related units must resolve problems within a given period. All complaints must be initially addressed within 24 hours, and after problem resolution, an inquiry of customer satisfaction with PTT's problem-solving will be made. At the same time, customers will learn of PTT's long-term problem-solving plans for their confidence and satisfaction to ensure customers' continued buying of PTT's products and services.

Customer Satisfaction Survey (%)

	Natural Gas					Trading
	Natural Gas	Power Plants and Wholesale	Industry	Petroleum and Petrochemical Products	NGV	
2021	92.2	90.8	92.6	91.3	90.2	99.3
2020	91.8	89.9	92.4	91.7	88.4	95.6
2019	92.2	90.6	92.7	93.1	88.4	96.2

5. Suppliers and Partners

Since supplies and partners are key to business success through mutual support, PTT values and treats them fairly through fair competition, mutual respect, and good cooperation. PTT strictly complies with contracts and procurement processes since they are vital to the determination of expenses and the quality of PTT products and services. A clear procurement procedure is in place to ensure transparency, accountability, and maximum benefit.

To achieve its resolution, PTT is committed to doing business for sustainable growth in parallel with good governance for communities, society, and the environment. It, therefore, values supply chain management such that it is clearly in place by developing risk management processes and mitigation of impacts arising from business partners' conduct to support the success of supply chain management. The key factors for the drive are as follows:

1. Business policy and directions

This means PTT's policies and strategies are key factors for forging awareness among employees and society of PTT's commitment and business directions. Therefore, PTT issued a **PTT Group policy on procurement and sustainable supplier management** in 2015.

To provide PTT's business partners with guidelines for conducting business in accordance with corporate sustainable management concept, PTT revised the **PTT Supplier Sustainable Code of Conduct (SSCoC)** and announced its third edition on August 3, 2015, defining the contents and scope under applicable regulations and laws, together with the aspects taken seriously by PTT, consisting of 4 main topics:

1. Business Integrity
2. Corporate Social Responsibility
3. Safety
4. Environmental Management

2. Sustainable supplier selection and management process development

For supply chain management to be in line with the organization's direction, PTT has established guidelines for supplier management that take into account environmental, social, and governance (ESG) impacts. Assessing risks and impacts from the perspectives of the environment, society, and oversight of goods and services groups, PTT divides business partner management into critical, key, and managed (in order of potential severity of impacts) levels. For those in the critical group, management actions will be more intensified than the other groups. Besides, formally acknowledging PTT Supplier Sustainable Code of Conduct, they must respond to the Sustainability Performance Assessment Form. After self-assessment, if they fail, they will need to formulate ESG Corrective Action Plans. PTT reserves the right to audit business partners' self-assessment outcomes. In 2021, PTT team in conjunction with a third-party agency conducted sustainability assessments of 14 "Critical" business partners. Overall, their scores passed the criteria set by PTT. A project designed to develop suppliers' sustainable operation caliber was launched, under which PTT selected major business partners whose operations involved ESG for training on sustainability capability development and practices and sustainability capability self-assessment for development planning in line with PTT's policy. In addition, PTT has PTT Green Procurement policy conforming to the public sector. A system was developed in support of green procurement through the PTT Vendor Management System, which compiles green spending data. As of the year-end, 21 tasks were related to such green spending and green products, valued at some THB 128 million.

PTT and PTT Group seriously take the reduction of risks in product/ service supply, boosting of confidence in supplier services, and sustainable procurement of international standards of PTT Group. This year, PTT prepared PTT Group Sustainable Procurement Manual in line with the standard criteria of ISO 20400:2017 Sustainable Procurement and applied the ISO 20400:2017 criteria with the joint procurement with three groups among PTT Group. It planned to extend this practice to cover all business groups in 5 years.

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In addition, to illustrate PTT's transparency and confidence in business operation, PTT joined public agencies in preventing and suppressing corrupt practices by signing a memorandum of cooperation on driving such actions with the Office of the National Anti-Corruption Commission (NACC), State Enterprise Policy Office (SEPO), and other state enterprises to ensure that the national strategy on prevention and suppression of corrupt practices, relevant measures, relevant government policies, and action plans are successfully driven to implementation in state enterprises under CG. To this end, for the provision and disclosure of information on procurement, PTT disclosed related data in compliance with the announcement of the Official Information Commission on the requirement that information on the outcomes of procurement deliberation of public agencies must be open to the public under Section 9 (8) of the Public Information Act of B.E. 2540 (1997). Disclosure is to be done monthly through www.pttplc.com for public examination. Note that PTT's procurement information disclosure is subject to annual assessment through a project on State Enterprise Integrity and Transparency Assessment (ITA), sponsored by NACC. This year's score for PTT was 100% on procurement information disclosure, based on the assessment of visual evidence inspection.

Since August 24, 2017, PTT has complied with the Public Procurement and Supplies Administration Act, B.E. 2560 (2017). It amended its own processes by requiring the disclosure of its annual procurement plan for interested parties to join price bidding contests at PTT and manage their bidding readiness. PTT has disclosed its 2021 annual procurement plan via three channels: www.pttplc.com, e-Government Procurement (e-GP) of the Comptroller General's Department, and bulletin boards at PTT offices.

PTT has appointed Procurement Governance and Audit Committee to ensure transparency of procurement, both those requiring compliance with Public Procurement and Supplies Administration laws and those direct commercial procurement requiring compliance with PTT regulations already approved by the Public Procurement and Supplies Administration Policy Committee. The committee consists of executives from procurement and legal units and the Office of Corporate Audit, charged with roles and responsibility for governing and audit procurement processes to ensure compliance with laws, regulations, criteria, and relevant processes. Annually, the committee inspects procurement processes randomly to detect deficiencies, causes, and preventive measures. In 2021, management committed to the vision of being a transparent organization, requested each department to set KPIs for procurement compliance to ensure that procurement is worth the value, transparent, fair, efficient, effective, and auditable.

PTT has improved Material Received (MR) on the web, through which user units assess business partners in assorted aspects, including quality, delivery, service, performance, Safety, Security, Health, and Environment (SSHE). Assessment outcomes would be released to business partners for further sustainable efficiency improvement.

PTT has integrated PTT Approved Vendor List (PTT AVL) as part of the PTT Vendor Management (PTTVM) system to facilitate the procurement process for business partners to have access to a single system and promote partnership. In addition, business partners can place and redeem their collateral through PTT Electronic Bank Guarantee (PTT e-BG) system via blockchain and other types of collateral. This results in timesaving in their transactions, increasing business opportunities, and the efficiency of contract management for both business partners and PTT.

3. Capability Development of relevant parties

Since the mastery and caliber of relevant parties represent another key factor driving the success of this matter, PTT values **capability development on procurement and management of business partners** by PTT's own executives and staff in a systematic and suitable way. This is achieved through training, communication, and knowledge management (KM), to achieve the sustainability objectives of business partner management. PTT and PTT Group conduct annual reviews and plans for the development of employees in the procurement profession to empower employees to effectively support the transformation of the organization. The focus is on enabling employees to apply information technology systems in conjunction with expertise in working under the Digital Procurement program, developed by PTT for the systematic and flexible operation of goods and services procurement process, thereby reducing work time. To increase employee efficiency and effectiveness, the focus is on enhancing their understanding of laws and practices related to the procurement process to empower them to carry out procurement operations more accurately, quickly, and efficiently.

In 2021, PTT organized additional training courses, such as sustainable procurement guidelines, ISO20400: 2017 Sustainable Procurement, to provide employees with knowledge and understanding of sustainable procurement principles according to international standards, development of sustainability auditors to assess the sustainability performance of PTT Group business partners or PTT Group ESG to equip employees with knowledge and understanding of the assessment criteria, auditing basic principles, guidelines and processes of a good auditor, which can be adapted or integrated into the sustainability vendor audit process, as a guideline for developing each business partner to conduct business in a sustainable manner.

To create an exchange of information and knowledge among PTT and business partners and develop their potential to be ready to support PTT in terms of operating results, business continuity as well as social responsibility, PTT organized a supplier seminar every year. In 2021, PTT communicated the direction of its business operations, giving opportunities to business partners who are important stakeholders of PTT to exchange procurement information. PTT has applied technology in the procurement process for transparency while developing various systems under the Digital Procurement project, to support internal and external operations. PTT Vendor Management system was introduced to enable business partners to conveniently and quickly access procurement work with PTT, including conducting business under the principles of governance, risk management, and compliance (GRC) without corruption. An appropriate complaint channel was provided as well as the management of sustainability and human rights in the supply chain, which PTT has taken seriously. PTT is ready to support suppliers and business partners as joint alliances. This is in line with PTT's stakeholder management vision that aspires to be an organization that Thai people trust and rely on to drive the future towards a clean society and environment for sustainable business growth together with the strategy of "understanding, accessing, interdependent." Supplier Seminars were organized online 3 times using teleconference technology due to the COVID-19 outbreak for the areas of Head Office, Rayong Gas Separation Plant, Gas Transmission, Gas Distribution, and Natural Gas for Vehicles.

PTT requires bidders to strictly conform to the rules of work safety and handling of tools, as well as other regulations, particularly the types of work affecting health, safety, and the surroundings. PTT visits business partners' sites to assess their capabilities, particularly those on the Safety, Security, Health, and Environment side. In addition, business partners' employees must undergo the do's and don'ts on PTT's sites in addition to conforming to the requirements for entering sites to work, as described for each.

PTT Approved **Vendor List (PTT AVL)** is prepared for the benefit of procurement through bidding to ensure that, under the process to determine business groups and procedures or methods of selecting business partners to register for PTT AVL, business partners are efficient and deliver products/services that meet PTT's requirements and foster sustainable partnership with PTT. This year the PTT AVL consisted of 294 companies from 23 business groups.

To ensure efficient preparation of PTT AVL, PTT considers the criteria, conditions, qualifications of business partners who apply to PTT AVL in each business group. The initial qualifications of the business partners must meet the following requirements:

1. Business partners must never have abandoned the work of PTT, the public sector, state enterprises, and government agencies.
2. If business partners were removed from the Vendor List, they would have no right to apply for registration in that particular business group for three years. An exception applies if the removal was the result of abandoning the work of PTT, state enterprises, and public agencies, in which case PTT will not accept them to PTT AVL until PTT receives a letter proving the cancelation of such removal.
3. Business partners must understand and acknowledge PTT Suppliers' Sustainable Code of Conduct (SSCoC).

Apart from these initial criteria, PTT assesses business partners' operations and sustainable implementation in parallel.

After business partners deliver products/ services in each allotment, PTT will assess and notify them of the strengths/ improvements to make in operation for future supplier development.

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Moreover, PTT supports Thai suppliers of goods and services and gives them the top priority. Past procurement information reveals that PTT has procured about 97% of local products, generating cash flow in the Thai economic system, promoting procurement of products from the areas where PTT sites are located, and promoting jobs and generating income for people in the communities.

6. Employees

Employee data are reported under Section 7: **"7.5 Employees."**

Respect for Universal Human Rights Principles (Code)

With the rollout of the human rights management system in 2016, PTT has reviewed risk aspects on human rights covering PTT Group's business operations under PTT Group Way of Conduct of 17 companies in 21 countries, or a total of 50 areas. What the Group found were aspects that represented core operational risks: safety and occupational health, migrated labor, security, suppliers' workplace conditions, the standard of living of communities, and the rights of natives. Control measures have been developed and applied along with human rights management plans to keep risks manageable. As an assurance of maximum effectiveness, the implementation of this plan is to be monitored every quarter. This year no human rights complaints arose. Constantly, PTT disclosed operating information under the 10 Principles of the United Nations Global Compact. Finally, PTT enrolled in the effectiveness assessment of operating outcomes on human rights organized by Corporate Human Rights Benchmark, with the outcomes also encouraging, and was awarded Outstanding Role Model Organization Human Rights Award 2021 in the State Enterprise sector by the Rights and Liberties Protection Department, Ministry of Justice.

Significant Disputes with Stakeholders

This appears under "Section 1: Business Operations and Performance, **5.2 Legal Disputes.**"

Information Disclosure and Transparency

Disclosure of information is a key index of operating transparency, a crucial factor for confidence among investors and stakeholders. PTT values accurate, precise disclosure of assorted information and creates numerous channels of disclosure so that all stakeholders can gain easy access to information. It promotes awareness among directors, management, and employees of the importance of information disclosure and transparent operations, and creates appropriate avenues for complaints while providing fair treatment to whistleblowers and those complained against as follows:

Financial and Non-financial Reports

PTT disclosed its sustainability reports and performance, taking into consideration all stakeholders' interests, covering environmental, social, and governance (ESG) aspects, through the annual information disclosure form/ annual report (Form 56-1 One Report) under "Driving Business for Sustainability" and included information on the outcomes of sustainability implementation in risk management, management's discussion and analysis (MD&A), and CG, as well as publicized via PTT's website under Sustainability topic. The sustainability performance reporting was based on Global Reporting Initiative (GRI) Sustainability Reporting Standard, Oil and Gas Sector Disclosure (OGSD), Integrated Reporting (IR) model of the International Integrated Reporting Council (IIRC), The United Nations Global Compact (UNGC), and Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation of the World Economic Forum (WEF) and illustrating PTT's commitment to supporting the UN Sustainable Development Goals (SDGs). Further, PTT applied the Recommendation of the Task Force on Climate-related Financial Disclosures (TCFD) to report performance on climate change. There also was a report review to validate the information by an external party regularly.

Investor Relations

Ever since PTT's privatization and share trading on SET in October 2001, Investor Relations has centralized essential information to investors and shareholders, with financial data like the quarterly performance and financial statements, quarterly Management's Discussion and Analysis (MD&A), corporate strategies, and outlooks of PTT, which are regularly, fairly and thoroughly disclosed. Investors may call Investor Relations at 0-2537-3518-9, e-mail: ptt-ir@pttplc.com, and log on to the PTT website at www.pttplc.com, which is regularly updated, for information in Thai and English, which includes:

- Company information
- Form 56-1 One Report
- Information for common shares holders
- Information and activities for debenture holders
- Presentations and webcasts
- Roadshow/ Conference
- Analyst Research
- Activity Calendar
- Code of Conduct for Investor Relations
- Major investment project information
- Policy and business direction statements by management
- Compliance with public policies
- Key plans
- Corporate Governance Policy
- Financial performance
- Non-financial performance
- Highlights of CSR activities
- Procurement
- Name and contact number of Investor Relations.

Through the years, PTT has valued disclosure of information that is accurate, complete, transparent, and comprehensive, as well as continual direct and indirect presentation of performance while keeping investors, shareholders, and relevant parties informed of its data. Highlights appear below:

- **Direct:** PTT regularly reports performance, capital budgets, and industry outlooks to analysts, institutional investors, and employees at quarterly analysts' meetings. This year they were organized through virtual conference (Microsoft Team and Facebook live), in Thai and English; conference calls; local and international roadshows/ conferences organized by securities companies/ or those directly contacted with IR; virtual conferences with analysts, institutional investors and/or related parties such as credit rating agencies; continuous application of digital technology e.g. via PTTIR Line Chatbot to provided information to analysts and institutional investors to access operating results, prices of oil, petroleum and petrochemical products, schedules of AGM and analyst meeting of PTT Group; dividend payment schedules of PTT Group; via response with autonomous text conversation; press meetings to discuss performance outcomes and investment projects; knowledge sharing e.g. natural gas and new businesses i.e. Life Science, EV value chain; in-depth PTT Group business analysis from upstream to downstream, a cooperation of PTT Group via PTT Group 201 Knowledge Sharing held for Krungthai fund managers; participation in SET's Opportunity Day via virtual conferences (Microsoft Team); global institutional investors quarterly meeting via a digital platform (SET Digital Roadshow) to inform investors and analysts of directions and opportunities of PTT business operations according to the new vision. In 2019 - 2021, the following key activities took place:

Activity	2019 (Times)	2020 (Times)	2021 (Times)
Analyst Meetings via Facebook Live/ Webex/ MS Team	4	4	4
Conference Calls Conference calls (presentations of quarterly performances, capital investment, and other key events) (if any)	5	4	4
Domestic roadshows/ conferences (including provision of basic PTT business knowledge, and via virtual conferences)	14	15	14
International roadshows/ conferences (including virtual conferences)	9	9	11
Company visits/ conference calls (upon request)	57	56	69
Credit Rating Review	4	4	3
Press Meeting	2	2	3
Company visits by analysts and institutional investors	4	-	-
E-mails/ phone calls	8 - 10 times/day	10 - 12 times/day	10 - 12 times/day
Quarterly SET Opportunity Days and SET in the City	5	4	4
Participation in SET Digital Roadshows (organized by SET)	4	4	4
Minor investors' meetings with management and company visits	Two debenture holder visits (2 groups) (April 18 - 20 and October 16 - 18) One common shareholder visit (3 groups) (October 29, 30 and 31)	Two debenture holder visits (2 groups) (October 6 - 8 and November 24 - 26) No common shareholder visit in 2020 due to COVID-19	No common shareholder visit in 2021, due to COVID-19
Relations activities with debenture holders	17	15 (5 via online channel)	12 (via online channel)

- **Indirect:** Information about PTT, its performance, financial statements, and reports filed with SET is found at www.set.or.th, www.pttplc.com, the "Happiness" magazine for debenture holders (via PTT Debenture Application).
- Investors and interested parties can also mail inquiries to Investor Relations at Tel. 0-2537-3518-9, through e-mail at ptt-ir@pttplc.com, or www.pttplc.com. In addition, PTT has constantly publicized news, business activities, operations, and project updates apart from addressing questions and facilitating contacts for the media and the public. In 2019 - 2021, the activities appear below:

Activity	2019 (Times)	2020 (Times)	2021 (Times)
E-mails	186	117	292
News/ photo releases	186	117	292
Press conferences	22	6	4
Media visits to operations (domestic and international)	3	2	1
Welcoming and providing information to visiting agencies for assorted purposes	64 Groups (2,521 persons)	7 Groups (483 persons)	-

4) The Use of Inside Information

PTT has defined guidelines in its CG handbook for all employees on best practices on the use of inside information and guarding of confidential information. They must guard PTT's inside information or confidential information not yet publicly available and must not share with other parties inside information learned during the course of their duties or use it to seek profit in a fraudulent way, or to cause damage to PTT's interests.

In addition, PTT has a policy for the Board, management, and personnel with the privilege to inside information to refrain from insider trading of PTT stocks as well as those of PTT Group. If necessary, they must report such trading to the Company Secretary at least two days in advance. All PTT personnel will be reminded to refrain from using inside information through PTT's contact channels, in particular, upon important events such as capital increase or debenture issuance.

5) Conflicts of Interest

PTT requires information disclosure to prevent conflicts of interest and illegal, improper activities. Under the Board's policy, business decisions made by management and employees must be solely in PTT's best interests. All staff must not only avoid engaging in financial and other relationships with external parties that would lead to financial losses for PTT or a conflict of loyalty or interest but must also not compromise the efficiency of business operations. Those staff with interests or related businesses which may require PTT's review and decisions must report their relationships and connection with potential conflicts of interest. PTT is to disallow such connected persons from exercising their authority for and involvement in such transactions.

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Reporting Transactions of Potential Conflicts of Interest with PTT

PTT has required the directors, management, and all employees to disclose potential conflicts of interest through a specific disclosure form for suspected conflicts of interest with PTT. In addition, any approval of such items must not contain special conditions or specifications that are out of the ordinary, which forms part of PTT's internal controls. PTT's Office of Corporate Audit and the Audit Committee have been entrusted with the monitoring and resolution of issues related to conflicts of interest.

Reporting Vested Interests of Directors, Management, and Related Parties

In the first quarter of this year, the Board reported a form for reporting vested interests of directors as basic information to manage vested interests for directors and senior management. The directors and management are to report such matters every year and with every change in circumstances. The Company Secretary is to compile and submit the copy to the Chairman of the Board and the Chairman of the Audit Committee to check and manage conflicts of interest. This year, however, no such cases have arisen.

Reporting Changes in Share Portfolios

As part of the oversight of inside-information measures, all PTT directors and management, including their spouses and children under the legal age, must report any changes in their PTT share ownership to SEC under Article 59 of the Securities and Exchange Act B.E. 2535 (1992) and its amendments within three days of the date of sale, purchase, disposal, or receipt of such shares. PTT defines a policy of disclosing or reporting the sale, purchase, disposal, or receipt of such shares, changes in share ownership of the directors and management to the monthly Board meeting, contained in advance as a regular agenda item.

Moreover, a week before the closing of the quarterly and yearly financial statements, the Office of the President issues a letter to the directors, management, or units with the privilege to inside information, forbidding them to disclose such information to external parties or unrelated parties, and to buy or sell PTT shares within 45 days (for quarterly statements) and 60 days (for the annual statements) of the last effective date of the financial statements to the notification date of the statements to SET, ahead of the public dissemination of the statements so as to prevent insider trading.

Filing of Assets and Debts to the National Anti-Corruption Commission (NACC)

Under the Organic Act on Counter-Corruption B.E. 2561 (2018), PTT's directors and top executives, including directors and top executives in the companies where PTT holds more than 50% shares, are required to file a list of their own assets and debts, including those of their spouses and children that are under the legal age, to the NACC each time they take up a position, every three years during their terms, and one year after leaving their positions. To this end, PTT issues a reminder to each of the directors and senior management as required.

Declaring Vested Interests at Meetings

At every board meeting, the Chairman reminds directors to conform to the policy on conflicts of interest on all agenda items, which requires those with vested interests to declare themselves to the meeting to abstain from voting or giving any views.

Review of Connected Transactions

The Audit Committee reviews related transactions and those with potential conflicts of interest that could undermine PTT's businesses to ensure conformance to the law and SET's criteria, all of which must be reported to the Board for approval.

6) Right of Shareholders

PTT has defined guidelines on the rights of shareholders and equitable and fair treatment, and has a written policy and guidelines for the rights and equitable treatment of shareholders for directors, management, and staff to comply with under PTT's "Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook".

7) Anti-fraud and Corruption

PTT is committed to running its businesses with integrity, transparency, fairness, and adherence to the CG Code, and resisting all forms of fraud and corruption, direct or indirect. Relevant implementations and development included:

- PTT defined its annual work plan in line with the national strategies on the prevention and suppression of fraud, phase 3 (2017 - 2021), to drive CG and anti-fraud and corruption strategies in pursuit of a prototype corporation of transparency and virtue.
- In 2010, PTT enlisted in the declaration of intention to join Thailand Private Sector Collective Action Coalition against Corruption (CAC), an endeavor of IOD with the support of the government and NACC. As one of the first 27 companies to do so, PTT underwent the certification process and became a certified member. PTT won approval for CAC recertification for a third term on March 31, 2021.
- In 2012, PTT joined the United Nations Global Compact (UNGC) to show its desire to apply to its business the principles of human rights, labor rights, environmental preservation, and anti-corruption at the international level.

PTT presents an update of its compliance with the 10 elements of UNGC in PTT's website www.pttplc.com under Section Sustainability, Subheading: Sustainability Governance, Topic: Sustainability Network.

- Since 2014, PTT has begun enforcing PTT's and PTT Group's Anti-Corruption Policies. The policies, revised in 2019, contain essential principles and guidelines embracing resistance to fraud by defining the anti-corruption policy as part of Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook. They require PTT Group's Anti-Corruption Policy as part of PTT Way of Conduct so that PTT Group may observe the same standards and management approaches and that all companies may achieve synergy under the investment objective.

Details of PTT's and PTT Group's anti-corruption policies are as shown in https://www.pttplc.com/uploads/CG/PTTGroupAntiFraudandCorruptionPolicy2022_EN.pdf

- PTT's Anti-fraud and Corruption Policy forbids PTT's employees to carry out or participate in corrupt practices as well as all forms of bribery offer or acceptance (direct and indirect). They must seriously observe the Anti-Corruption Policy, which covers various processes, including donations to charities, HR administration, procurement, and internal control.

Details of PTT's Anti-fraud and Corruption Policy are as shown in https://www.pttplc.com/uploads/CG/PTTAntiFraudandCorruptionPolicy2021_EN.pdf

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- In 2015, PTT declared its "No-Gift Policy" for any festive period, and enforced practical guidelines under PTT Group's policy on gifts, entertainment, or other benefits to establish a higher standard for business practices in the hope of having all employees do their best without expecting benefits. To this end, a letter was sent to business partners and external agencies, and signboards were put up on the premises of PTT along with assorted PR channels. PTT was the prototype company of Thailand to truly enforce this policy.
- PTT has developed a Fraud and Corruption Risk Assessment Manual for all units to apply as guidelines for assessing corruption risks in their respective business processes and for defining suitable internal control processes. PTT Management Committee (PTTMC) approved the review of the manual to align with PTT's Anti-fraud and Corruption Policy 2021, comparable with the COSO Fraud Risk Management Guide 2016, including practices and standards of leading companies.
- Communication, training, and task highlights:
  - PTT communicates its Anti-fraud and Corruption Policy and guidelines to its subsidiaries, associates, and other PTT-controlled companies, business partners, and stakeholders as well as the public through assorted channels including letters, e-mails, website, PTT intranet, seminars, and exhibitions so that all stakeholders may acknowledge and conform to PTT's guidelines.
  - PTT communicates with its employees and provides training to ensure their understanding of anti-fraud and anti-corruption measures, PTT's expectation, and disciplinary actions for non-compliance. The training includes an orientation session, morality courses, and E-learning, and supports its executives' and staff's participation in public courses on anti-fraud and anti-corruption.
  - PTT applies information technology as a means for its personnel to express their transparency, such as in e-trading, which shows pre-order trading of PTT and PTT Group's stocks to prevent insider trading, and a reporting system on receiving/offering customary gifts, assets, and others benefit under the No-Gift Policy; PTT personnel who have to receive and cannot return a gift must report and give it to the Good Governance and Corporate Ethics Department to collect and donate for public use.
  - Recognizing that corruption undermines the nation, PTT values work integration and anti-corruption networking with the public and private sectors to drive anti-corruption suppression through several activities, such as joining the Anti-Corruption Committee and Code of Conduct Promotion of the Thai Chamber of Commerce, joining Anti-Corruption Day, and International Anti-Corruption Day, developing a master plan and action plan on enhancing PTT's morality for the National Morality Promotion Committee, Department of Religious Affairs, Ministry of Culture, joining discussions and opinion exchange organized by both public and private sectors.
- Oversight and monitoring of performance:
  - The Board ensures that PTT commands an efficient system for anti-fraud and corruption to ensure that management recognizes and values anti-fraud and corruption and abide by anti-fraud and corruption measures.
  - The Audit Committee reviews the efficiency and effectiveness of corporate governance, risk management and internal control processes; financial reporting, and other procedures concerning anti-corruption measures to ensure such measures are adequate and effective. The committee also regularly reports internal audit outcomes regarding anti-corruption measures to the Board and provides best practices to the Board and the executives.
  - The Corporate Governance Committee endorses objectives, goals, strategies, management framework and grants anti-fraud and corruption policy and implementation directions. The committee annually provides recommendations and guidelines, monitors, and assesses performance, and steers and advocates risk management practices concerning anti-fraud and corruption and process-level corruption by assessing fraud and corruption risk and reviewing anti-fraud and corruption measures for adequacy and suitability.
  - Executives establish risk assessment for business processes that may lead to corrupt practices, review efficiency and effectiveness of internal control processes and measures, and personify proper behavior as well as communicate it to all employees and related parties.
  - PTT establishes procedures for maintaining auditable documents and records to confirm the accuracy and suitability of financial reports. The internal control of accounting processes and information storage is audited to verify the effectiveness of anti-fraud and corruption processes and ensure that the entry of financial items is well evidenced for audit.
  - The Office of Corporate Audit reviews items of potential conflicts of interest, the likelihood of corruption, and corporate efficiency for managing risks arising from corporate corruption and those at the operating level. The office also reviews business ethics principles and the code of conduct for executives and employees. It reviews actions and reports to the Audit Committee and top executives immediately when encountering items or actions that could undermine PTT's performance outcomes, including corruption.

8) Disciplinary Measures for Non-Compliance with Policies and Guidelines

- Measures, scope, and tools for whistleblower protection:
  - PTT's HR administration process echoes its commitment to anti-corruption measures. Although refusal to take part in corruption may deprive PTT of business opportunities, its policy is not to demote, punish, or harm those that do so.
  - PTT's employees should not ignore actions in potential conflicts with anti-fraud and corruption measures. PTT has established channels for whistleblowing and protection of whistleblowers or those that need advice about conformance to anti-fraud and corruption measures.
  - PTT has established rules on "complaint-filing and whistleblowing on corruption and non-compliance with laws and corporate regulations" to define applicable criteria and guidelines that are suitable and uniform throughout the corporation. Protective measures and fair treatment are in place for whistleblowers or those that provide information.
- Punishment
  - PTT has established a suitable and fair process for punishing violators of anti-corruption measures. Any violation of this policy, direct or indirect, calls for disciplinary review under PTT's regulations, consisting of fact-finding, investigation, punishment, and appeal. They could also lead to punishment by law. Employees must therefore master and strictly conform to the Anti-fraud and Corruption Policy in every step of their work.

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6.2 Code of Conduct

Code of Conduct and Code of Business Ethics

PTT has its written policy and a code of conduct included in the "Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook" (CG Handbook), based on international standards. The handbook compiles the format, scope of standard behaviors, and actions that the directors, management, and employees must comply with during the course of business and in their duties with ethics, integrity, fairness, and equality. The code maintains PTT's image as an organization of sustainable growth. Supervisors are responsible for the monitoring and promotion of CG compliance among their subordinates. Violators of the code are subject to disciplinary action.

The essential aspects of the code are included below:

1. Respect and compliance with laws and regulations, and human rights principles
2. Anti-money Laundering
3. Political neutrality
4. No vested interests or conflicts of interest
5. Maintaining the confidentiality of information and refraining from using inside information for personal gain
6. Responsibility to customers and response to their needs
7. Free and fair business competition
8. Transparent procurement and fair treatment of business partners (suppliers)
9. Community, social and environmental responsibility
10. Support of employees' rights and promotion of their engagement
11. Stringent, transparent, and equitable observance of contracts/ agreements with creditors
12. Internal control system and efficient internal audit
13. Guidelines for receiving and offering customary gifts, assets, and other benefits
14. Safety, occupational health, and the environment
15. Respect for intellectual properties and proper application of information and communication technology
16. Study, understand, verify information accuracy, and communicate responsibly

Details of the complete information on Corporate Governance, Ethical Standards, and Code of Business Ethics are shown in *https://www.pttplc.com/uploads/CG/Publication/CGHandbookforOneReport/PTTCGHandbook_Revision5_EN.pdf*

6.3 Milestone Development on the CG Policy, Guidelines, and System During the Year

This year, the Board approved the review and revision of the essences of the CG policy, guidelines, monitoring system, and the CG Handbook as follows:

- Improving PTT's Corporate Governance Policy to include appropriate content, in line with Corporate Governance Principles of the Office of the Securities and Exchange Commission (SEC), The Stock Exchange of Thailand (SET), and the State Enterprise Policy Office (SEPO).
- Improving PTT's Anti-fraud and Corruption Policy to align with laws, practices, and standards of leading companies, including improving the definition of corruption to be clearer and more complete.
- Improving the Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook (CG Handbook), the 5th revision, with important improvements as follows:
  - Improving the Board's Corporate Governance Practices to be in line with the CG Code of the SEC.
  - Improving PTT's Ethical Standards and Code of Business Ethics to be consistent with laws, rules, regulations, and international standards and practices of leading international companies, as well as categorizing good practice guidelines for committees, executives, and employees for clarification according to recommendations from the State Enterprise Assessment Model (SE-AM) of SEPO.

In addition, in 2021, the PTT Management Committee (PTTMC) has approved a review of PTT's regulations regarding complaints and whistleblowing, malpractice, misconduct, and non-compliance to make the consideration of complaints related to malpractice and misconduct transparent, fair and efficient in accordance with the corporate governance principles.

Other Implementation under CG Code

A survey on PTT's CG conducted by the Thai Institute of Directors Association (IOD) under the Corporate Governance Report of Thai Listed Companies for 2021 has ranked PTT as "Excellent", with an average score overall and by category higher than the average score of 716 other companies surveyed and higher than the average score of companies in the SET50 group. The survey was based on publicized information in 2021. PTT's other guidelines which might be useful to other listed companies are:

- PTT's current Chairman of the Board is an independent director, so he independently delegates policy and oversees PTT's operations.
- Independent directors must consist of at least half of the directors in office.
- The Corporate Governance Committee Meeting No. 6/2021 dated December 7, 2021, and the PTT Board Meeting No. 12/2021 dated December 16, 2021, considered the "Corporate Governance Principles for Listed Companies 2020" ("CG Code") prepared by SEC, and the "Corporate Governance Principles and Guidelines for State Enterprises 2019" prepared by the State Enterprise Policy Office (SEPO), Ministry of Finance. They recognized their role as PTT's governing body in applying CG principles to create sustainable value for the business and assessed its performance under the CG Code and the Corporate Governance Principles and Guidelines for State Enterprises 2019, and duly compared with those of PTT. They were of the opinion that PTT's policy, measures, and operational processes are comparable with these two and that PTT also commanded short-term and long-term plans to develop PTT's CG system to suit business directions and trends of other international leading companies.

This year, PTT complied with CG principles, but did not cover the criteria under the Corporate Governance Report of Thai Listed Companies and the ASEAN CG Scorecard as follows:

Composition of the Board, which shall consist of 5 - 12 members

Under PTT's Articles of Association, the Board shall consist of a minimum of 5 but not exceeding 15 directors. The current Board consists of 15 directors, which complies with the Articles of Association and suits operations in the petroleum businesses, which need qualified experts in assorted fields essential for PTT business operations. The Board also appointed five specific committees to assist it in screening crucial matters: the Audit Committee, Nominating Committee, Remuneration Committee, Corporate Governance Committee, and Enterprise Risk Management Committee.

(Meeting attendance of the committees are detailed under Section 2: **"8.1.2 (1) Meetings of the Board"**)

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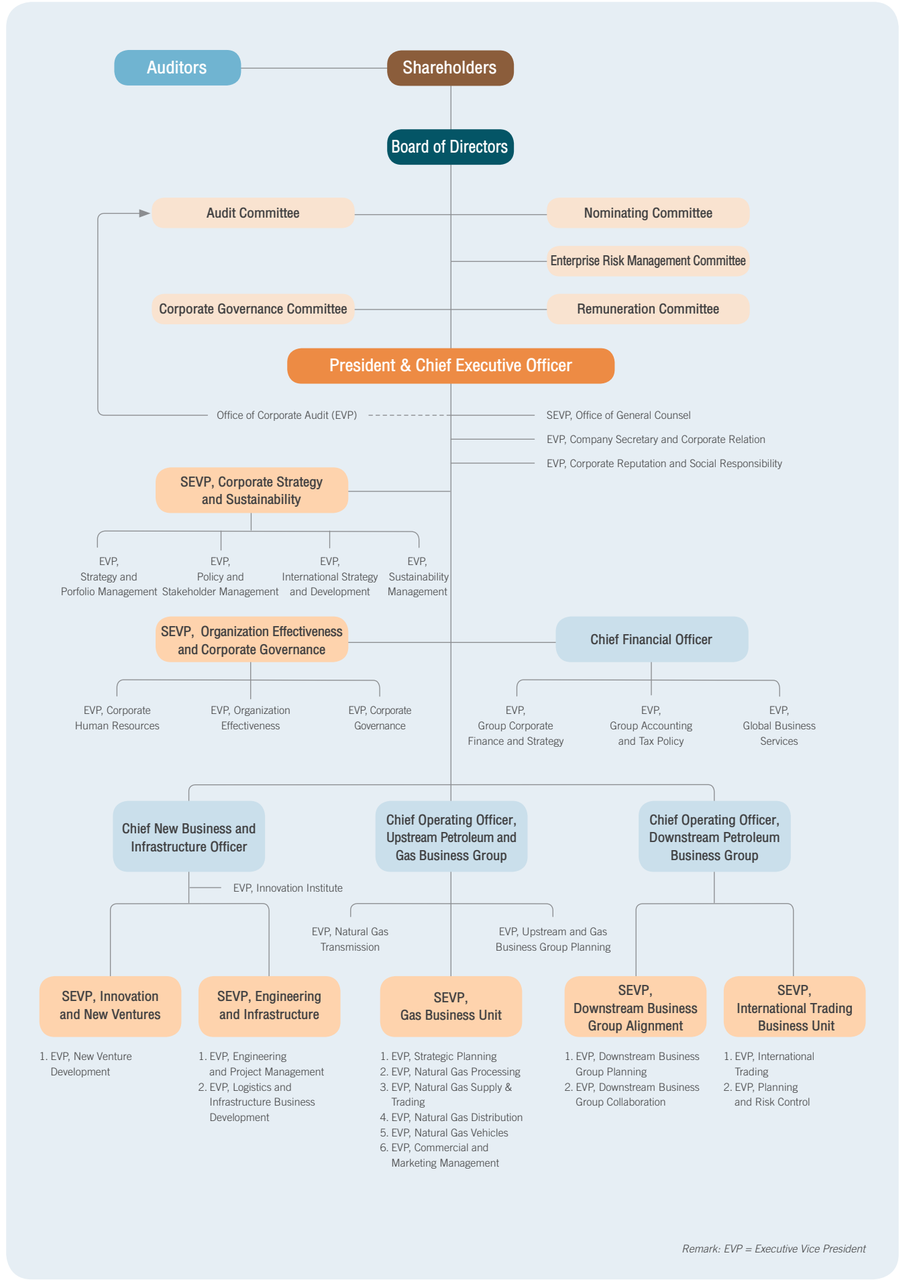
7. Governance Structure and Key Data on the Board of Directors, Specific Committees, Management, Employees, and Others

7.1 Governance Structure

PTT Public Company Limited's management structure as of December 31, 2021, comprises the Board of Directors and five specific committees to consider significant matters: Audit Committee, Nominating Committee, Remuneration Committee, Corporate Governance Committee, and Enterprise Risk Management Committee. The President & CEO (President) is the top executive who manages PTT's business groups through 3 groups of 51 management committees.



Remark: EVP = Executive Vice President

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7.2 Board of Directors

7.2.1 Composition of the Board

Under PTT's Articles of Association, the Board consists of:

- 5 - 15 persons
- A minimum of 3 independent directors (PTT's CG requires that independent directors account for no less than one-half of the Board.)
- At least 1 director must be knowledgeable in accounting and finance.

According to the certification of the Ministry of Commerce dated December 17, 2021, the PTT Board consisted of 15 directors as follows:

- 14 non-executive directors (93.33% of the entire Board)
- 10 independent directors, which exceeds half of the Board (66.67% of the entire Board)
- 1 executive director
- 1 female director (6.67% of the entire Board)

7.2.2 Information of the Board and Authorized Directors

The Board of Directors as of December 31, 2021, consisted of:

No.	Name	Position	Date of Appointment
1.	Professor Dr. Thosaporn Sirisumphand	Independent Director/ Chairman of the Board (Appointed as an Independent Director effective from November 6, 2020, and Chairman effective from November 18, 2020)	November 6, 2020 (First term)
2.	POL. GEN. Rungroj Sangkram	Independent Director/ Chairman of the Audit Committee	July 3, 2020 (First term)
3.	Mr. Don Wasantapruek	Independent Director/ Chairman of the Nominating Committee	July 26, 2014 (First term) April 11, 2016 (Second term) April 11, 2019 (Third term)
4.	GEN. Teerawat Boonyawat	Independent Director/ Chairman of the Remuneration Committee	April 11, 2019 (First term)
5.	Mr. Danucha Pichayanan	Independent Director/ Chairman of the Corporate Governance Committee	April 12, 2018 (First term) April 9, 2021 (Second term)
6.	M.L. Chayotid Kridakon	Director/ Chairman of the Enterprise Risk Management Committee	December 16, 2020 (First term)
7.	Mr. Krishna Boonyachai	Independent Director/ Member of the Audit Committee (Having adequate knowledge and experience to review the reliability of financial statements)	July 3, 2020 (First term)
8.	Associate Professor Dr. Chayodom Sabhasri	Independent Director/ Member of the Audit Committee (Having adequate knowledge and experience to review the reliability of financial statements)	April 9, 2021 (First term)
9.	Mr. Payong Srivanich	Independent Director/ Member of the Nominating Committee/ Member of the Remuneration Committee	April 9, 2021 (First term)
10.	Mr. Phongsthorn Thavisin	Director/ Member of the Nominating Committee	October 8, 2021 (First term)
11.	Mr. Krisada Chinavicharana	Director/ Member of the Remuneration Committee	October 1, 2021 (First term)
12.	Mr. Jatuporn Buruspat	Independent Director/ Member of the Corporate Governance Committee/ Member of the Enterprise Risk Management Committee	April 9, 2021 (First term)
13.	Associate Professor Dr. Narongdech Srukhosit	Independent Director/ Member of the Corporate Governance Committee	October 8, 2021 (First term)
14.	Mrs. Premrutai Vinaiphat	Director/ Member of the Enterprise Risk Management Committee	July 3, 2020 (First term)
15.	Mr. Auttapol Rerkpiboon	Director and Secretary to the Board (President and CEO)	May 13, 2020 (First term) April 9, 2021 (Second term)

Remarks:
In 2021, the Board/ the Annual General Meeting (AGM) appointed new directors to replace those who had either completed their terms and/or resigned as follows:

- *No. 8: Associate Professor Dr. Chayodom Sabhasri was appointed as an independent director with effect from April 9, 2021, replacing Mrs. Nuntawan Sakuntanaga, who retired by rotation at the 2021 Annual General Meeting (AGM).*
- *No. 9: Mr. Payong Srivanich was appointed as an independent director with effect from April 9, 2021, replacing Professor Dr. Surapon Nitikraipot, who retired by rotation at the 2021 Annual General Meeting (AGM).*
- *No. 10: Mr. Phongsthorn Thavisin was appointed as a director with effect from October 8, 2021, replacing Dr. Pailin Chuchottaworn, who resigned with effect from May 1, 2021.*
- *No. 11: Mr. Krisada Chinavicharana was appointed as a director with effect from October 1, 2021, replacing Mr. Chumpol Rimsakorn, who resigned with effect from October 1, 2021.*
- *No. 12: Mr. Jatuporn Buruspat was appointed as an independent director, with effect from April 9, 2021, replacing Dr. Thon Thamrongnawasawat, who retired by rotation at the 2021 Annual General Meeting (AGM).*
- *No. 13: Associate Professor Dr. Narongdech Srukhosit was appointed as an independent director, with effect from October 8, 2021, replacing Professor Dr. Kittipong Kittayarak, who resigned with effect from June 7, 2021.*

7.2.3 Authorities, Duties and Responsibilities of the Board

Authorities of the Board

- The Board is authorized to supervise and oversee PTT's management's compliance with applicable laws, objectives, Articles of Association, and resolutions of shareholders' meetings.
- The Board is authorized to select one director to serve as Chairman and may select a Vice Chairman if appropriate.
- The Board of Directors is authorized to appoint the President and CEO who has been nominated under the nomination process and procedures under relevant laws and regulations. The President and CEO shall be a director and secretary to the Board of Directors.

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Duties and Responsibilities of the Board

- The Board is to: Carry out its duties under PTT's Articles of Association and ensure that management complies with applicable laws, PTT's objectives, Articles of Association, and resolutions of shareholders' meetings.
- Define PTT's vision, directions, strategies, policies, and major plans and consider potential risks to ensure that management can effectively drive plans into practice.
- Monitor and ensure plan implementation in line with PTT's major strategies and policies, including objectives, financial targets and operating plans, and budget.
- Institute systems for corporate accounting, financial reporting, and auditing, as well as efficient and effective internal control and internal audit systems.
- Oversee and supervise issues regarding potential conflicts of interest and related-party transactions.
- Define comprehensive risk management guidelines and ensure an efficient risk management system or process.
- Ensure a suitable remuneration system or mechanism for senior management to induce short-term and long-term motivation.
- Assess the performance of the President & CEO and determine the remuneration in accordance with the performance.
- Ensure suitable communication channels with each group of shareholders and stakeholders.
- Ensure accurate, clear, transparent, reliable, and high-quality disclosure of information.
- Express leadership and be role models for performance excellence.

The Board's Additional Authorities Include:

- Approve long-term investments, such as common stocks, preferred stocks, bonds, debentures, and warrants, or other financial instruments.
- Approve financial support, including funds, common stocks, preferred stocks, loans, or others as appropriate for PTT-invested companies.
- Approve debt financing and issuance of debt instruments such as debentures.
- Approve the annual budget.
- Approve procurement and other related matters if the limits exceed the CEO's approval authority.
- Consent to employ, appoint, transfer, or promote employees serving as senior executive vice presidents or equivalent upward. And consent to appoint, transfer or promote employees serving as executive vice presidents or equivalent upward.
- Appoint the Company Secretary.

Authorized Director to Sign and Bind for PTT

According to PTT's Articles of Association, as of December 17, 2021, the directors whose signatures are authorized to sign and bind PTT are either (1) Mr. Auttapol Rerkpiboon, President & CEO, to sign and affix PTT's seal, or (2) Two out of these three directors: Mr. Don Wasantapruek, M.L. Chayotid Kridakon, and Mr. Phongsthorn Thavisin, jointly sign and affix PTT's seal.

Appointment and Dismissal of Directors

1. The Board consists of 5 - 15 persons who are appointed at shareholders' meetings. In addition, the Board consists of a minimum of 3 independent directors and at least half of the directors must reside in the Kingdom. At least 1 of them must be knowledgeable in accounting and finance. The Nominating Committee also seek to maintain an appropriate balance and take into account board diversity for consideration including expertise, skills and qualification without discrimination of gender, race or religious in making appointment. All directors must have qualifications as specified by law and the Articles of Association. Since 2004, the Board has decided that independent directors must consist of at least half of the Board, a requirement that remains effective until the present. As of December 31, 2021, the Board had 10 independent directors, 1 female director, and all of them resided in Thailand. 6 directors are experts in accounting and finance, namely: Mr. Danucha Pichayanan, Mr. Krishna Boonyachai, M.L. Chayotid Kridakon, Associate Professor Dr. Chayodom Sabhasri, Mr. Payong Srivanich, and Mr. Krisada Chinavicharana.
2. The shareholders' meetings are to appoint qualified directors whom the Nominating Committee has elected and proposed to the Board under the following criteria:
   (1) Each shareholder has one vote per share held.
   (2) Each shareholder exercises all votes applicable under (1) in electing one or more persons as directors, provided that no vote is divisible.
   (3) Candidates with the highest numbers of votes are to be appointed directors up to the number required at the meeting.
   (4) If candidates get equal votes, which makes the number of successful candidates exceed that of directors to be elected, the Chairman of that meeting will cast the decisive vote.
3. At the AGM, one-third of the directors - or if the number is not a multiple of three, then the number nearest to one-third - will retire from directorship. The directors retiring in the first and second year after PTT was listed are to be drawn by lots. For subsequent years, those with the longest terms are to retire.
4. If a director's seat is vacated for reasons other than term completion, the Board may elect a qualified person without the prohibitions stipulated by PTT's Articles of Association to fill the vacancy at the next Board meeting unless the remaining term of the vacated director is less than two months. The acting director must secure at least three-quarters of the votes of the remaining directors. He or she can also stay in office only for the remaining term of the predecessor.
5. Any director who wishes to resign from directorship must tender his or her resignation to PTT. Such resignation will take effect from the date the resignation letter reaches PTT.
6. For voting to remove any director from the directorship before the completion of his or her term, a three-quarter vote of eligible shareholders present at the meeting is required as well as at least half of the total number of shares represented by the eligible shareholders present at the meeting.

Qualifications of Directors

Directors must be duly qualified, without the prohibitions stated in the Public Limited Company Act and the Standard Qualifications of State Enterprise Directors and Officials Act B.E. 2518 (1975) and its amendments, as well as relevant Cabinet resolutions, including:

- Must not be over 65 years of age.
- Must not hold more than three directorships in state enterprises or juristic persons in which state enterprises hold shares, including appointments due to their positions and those due to acting assignments.
- Independent directors must command independence as required by SET's Notification on the Qualifications and Scope of Work of the Audit Committee.
- Must never have been sentenced to imprisonment, except for violations of the law by negligence or a petty offense.
- Must not be a political official, except for holding a director position under a provision of law.
- Must not hold any position in a political party or be an official of a political party.
- Must never have been expelled, dismissed, or removed from a position because of malfeasance.
- Must not be a shareholder of such state enterprise or a shareholder of a juristic person in which such state enterprise holds shares. Exceptions apply to directors of state enterprises who are not government officials, government employees, or wage earners with positions or position salaries of centralized, provincial, or local government, or other government agencies. Also, such state-enterprise directors can hold no more than 0.5% of the paid-up capital of the state enterprise in which they serve as directors or juristic persons where the state enterprise in question holds shares.
- Must not hold any position in a juristic person in which such state enterprise holds shares, except where entrusted by the boards of directors of such state enterprise to hold a directorial position or other position in the juristic person in which such state enterprise holds shares.
- Must not be a director or an executive or person with authority over the management or an interest in a juristic person who is a concessionaire or joint-venture party, or having an interest in the undertakings of such state enterprise, except for being a chairperson of the board of directors, director or executive by entrustment of such state enterprise.

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In addition, the Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook, Revision 4th, on term holding, a director can hold office up to the following limits:

1. A maximum of three directorships in the state enterprises / juristic persons of which the state enterprise is a shareholder.
2. A maximum of three directorships in SET-listed companies provided that the directorships under (2) do not contradict (1). Such directorships in (1) and (2) must not exceed five.

In addition, independent directors and members of specific committees shall serve no more than nine consecutive years.

In compliance with the law, PTT ensures that at least one-third of the Board are listed in the Director's Pool of the Ministry of Finance. As of December 31, 2021, 15 out of 15 PTT directors' names were listed in the Director's Pool.

7.3 Specific Committees

PTT's specific committees are as follows:

(1) The Audit Committee

Each quarter the Audit Committee, together with the Financial and Accounting functions and the external auditor (EY Office Limited), reviews PTT's financial reports. The Board is accountable for PTT Group's consolidated financial statements as well as other financial information presented in the annual report. The financial reports are prepared under generally accepted accounting principles and are audited and certified by Miss Waraporn Prapasirikul, C.P.A. No. 4579, of EY Office Limited. Material information, financial and non-financial, is accurately, completely, and consistently disclosed.

The Board approved the appointment of the Audit Committee on October 1, 2001, which consisted of directors with the qualifications specified by SEC laws and SET. The committee must consist of at least three directors. As of December 31, 2021, it consisted of three independent directors as follows:

Name	Position in the Audit Committee	Position in the Board
1. POL. GEN. Rungroj Sangkram	Chairman	Independent Director
2. Mr. Krishna Boonyachai	Member	Independent Director
3. Associate Professor Dr. Chayodom Sabhasri	Member	Independent Director

The Executive Vice President, Office of Corporate Audit served as secretary.

Remarks:

1. *POL. GEN. Rungroj Sangkram was appointed Chairman with effect from June 17, 2021. (Professor Dr. Kittipong Kittayarak was Chairman from July 3, 2020, to June 6, 2021.)*
2. *Mr. Krishna Boonyachai was appointed member with effect from July 3, 2020. He commands sufficient expertise and experience to review and ensure the accuracy and credibility of financial statements.*
3. *Associate Professor Dr. Chayodom Sabhasri was appointed member with effect from May 20, 2021. He commands sufficient expertise and experience to review and ensure the accuracy and credibility of financial statements.*

Duties and Responsibilities

1. Review and reassess the adequacy of the Audit Committee Charter annually in accordance with PTT strategic objectives. Final approval of the charter resides with PTT Board of Directors.
2. Review the effectiveness and efficiency of governance, risk management and control processes.
3. Review and ensure that PTT financial statement is appropriate and in accordance with the accounting standards.
4. Review and ensure that PTT business processes are in accordance with the Securities Law, the Stock Exchange's regulations, policy, rules, ordinances, the Articles, the Cabinet Resolutions and the relevant laws.
5. Review and ensure that PTT internal audit system is appropriate including the sufficiency of internal audit budget, resource, and the organizational independence of the internal audit activity.
6. Consider any connected or Conflict of Interest transaction or fraud occurrence that may affect PTT business in accordance with the Stock Exchange's regulations and rules.
7. Review and ensure that the business processes are in accordance with State Enterprise Assessment Model (SE-AM), including monitoring the implementation of the relevant observations/ recommendations.
8. Recommend to PTT Board of Directors, the Chief Audit Executive appointment, removal and performance.
9. Recommend to PTT Board of Directors, the external auditor nomination, appointment or termination including its fee.
10. Coordinate with the external auditor and may purpose to review or assess any significant accounting and reporting issues.
11. Receive complaints through the channels and methods identified in PTT's Rule on Complaints and Whistleblowing against Fraud, Malpractice, Misconduct, and Non-Compliance with Laws or Organizational Regulations.
12. Report to PTT Board of Directors, the Audit Committee performance at least one time quarterly. For the fourth quarter, the Audit Committee Annual Report must be prepared and submitted to Responsible Ministry of Government agencies and the Ministry of Finance.
13. Report to PTT Board of Directors, the Audit Committee performance on internal audit activity assessment at least one time annually.
14. Disclose the Audit Committee Annual Report and the external auditor annual fee in the PTT annual report.
15. Either the Chairman or a member of the Audit Committee must attend the PTT annual general shareholder meeting.
16. If competent advice or assistance is needed to perform internal audit activity or other the Audit Committee tasks, the Audit Committee can purpose PTT Board of Directors to appoint any independent consultant or expert. The costs and expenses of such services or invitations shall be on PTT's account.
17. Inform the CEO, any breach of the Securities Law, the Stock Exchange's regulations, policy, rules, ordinances, the Articles, the Cabinet Resolutions and the relevant laws to resolve the issue.
18. Meet at least one time quarterly and must hold private meeting with the external auditor at least one time annually.
19. Officially meet with the managements at least one time annually.
20. Perform any designated tasks by the laws or PTT Board of Directors under the Audit Committee duties and responsibilities.

These are in line with the guidelines of PTT Public Company Limited's ordinance on the Audit Committee and the Internal Audit Unit, B.E. 2564 (2021).

This year, the committee held 18 meetings and duly reported its findings to the Board. In addition, it participated in quarterly audits along with the external auditor and the Financial and Accounting functions.

The Audit Committee disclosed its annual performance in the Report of the Audit Committee.

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(2) The Nominating Committee

The Board approved the appointment of the Nominating Committee on October 1, 2001, by appointing three directors. As of December 31, 2021, it consisted of:

Name	Position in the Nominating Committee	Position in the Board
1. Mr. Don Wasantapruek	Chairman	Independent Director
2. Mr. Payong Srivanich	Member	Independent Director
3. Mr. Phongsthorn Thavisin	Member	Director

The Company Secretary served as secretary.

Remarks:
1. *Mr. Don Wasantapruek was appointed Chairman with effect from December 23, 2018.*
2. *Mr. Payong Srivanich was appointed a member with effect from April 9, 2021.*
3. *Mr. Phongsthorn Thavisin was appointed a member with effect from October 8, 2021.*

Duties and Responsibilities

1. Define the methods and criteria for directors' nomination for transparency.
2. Select director nominees to fill vacancies (due to resignation or term completion) for the Board's or the shareholders' meeting's consideration and appointment with due regard for the composition of the Board, expertise, competencies, and experience that would be useful to PTT in compliance with PTT's Board Skill Matrix and the Director's Pool of the Ministry of Finance and Thai Institute of Directors Association (IOD). Equally important, nominees must have no conflict of interest with PTT, and the qualifications of desirable directors must prove compatible with PTT's business strategies.
3. Propose directors for specific committee duties with due regard for the committees' compositions, qualifications, expertise, and competencies. Then these names are to be tabled for the Board's appointment. An exception is for the committee itself, which is to be appointed by the Board.
4. Be directly accountable to the Board, while the Board is accountable for PTT's businesses to all stakeholders.
5. Assess its performance and report the outcomes to the Board for acknowledgment and disclose them in the annual report.
6. Disclose its performance in the annual report.
7. Hold at least two meetings a year.
8. Perform other Board-assigned tasks.

The procedures and criteria for nomination of directors are as follow:

1. The committee defines the qualifications needed for replacements to ensure that new directors meet the criteria and qualifications required by applicable laws and regulations and align with PTT's strategy and operations.

   According to the Corporate Governance, Ethical Standards, and the Code of Business Ethics Handbook, the Board should consist of experts from a variety of disciplines needed for the administration of PTT businesses. Specifically, its composition should consist of at least three experts in the petroleum business, one expert in the law, and one expert in finance and accounting. Currently, PTT's Board Skill Matrix consists of Accounting/ Finance/ Laws/ Information Technology/ Engineering/ Marketing/ Business Administration and Management/ Listed State Enterprise Management and Supervision/ International Business/ Economics/ Science and Technology/ Energy Innovation/ Petrochemical/ Biological Industry/ Digital/ Automation/ Artificial Intelligence or Robotics/ Political Science/ Security/ Crisis Risk Management/ Social, Community, Natural Resources and Environmental Activities, and Sustainable Development.
2. The committee summarizes the result of the nomination process and presents a shortlist of qualified candidates along with supporting rationale to the Board.
3. The Board considers and selects qualified candidates from the list prepared by the committee and submits their names to the shareholders' meeting for approval. The list must also be endorsed by the State Enterprise Policy Office (SEPO) in conformance to the guidelines on the appointment of state enterprise directors under the Cabinet resolution of August 6, 2019.

This year, the committee held 11 meetings, with all committee members at the time in attendance. The Company Secretary served as secretary.

The Nominating Committee disclosed its annual performance in the Report of the Nominating Committee.

(3) The Remuneration Committee

The Board approved the appointment of the Remuneration Committee on October 1, 2001, by appointing three directors. As of December 31, 2021, it consisted of:

Name	Position in the Remuneration Committee	Position in the Board
1. GEN. Teerawat Boonyawat	Chairman	Independent Director
2. Mr. Payong Srivanich	Member	Independent Director
3. Mr. Krisada Chinavicharana	Member	Director

The Company Secretary served as secretary.

Remarks:
1. *GEN. Teerawat Boonyawat was appointed Chairman with effect from April 11, 2019.*
2. *Mr. Payong Srivanich was appointed member with effect from April 9, 2021.*
3. *Mr. Krisada Chinavicharana was appointed member with effect from October 1, 2021*

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Duties and Responsibilities

1. Define the criteria for remuneration and propose fair, sensible remuneration of directors and specific committee to the Board and the shareholders' meeting for approval.
2. Propose guidelines for assessing performance outcomes and remuneration for the President & CEO to the Board for approval.
3. Acknowledge and comment on organization restructuring and job levels and assess and decide remuneration for senior executive vice presidents.
4. Be accountable to the Board directly, while the Board is accountable for PTT's businesses to all stakeholders.
5. Assess its performance outcomes and report to the Board for acknowledgment and disclose them in the annual report.
6. Disclose its performance in the annual report.
7. Hold at least two meetings a year.
8. Perform other Board-assigned tasks.

This year, the committee held 4 meetings, with all committee members at the time in attendance. The Company Secretary served as secretary.

The Remuneration Committee disclosed its annual performance in the Report of the Remuneration Committee.

(4) The Corporate Governance Committee

The Board approved the appointment of the Corporate Governance Committee on June 24, 2004, by appointing three directors. As of December 31, 2021, it consisted of:

Name	Position in the Corporate Governance Committee	Position in the Board
1. Mr. Danucha Pichayanan	Chairman	Independent Director
2. Mr. Jatuporn Buruspat	Member	Independent Director
3. Associate Professor Dr. Narongdech Srukhosit	Member	Independent Director

Senior Executive Vice President, Organization Effectiveness and Corporate Governance and Senior Executive Vice President, Office of General Counsel, served as secretary, and Executive Vice President, Corporate Governance, Executive Vice President, Company Secretary and Corporate Relation, and Executive Vice President, Sustainability Management, served as assistant secretaries.

Remarks:

1. *Mr. Danucha Pichayanan was appointed a member with effect from May 20, 2021, and was appointed Chairman with effect from June 17, 2021. (POL. GEN. Rungroj Sangkram was Chairman from April 9, 2021, to June 17, 2021.)*
2. *Mr. Jatuporn Buruspat was appointed member with effect from April 9, 2021.*
3. *Associate Professor Dr. Narongdech Srukhosit was appointed member with effect from October 8, 2021.*

Duties and Responsibilities

1. Corporate Governance, Operational Risk Management and Internal Control, and Compliance (GRC) and Anti-fraud and Corruption, Sustainability Management (SM) and Corporate Social Responsibility (CSR):
   - Advise and provide consultation to the Board and management for PTT's business operations under the principles of good corporate governance, integrity, and ethics.
   - Approve objectives, goals, strategies, management frameworks along with the policy and operational guidelines to be in line with PTT's goals, strategies, and international practices, including annual review.
   - Supervise and monitor CG implementation and report to the Board.
   - Advise and provide consultation to the Governance, Risk and Compliance Management Committee (GRCMC).
2. Establish the policy of allowing minor shareholders to nominate directors and propose AGM agenda items.
3. Establish the policies and define the scopes for supervising matters dealing with PTT's whistleblowing mechanism for complaints, non-compliance, and anti-fraud and corruption practices.
4. Perform other Board-assigned tasks.
5. Hold at least one meeting each quarter.

This year, the committee held 7 meetings with all committee members at the time in attendance. The Senior Executive Vice President, Organization Effectiveness and Corporate Governance, and the Senior Executive Vice President, Office of General Counsel, served as joint secretary to the committee.

The Corporate Governance Committee disclosed its annual performance in the Report of the Corporate Governance Committee.

(5) The Enterprise Risk Management Committee

The Board approved the appointment of the Enterprise Risk Management Committee (ERMC) on October 25, 2013, by appointing at least three directors, at least one of whom must be an independent director. As of December 31, 2021, it consisted of:

Name	Position in the Enterprise Risk Management Committee	Position in the Board
1. M.L. Chayotid Kridakon	Chairman	Director
2. Mr. Jatuporn Buruspat	Member	Independent Director
3. Mrs. Premrutai Vinaiphat	Member	Director

Senior Executive Vice President, Corporate Strategy and Sustainability tasked as Chief Risk Officer (CRO) and Chief Stakeholder Officer (CSO) served as secretary.

Remarks:

1. *M.L. Chayotid Kridakon was appointed Chairman, with effect from May 1, 2021. (Dr. Pailin Chuchottaworn was Chairman from September 11, 2020, to April 30, 2021.)*
2. *Mr. Jatuporn Buruspat was appointed member, with effect from May 1, 2021.*
3. *Mrs. Premrutai Vinaiphat was appointed member, with effect from July 3, 2020.*

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In 2021, the committee's duties and responsibilities were revised to embrace policies and strategic plans for customers and markets, as follows:

Duties and Responsibilities

1. Define and review PTT's risk management and corporate stakeholder management policies and scopes.
2. Supervise and support risk management and stakeholder management practices in line with strategies and business goals as well as prevailing circumstances.
3. Provide recommendations, monitor, and evaluate risk management and stakeholder management for further implementation of the Corporate Plan and Risk Management Committee (CPRC) (management level).
4. Review risk management outcome reports and provide recommendations on risks, including specifications of control measures or mitigation plans and development of the risk management system to CPRC for continued efficiency.
5. Review reports of corporate stakeholder management outcomes and provide recommendations on relevant plans to extend positive outcomes or minimize/offset potential impacts on stakeholders, including the development of a stakeholder management system for CPRC to ensure continued efficiency.
6. Support the Chief Risk Officer (CRO) and Chief Stakeholder Officer (CSO) in achieving PTT's corporate risk management and stakeholder management goals.
7. Report risk management and stakeholder management outcomes to the Board at least every quarter. For factors or events with potential significant impacts on PTT, the Board must be notified immediately.
8. Screen and comment before submitting for the Board's approval contractual items that are complicated businesswise and contain risks potentially affecting PTT or potentially and significantly affecting PTT's stakeholders, as endorsed by PTT Management Committee.
9. Screen and comment on investment agendas:
   - PTT's and PTT Group's wholly-owned investment projects with investment values exceeding THB 5 billion presented to the Board for approval.
   - PTT's investment projects in companies where it holds less than 100% shares and those not SET-listed, with investment values exceeding THB 5 billion, presented to the Board for approval before PTT's representative votes in the shareholders' meetings or board meetings in question.
   - Investment with risks potentially significantly impacting PTT or its stakeholders, as endorsed by PTT Management Committee.
10. Define and review the corporate innovation policy.
11. Provide recommendations and guidelines for the monitoring and assessment of the long-term and annual innovation management master plan for further implementation.
12. Supervise and promote implementation under the innovation policy and master plan to ensure that the annual operation plan can achieve its goals.
13. Report the results of the implementation outcomes of creative thinking and innovation to the Board for acknowledgment at least every quarter.
14. Define and review the customer and market management framework.
15. Supervise, promote, and support operations under the customer and market management framework to achieve the set goals according to the business direction.
16. Report the performance of customer and market management to the Board for acknowledgment at least every quarter.
17. Hold at least one meeting each quarter.
18. Perform other Board-assigned duties.

The reviewing of the risk management system remains the duty of the Audit Committee and the Office of Corporate Audit.

This year, the Committee held 13 meetings with all committee members at the time in attendance. The Senior Executive Vice President, Corporate Strategy and Sustainability, servedas secretary.

The Enterprise Risk Management Committee disclosed its annual performance in the Report of the Enterprise Risk Management Committee.

7.4 Management

7.4.1 Management Team Members as of December 31, 2021

(PTT Management Structure as in the organization chart is detailed under **"7.1 Governance Structure."**)

Name	Position
1. Mr. Auttapol Rerkpiboon	President & CEO
2. Mr. Atikom Terbsiri	Chief Operating Officer, Upstream Petroleum and Gas Business Group
3. Mr. Kris Imsang	Chief Operating Officer, Downstream Petroleum Business Group
4. Mr. Noppadol Pinsupa[1/]	Chief New Business and Infrastructure Officer
5. Miss Pannalin Mahawongtikul	Chief Financial Officer
6. Mr. Terdkiat Prommool[2/]	Senior Executive Vice President, Corporate Strategy and Sustainability
7. Mr. Suchat Ramarch[3/]	Senior Executive Vice President, Organization Effectiveness and Corporate Governance
8. Miss Peangpanor Boonklum	Senior Executive Vice President, Office of General Counsel
9. Mr. Wuttikorn Stithit	Senior Executive Vice President, Gas Business Unit
10. M.L. Peekthong Thongyai[4/]	Senior Executive Vice President, Downstream Business Group Alignment
11. Mr. Disathat Panyarachun	Senior Executive Vice President, International Trading Business Unit
12. Dr. Buranin Rattanasombat[5/]	Senior Executive Vice President, Innovation and New Ventures
13. Mr. Chansak Chuenchom[6/]	Senior Executive Vice President, Engineering and Infrastructure
14. Mr. Montri Rawanchaikul[7/]	Senior Executive Vice President, seconded to CEO, PTT Exploration and Production Plc.
15. Dr. Kongkrapan Intarajang[8/]	Senior Executive Vice President, seconded to CEO, PTT Global Chemical Plc.
16. Mr. Wirat Uanarumit	Chief Operating Officer, seconded to CEO and President, Thai Oil Plc.
17. Mr. Chawalit Tippawanich	Senior Executive Vice President, seconded to President and CEO, IRPC Plc.
18. Miss Jiraphon Kawswat	Senior Executive Vice President, seconded to Acting President and CEO, PTT Oil and Retail Business Plc.
19. Mr. Worawat Pitayasiri	Senior Executive Vice President, seconded to President and CEO, Global Power Synergy Plc.

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Name	Position
20. Mrs. Chanamas Sasnanand[9/]	Executive Vice President, Group Corporate Finance and Strategy
21. Miss Wilaiwan Kanjanakanti[10/]	Executive Vice President, Group Accounting and Tax Policy
22. Miss Jaroonsri Wankertphon	Executive Vice President, Global Business Services

Remarks:
Nos. 1 - 5 are "Management" under SEC's notification.
1/ Appointed on October 1, 2021, replacing Mr. Wittawat Svasti-Xuto who retired and the position name was changed in line with organizational restructuring.
2/ Appointed on October 1, 2021, replacing Mrs. Arawadee Photisaro who retired and the position name was changed in line with organizational restructuring.
3/ Appointed on October 1, 2021, replacing Mr. Terdkiat Prommool, who was appointed SEVP, Corporate Strategy and Sustainability; the position name was changed in line with organizational restructuring.
4/ Appointed on October 1, 2021, replacing Dr. Buranin Rattanasombat, who was appointed SEVP, Innovation and New Ventures.
5/ Appointed on October 1, 2021, replacing Mr. Noppadol Pinsupa, who was appointed Chief New Business and Infrastructure Officer; the position name was changed in line with organizational restructuring.
6/ Appointed on October 1, 2021, according to the organizational restructuring.
7/ Appointed as CEO of PTT Exploration and Production Plc. on October 1, 2021.
8/ The position name changed from CEO to President & CEO of PTT Global Company Plc. with effect from January 1, 2022.
9/ Appointed on January 1, 2021, replacing Mr. Yongyos Krongphanich.
10/ The position name changed from Executive Vice President, Group Finance and Accounting Policy to Executive Vice President, Group Accounting and Tax Policy with effect from January 1, 2021.

Duties and Responsibilities of the President & Chief Executive Officer (President)

Under the Articles of Association, the President is authorized and responsible for managing the Board-assigned and PTT's overall business, which must be strictly and prudently managed with integrity under the Board-approved plans or budget in the best interests of PTT and its shareholders. The President's authority and responsibilities include:

- Operating or managing day-to-day business, or both.
- Hiring, appointing, removing, transferring, promoting, demoting, deducting the salary or wages of, punishing, and dismissing any employee under the Board's regulations.
- Ensuring the preparation and submission of business policies, including operating plans and budget estimates, for the Board's approval, and reporting performance outcomes to the Board every three months.
- Ensuring implementation of the Board-approved policies, plans, and budget.

The Board authorized the President to manage PTT's business under the following scope:

- Manage the overall business under the objectives, Articles of Association, policies, rules and regulations, directives, and resolutions of the Board and/or shareholders' meetings.
- Order, contact, command, implement, and sign juristic acts, agreements, orders, announcements, or correspondence with government agencies, state enterprises, or other parties and engage in any essential and suitable action to facilitate this duty.
- Command all employees, including hiring, appointing, removing, promoting, demoting, deducting the salary or wages of, taking disciplinary action against or dismissing any employee under the rules, regulations, and directives of the Board. For employees serving as advisers, senior executive vice presidents, or equivalent upward, prior approval of the Board is required. The President is also authorized to specify employment conditions for employees and issue rules for PTT's operations provided that they do not contradict the rules, regulations, and directives of the Board.
- Assign the power of attorney or delegate specific tasks to other persons, or both, provided that the action complies with the document on the power of attorney or rules, regulations, or directives of the Board or PTT, or both.

The authority and duties of the President stated above are invalid for any conflict of interest with PTT in any form resulting from the President's exercise of the authority. This year, no such cases have arisen.

The Management Committee

The PTT Management Committee (PTTMC) was appointed on October 1, 2001, with the mandate of operating PTT's business. As of December 31, 2021, the Committee consisted of 14 members as follows:

Name	Position
1. President & CEO	Chairman
2. Chief Operating Officer, Upstream Petroleum and Gas Business Group	Member
3. Chief Operating Officer, Downstream Petroleum Business Group	Member
4. Chief New Business and Infrastructure Officer	Member
5. Chief Financial Officer	Member
6. Senior Executive Vice President, Gas Business Unit	Member
7. Senior Executive Vice President, International Trading Business Unit	Member
8. Senior Executive Vice President, Downstream Business Group Alignment	Member
9. Senior Executive Vice President, Innovation and New Ventures	Member
10. Senior Executive Vice President, Engineering and Infrastructure	Member
11. Senior Executive Vice President, Organization Effectiveness and Corporate Governance	Member
12. Senior Executive Vice President, Office of General Counsel	Member
13. Senior Executive Vice President, Corporate Strategy and Sustainability	Member and Secretary
14. Executive Vice President, Company Secretary and Corporate Relation	Assistant Secretary

The Management Committee meets at least twice a month. This year, there were altogether 54 meetings (46 regular and 8 special meetings).

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Duties and Responsibilities

Provide advice and recommendations to the President on significant issues regarding corporate strategy and business directions, long-term planning, business performance, investment plans, budgets, allocation of resources to PTT and its affiliates, and ensure the uniformity of PTT's operations. PTTMC also provides consultation and recommendations to the President & CEO and promotes operation on the following matters:

- Set the visions and key missions for PTT Group.
- Establish directions, strategies, and business targets for the group along with the performance targets of business units and the group as a whole.
- Define a direction for corporate governance monitoring and integration of Governance, Risk and Compliance of the Group.
- Consider the capital allocation structure (budget and resources) to support future investment and operations of PTT and PTT Group (PTT Group's Capital Allocation Structure).
- Consider the investment management of PTT and PTT Group (PTT Group's Portfolio Management).
- Consider and monitor PTT's extended international investment.
- Establish a policy on human resource management, prepare and develop the group's management of level 14 up in a systematic, professional way for its future missions in line with the Leadership Affiliation and Alignment Program.
- Screen and provide opinions and recommendations on the establishment of standards/ mechanisms for the systems of business administration, human resources, and information, as well as business processes and organizational structures of PTT and its affiliates to be a corporation of sustainability excellence.
- Consider, screen, define policies and principles for PTT Way of Conduct, and ensure desirable direction.
- Rank significant matters about the allocation of human and financial resources of PTT and its affiliates.
- Jointly resolve significant conflicts between PTT's upstream and downstream petroleum and new business and Infrastructure businesses.
- Follow up progress and assess the performance of the Group against KPIs (PAs & KPIs).
- Scrutinize risk management in the business operations of the Group.
- Screen meeting agendas before presenting to the Board.
- Prioritize Board decisions to ensure effective implementation.
- Appoint committees or working groups, or both, to assist the Board's tasks.
- Perform other work as may be assigned by the President & CEO.

To efficiently manage PTT Group to drive the strategies and operations to achieve their goals, PTT has divided its committees into three groups, as of December 31, 2021, as follows:

1. Strategy Committees:

Consider, screen, define strategies/ policy, business directions, and operational plans of PTT/ PTT Group in various management aspects, comprising:

1.1 PTT Group Management Committee (PTTGMC)
1.2 PTT Management Committee (PTTMC) (mentioned above)
1.3 Minor PTT Group Management Committee (Minor PTTGMC)
1.4 Corporate Plan and Risk Management Committee (CPRC)
1.5 Gas Business Strategic Alignment Committee (GBSC)
1.6 Downstream Petroleum Business Group Strategic Alignment Committee (DBSC)
1.7 Trading Business Strategic Alignment Committee (TBSC)

2. PTT Group Alignment Committees:

Provide advice/ suggestions, push/ decide when cooperation between business units or PTT Group is required to enhance synergy and good collaboration, consisting of:

2.1 Upstream & Gas Business Group Alignment & Coordination Management Committee (UAC)
2.2 Downstream Business Group Alignment & Coordination Committee (DAC)
2.3 New Business and Infrastructure Group Alignment & Coordination Management Committee (NBIAC)
2.4 Finance & Accounting Group Alignment & Coordination Management Committee (FAAC)
2.5 Human Resources Group Alignment & Coordination Management Committee (HRAC)
2.6 PTT Group Core Values & KM Alignment Committee
2.7 PTT Group Operational Excellence Steering Committee (OpEx SteerCo.)
2.8 PTT Group Internal Audit Management Committee
2.9 PTT Group Corporate Social Responsibility Steering Committee, Rayong Province
2.10 LNG Business Cooperation Committee (LBCC)
2.11 PTT Group Digital Steering Committee
2.12 PTT Group Technology Committee (PTTGTC)
2.13 Procurement Strategic Alignment Committee (PSAC)
2.14 Properties Acquisition and Utilization Committee (PAC)
2.15 International Business Development Committee (IBDC)
2.16 PTT Group Corporate Governance Committee
2.17 PTT Group ONE Project Committee
2.18 PTT Group Sustainability Management Committee (GSMC)
2.19 PTT Group Corporate Reputation and Social Responsibility Committee (PTT Group CRSR)

3. Corporate Management Committees:

Responsible for overseeing, follow up on the progress of operations, approval/ screening/ giving opinions/ advice/ suggestions in various aspects of organization management, comprising:

3.1 Governance Risk and Compliance Management Committee (GRCMC)
3.2 PTT Procurement Oversight Committee (KorTorJor.)
3.3 PTT Credit Committee
3.4 Upstream Petroleum and Gas Credit Committee
3.5 Trading Credit Committee (TCC)
3.6 Strategic Investment Management Committee (SIMC)
3.7 Upstream Strategic Investment Management Committee (USIM)
3.8 Support Function Budgeting Committee (SFBC)
3.9 Non-Life Insurance Fund Management Committee
3.10 PTT Innovation Management Committee (PTT IMC)
3.11 Information Security Management System Committees (ISMSC)
3.12 PTT Idea to Commercialization Gate Committee (PTT I2C Gate Committee)
3.13 Thailand Energy Academy Management Committee
3.14 PTT Customer Excellence Committee (PTT CEC)
3.15 Social Enterprise Committee
3.16 Structure, Job Weight and Manpower Committee (SJMC)
3.17 Human Resources Management Committee (HRMC)
3.18 Corporate Human Resources Committee (HRC)
3.19 Screening Committee for the Request for the Royal Bestowment of the Most Exalted Order of the White Elephant and the Most Noble Order of the Crown of Thailand
3.20 Potential Pool and Scholarship Management Committee
3.21 Employee Welfare Fund Committee
3.22 Vendor Selection Committee
3.23 Trading Risk Management Committee (TRMC)
3.24 Gas Business Unit Hedging Committee (Gas HC)
3.25 Sale Execution of Steering and Oversight Committee on the Shareholding and Share East Mediterranean Gas Pipeline S.A.E (EMG) held by PTT Energy Resources Company Limited (PTTER)

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Succession Plan

Because PTT is a state enterprise, the nomination and appointment of the President & CEO must follow the Standard Qualifications of Directors and State Enterprise Officer Act. The directors must possess the qualifications as specified in Section 8 ter, and the nominating procedures as specified in Section 8 quarter. The Board is to appoint a Nominating Committee with five members legitimately qualified to nominate persons with appropriate knowledge, capability, and experience to fill the positions of PTT management. They must be legitimately qualified with no prohibited characteristics and cannot be PTT directors, except for management who are directors by title. They must not be older than 58 years old when submitting the application form. When the Nominating Committee has selected suitable candidates, The result will be submitted to the authority's consideration. The appointment must be completed within a year since the day the incumbent left the position. The employment contract lasts up to four years for each term. If the Board wishes to hire the previous person after the completion of his term as specified in the employment contract, it does not have to go through the nominating process. However, it cannot hire that person for more than two consecutive terms.

PTT has been grooming top management to become qualified candidates to replace the top management due to retire in the next 3 - 5 years. In 2007, PTT set up a Group Leader Development Program (GLDP) to develop a succession plan for potential leaders to assume higher positions of PTT Group that become vacant, namely:

- President and CEO
- Senior Executive Vice President (SEVP) or equivalent
- Executive Vice President (EVP) or equivalent
- Vice President (VP) or equivalent.

Management mechanisms are as follows:

- PTT Group Management Committee (PTTGMC)
- Minor PTT Group Management Committee (Minor PTTGMC)
- Human Resources Group Alignment & Coordination Management Committee (HRAC)
- Human Resources Management Committee (HRMC)

Performance in 2021

- Selection of SEVP pool members from potential EVPs (PTT Group)
  - 45 pool members (as of December 31, 2021)
  - 43 pool members already promoted (2008 - 2021).
- Selection of EVP pool members from potential VPs (PTT Group)
  - 117 pool members (as of December 31, 2021)
  - 89 pool members already promoted (2009 - 2021).
- Selection of VP pool members from PTT potential division managers (PTT)
  - 147 pool members (as of December 31, 2021)
  - 265 pool members already promoted (2009 - 2021).

Labor Disputes

No reports of labor disputes have been received over the past three years.

7.4.2 Management's Remuneration Policy

Management's Remuneration

Management's remuneration is set under the policy and regulations specified by the Board, aligning with the Company's Performance Agreement (PA) stipulated by the Ministry of Finance. The President & CEO and all executives together define Key Performance Indicators (KPIs) on annual performance targets.

The Remuneration Committee is responsible for considering the remuneration of the President & CEO to reflect his performance management, which is also in line with the principles and standards of other industrial peers, with clear criteria, transparency, and fairness. As a result, the annual salary increase and bonus payment would align with the results of KPIs, short-term and long-term performance of PTT. Overall, it should reflect his vision and long-term value-added and capacity enhancement for the Company. The principles and the appropriate remuneration must be presented to the Board for approval. To this end, key factors to evaluate the performance of the President & CEO were 1) PTT's performance under the State Enterprise Assessment Model (SE-AM), 2) the performance based on the vision presented to the Board, and 3) management capability and leadership.

According to the definition of "Management" defined by the Securities and Exchange Commission (SEC), 5 members included the President and CEO, Chief Operating Officer, Upstream Petroleum and Gas Business Group; Chief Operating Officer, Downstream Petroleum Business Group; Chief New Business and Infrastructure Officer; and Chief Financial Officer. The remuneration paid to management (excluding those seconded to PTT affiliates and those from PTT affiliates seconded to PTT) are detailed below:

Total Remuneration Paid to President & CEO in 2020 – 2021

Unit: THB

Remuneration	2020	2021
	Amount	Amount
Remuneration	30,772,423	31,112,160
Bonus	7,939,778	9,671,211
Total	**38,712,201**	**40,783,371**

Remark:
The remuneration of the President & CEO included an allowance for additionally assigned tasks, namely the positions of Chairman or Director (or both) of PTT's subsidiaries. He has duly complied with the terms of the employment contract as president.

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Total Remuneration Paid to Top Management according to SEC's Definition (4 persons) in 2020

Unit: THB

Remuneration	2020		2021	
	Management (under SEC's Definition)		Management (under SEC's Definition)	
	Person	Amount	Person	Amount
Salary	4	31,623,762	4	33,499,680
Bonus	4	14,357,096	4	16,815,875
Total		**45,980,858**		**50,315,555**

Remuneration Paid to Management (5 persons) from 2018 – 2021

Unit: THB

Remuneration	2018		2019		2020		2021	
	Person	Amount	Person	Amount	Person	Amount	Person	Amount
Salary	5	62,930,910	5	60,436,160	5	62,396,185	5	64,611,840
Bonus	5	24,672,468	5	24,474,078	5	22,296,874	5	26,487,086
Total		**87,603,378**		**84,910,238**		**84,693,059**		**91,098,926**

Remuneration Paid to Top 5 Management according to SEC's Definition as Chairman and Directors of PTT Group and Subsidiaries, 2020 – 2021

Unit: THB

Remuneration	2020		2021	
	Person	Amount	Person	Amount
Meeting Allowance and Monthly Allowance	5	14,202,084.34	5	15,505,165.32
Bonus	5	14,951,245.29	5	20,095,626.86
Total		**29,153,329.63**		**35,600,792.18**

Remarks:
The remuneration paid to top 5 Management according to SEC's Definition as Chairman and Directors of PTT Group and Subsidiaries.
In addition, the remuneration of the President & CEO ***has complied*** *with the employment term contract as president.*

Provident Fund Contribution to Management from 2018 – 2021

Unit: THB

Remuneration	2018		2019		2020		2021	
	Person	Amount	Person	Amount	Person	Amount	Person	Amount
Provident Fund Contributions	4	3,708,690.50	4	3,836,735.80	4	5,460,684.00	4	4,584,004.80

Additional information on the Board and management:
Records have shown no violation of the law within the past 10 years regarding:
1) Being sentenced for criminal charges except for violations of traffic laws, petty charges, or similar charges
2) Being sentenced to bankruptcy or having assets controlled
3) Serving as an executive or an authority in a company or partnership sentenced to bankruptcy or whose assets are controlled.

7.5 Employees

Employees are pivotal to corporate operations, and their quality is a key to its business success. PTT, therefore, stresses the development of HR management systems compatible with technological advancement and international standards. It not only promotes both conscientious merit and business competence among its employees but also encourages them to actively take part in public service. It is indeed through employees that PTT focuses on its development into a sustainable organization to elevate competitiveness and respond to internal changes of a corporation in pursuit of national energy security.

Headcount and Remuneration

The employee headcount (including those seconded to PTT's affiliates) as of December 31, 2021, stood at 3,551. PTT has continued to set its manpower plans in line with its operations under economic uncertainty. The focus is on allocating resources where significant value supplementation is likely or where continuing investment is needed.

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The business-group headcounts from 2018 to 2021 were as follows:

Unit: person

Business Unit	2018		2019		2020		2021	
	PTT	PTT Group	PTT	PTT Group	PTT	PTT Group	PTT	PTT Group
1. Gas	1,393	-	1,417	-	1,440	-	1,480	-
2. Oil	-3/	-	-	-	-	-	-	-
3. Petrochemicals and Refining	144	-	124	-	141	-	112	-
4. New Business and Infrastructure	380	-	394	-	429	-	462	-
5. Support staff/ secondees to PTT affiliates	1,144 1/	654 2/	1,167 1/	476 2/	1,117 1/	379 2/	1,104 1/	393 2/
6. Subsidiaries and jointly-controlled entities	-	25,959	-	27,511	-	29,042	-	29,372
Total	**3,061**	**26,613**	**3,102**	**27,987**	**3,127**	**29,421**	**3,158**	**29,765**

Remarks:
1/ Excluding PTT secondments
2/ PTT secondments
3/ On July 1, 2018, the Oil Business Unit underwent a spin-off and became PTT Oil and Retail Business Plc.

Remuneration for Personnel (excluding the President and management) from 2018 - 2021

Unit: THB

Remuneration	2018 1/	2019	2020	2021
Salary	4,104,427,784.01	3,855,819,435.99	3,966,160,901.90	4,122,373,594.88
Bonus	1,980,862,083.68	1,915,330,097.81	1,628,293,859.46	2,078,579,310.45
Provident Fund Contributions	489,326,712.01	464,877,921.50	477,524,458.33	490,980,568.77
Others (if any)	3,286,987,468.56	3,629,328,277.20	2,077,146,865.96	2,593,728,683.64
Total	**9,861,604,048.26**	**9,865,355,732.50**	**8,149,126,085.65**	**9,285,662,157.74**

Remarks:
1/ On July 1, 2018, the Oil Business Unit underwent a spin-off and became PTT Oil and Retail Business Plc. Therefore, remuneration for personnel from the Oil Business Unit for 2018 was from January to June only.

PTT sets the remuneration of employees based on the Company's short-term and long-term performance through Performance Management, a continuous and systematic process to drive the Company's performance to its achievement and in line with the Performance Agreement (PA) which is also linked to the corporate targets, business unit targets, and individual targets in the same direction, as well as PTT's strategic direction, to drive the operating results according to business plan targets.

PTT employees' annual salary increase is considered according to their performance. To this end, KPIs were applied to manage employee performance evaluation, which would be accordingly reflected in their salary increases and benefits. Employee KPIs could be divided into 2 key types: corporate KPIs and business/ operational/ personal (or functional KPIs). Individual KPIs must align with the four aspects of the balanced scorecard, namely finance, customers, internal process, and learning and developing. o achieve the Company's targets sustainably, PTT has added two more important aspects: products and personnel, to align with current performance results (short-term) and long-term business plans. Besides, PTT set a variable bonus aligned with the KPIs of PTT executives and employees of the management group to create motivation in achieving the annual targets.

Provident Fund

PTT has established and registered a provident fund called the "Provident Fund of PTT Public Company Limited and Affiliates" (the Fund). Employees of PTT and its joint ventures are eligible to participate in the scheme, and currently, 3,440 employees out of the total 3,502 employees of PTT, or 98.23%, have joined the Fund, managed by Krungthai Asset Management Public Company Limited and TISCO Asset Management Company Limited. The two companies disclosed related information in compliance with the Investment Governance Code (I Code).

The Fund engaged in investment with due regard for environmental, social, and governance (ESG) factors and jointly with the companies set a policy and assigned them to invest in entities with committed responsibility for all stakeholders: shareholders, employees, customers, business partners, society and the world. PTT has defined CG criteria and applied its decision-making process to ensure that the Fund makes the right investment in transparent businesses. Moreover, the Investment Committee required the fund managers to report PTT's current assets that are currently invested and compared them with the lists of SETTHSI index (Thailand Sustainability Investment) to learn of the ratio of its assets and the change whenever they submit investment performance.

Other Remunerations

PTT has instituted employee welfare and other remuneration programs apart from salary, bonus, and provident fund contributions for management and all employees. This is to keep up with economic conditions, the cost of living and other standards peer companies as well as PTT's current and future performance, achieved through constant revision and improvement. In addition, PTT has adopted a Flexible Benefits scheme, in response to the needs of individual employees. Each employee can choose to apply for flexible benefits by declaring his or her intention once a year under the period, conditions, and details prescribed by PTT, provided that such customized flexible benefits are not against the law, tradition, and good morals. However, mandatory employee benefits vital to the well-being of employees and in performing his or her duties will not be included as a choice. Moreover, contribution to the provident fund has been increased, and more choices are available for employee fund contribution to promote employees' financial planning and preparation for retirement.

HR System Development and Improvement

To become a sustainable organization, PTT continuously improves its HR management processes and mechanisms to ensure higher efficiency and realize the full potential of its employees, which will lead PTT toward its goals. PTT employees can fully demonstrate their competence, advance in their careers, and continue to grow with PTT.

PTT has focused on participation across the board in designing business plans to suit its direction and targets since this will efficiently align all its components. To this end, it has instituted a process in which senior PTT Group management along with support staff jointly define a vision and directions before propagating the agreed items for other units to apply in turning business strategies into business plans and budget plans in broad alignment. All PTT employees define individual objectives and KPIs, cascaded through the ranks from the corporate, department, to an individual level. Such objectives and indicators defined by employees then serve as a scope for performance and performance assessment standards to reflect individual performance.

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PTT has applied Career Management guidelines to prepare and promote management and all employees with skills and knowledge to fit the PTT-designed model in coping with its missions and creating value for the organization. PTT has applied this model to the management and development of all its employees and, taking into account business direction to enhance corporate competitiveness, has divided them into two professional groups (senior management and employees), with clear, efficient interconnected systems for recruitment, assessment, and individual development planning (IDP) in place.

- Senior management (equivalent to vice presidents upward) undergo Group Leader Development, which sustains the needs of senior executives in both quantity and quality. Management of this group is supervised by a panel of CEOs in PTT Group called the "PTT Group Management Committee (PTTGMC)", responsible for defining directions and policies for development plans for senior management. Another team, called "Human Resources Group Alignment & Coordination Management Committee (HRAC)", provides counseling and recommendations to the Senior Executive Vice President, Organization Effectiveness & Corporate Governance, to enhance decision-making on key coordination issues regarding human resource development strategies and directions of the PTT Group to align with those of PTT.
- Employees (division manager or equivalent and below): This internal management is specific to PTT or a PTT affiliate in developing employees to suit future operational needs. For PTT, Corporate Human Resources Committee (HRC) was established to promote and monitor career development planning to ensure goal achievement. Career Counseling Teams (CCT) for 16 professional groups take charge of defining and developing individuals, providing counseling and guidance, and monitoring and following up on implementation. An individual development plan is a tool for employees to set their goals and develop their career paths, thus adding value to their work in line with PTT's directions and goals. Such employee development can be undertaken through proper training via success profiles or job rotation in line with their career paths. This will enable all employees to develop skills in their new positions, as will suitable appointments and promotions in line with their responsibilities and potential. With this development framework, employees will be qualified to assume top management positions of PTT Group and enable PTT to achieve its goals.
- To ensure that the policy defined and HR management align with and support the business directions of PTT Group, the Human Resources Management Committee (HRMC), appointed to define and propose policies and make decisions on HR management, provide recommendations on the preparedness and development of PTT's current as well as future executives and employees, screen and give recommendations on the corporate structure and manpower, and approve or screen matters on HR management under the authority assigned.

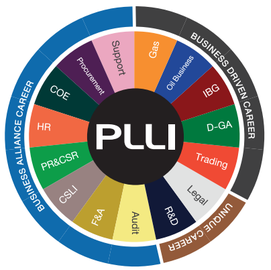
In 2021, PTT held the Seventh "Young People to Globalization program" (YP2G, Class 7) to develop qualified personnel for overseas posting in line with PTT's strategies. These employees will be assigned challenging responsibilities through the following core functions: Strategy & Planning, Business Development, Commercial & Marketing, and Engineering & Operation. These tasks will enable them to learn and accrue experience in business acumen through on-the-job training (OJT).

Valuing career and competency management, PTT not only prepared and reviewed the success profile and career path of each position, but also assessed success profiles for alignment with the performance cycle. The employees were urged to discuss their responsibilities with their supervisors (two-way communication) at the beginning of the year. These responsibilities were monitored and evaluated at mid-year and the end of the year to monitor or formulate individual development plans (IDPs), or both, for the employees.

PTT Group encourages and supports employees' learning through the "PTT Leadership and Learning Institute (PLLI)" with goals of establishing standards and developing employee capability through the management and implementation of compulsory courses for all PTT employees in the same direction.

PLLI has continually provided capacity-building courses for management and employees to be "smart and conscientious", leadership development grooming for the organization's growth and staff capacity-building to prepare them for corporate core competencies, advanced technology, stakeholders' needs, and strategic challenges in response to the new corporate vision. This year, despite the COVID-19 spread, it has upgraded its learning and development course structure by developing self-learning tools to support continued learning. The classroom was replaced by a real-time virtual classroom for all courses, which enabled participants to exchange their knowledge, experience, and opinions with their classmates and instructor through video conferences, such as MS Teams, WebEx, Zoom through PTT LMS. Other improved digital learning included experiential learning with online roleplay learning, more fun, and interesting learning through board games, creating better knowledge and understanding of business. Other digital learning media have also been developed to respond to the learning and needs of diversified groups of employees. Anywhere Anytime and Life long learning e.g. e-learning on organizational knowledge, regulations, rules policies, online learning from external learning sources covering over 100 courses on business, technology, soft skill, lifestyle, etc., PTT E-Library (E-Book, E-Magazine, Magazine, Book) that employees can search, reserve, borrow, and return, including online reading anywhere anytime. The podcast and online voice are other options for employee self-development with diversified content from inside and outside the company. This can be extended to flipped learning, a combination of various types of learning e.g. virtual class together with reading recommended books for compulsory courses in the electronic format. All of them support uninterrupted self-development of employees in line with PTT's business direction and strategies and maximum benefit in the development of employees' capacity and modern management. PLLI's course structure covers the development of all employees, from new recruits to top management, as follows:

1. Leadership Development Program is designed to prepare and accelerate the development of high-potential management team members for skills, knowledge, and ability in people and business management through learning, knowledge-sharing, and experience-sharing with world-class instructors, including learning and experience-sharing with top management, internal and external. Participants of this program are potential management team members selected under the given criteria.
2. Core Programs are designed to develop the capacity of all employees at each level, position, and career. Supervisors must support employees for training under this program. The program comprises compulsory courses, direction/ assignment, essential program, and functional program.
3. Elective Programs are designed to develop the capacity of each individual's needs. The line supervisor and employee will together choose additional courses as suitable and necessary, for example, marketing for crisis management, crisis team management, and Virtual Agile Team.



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Summary of Human Resource Development

Unit: Hours/person/year

Training hours/person/year	2017	2018	2019	2020	2021
Employee	40.62	73.67	78.88	30.26	37.40
Management	25.12	73.91	89.15	45.93	34.25

Unit: THB/person/year

Expense/person/year	2017	2018	2019	2020	2021
Employee & Management	37,837.83	55,274.35	53,143.21	13,471.73	13,485.45

Fostering Relationship between Management and Staff in Search of Common Goal

Communication between management and staff comes in various forms. The President & CEO constantly holds regular meetings with employees, allowing them to learn of the Company's operation directions, obstacles, or emerging impacts during the development and efficiency enhancement each year. The focus is primarily on employees' participation and views. Annual employee satisfaction and engagement survey is implemented for solution and improvement of satisfaction and engagement. PTT believes that proper communication and information exchange among staff and management will foster smooth relations and cooperation, thus driving the organization toward goal achievement. Moreover, PTT surveys the basic human resource needs of management and staff through various committees such as the Human Resource Management Committee, PTT Labor Relations Committee, and Career Path Management Committee. An annual survey of staff opinions is undertaken by an external human resource management adviser. There was also cooperation with PTT Group to jointly develop a database of management as well as development plans of senior management.

The PTT Labor Relations Committee was established under the State Enterprise Labor Relations Act B.E. 2543 (2000). The committee consists of 19 members with the President (as PTT director) as Chairman, nine members representing the employer, and nine members representing the employees. The committee considers issues about employment conditions, employees' rights and benefits, as well as employee complaints. The committee meets monthly to monitor the progress of related issues with prudence.

Besides the monthly Labor Relations Committee meetings, PTT holds meetings of a working group on the study and development of employees' welfare and other benefits, appointed with the resolution of the Labor Relations Committee. Members comprised representatives from the employer and employees to jointly search and analyze information on employees' welfare and benefits of PTT Group in comparison with those of other leading businesses for use in the improvement for PTT's regular and probationary employees.

PTT also holds Joint Consultation Committee (JCC) meetings between its management team and staff of regional offices nationwide, e.g. Rayong Gas Separation Plant, Khanom Gas Separation in Nakhon Si Thammarat. The JCC comprising the top management of certain establishments as chairman and employee representatives would jointly consider every issue of proposals and complaints of both management and employees for employees' good standard of living in line with laws and PTT's regulations.

PTT Group Core Values

PTT Group Core Values

PTT Group defined its core values as SPIRIT, which is significant in molding PTT management and employees to command uniform work behavior. The SPIRIT (S: Synergy, P: Performance Excellence, I: Innovation, R: Responsibility for Society, I: Integrity & Ethics, and T: Trust & Respect) clearly reflects PTT's identity of smart, conscientious, and responsible for the company and the outside society alike.

In 2021, the values were reviewed and desirable behaviors were adjusted to align with the new corporate vision and future challenges by focusing on PTT Group employees as the driving force for Thailand to move through the transformation into a new future through SPIRIT values, namely:

- **Synergy:** Join forces to form alliances by focusing on employee knowledge sharing, and instigating collaborative power both inside and outside the company.
- **Performance Excellence:** Strive for excellence, focus on employees' readiness to quickly adapt to changes, and work hard to accomplish beyond-expectation results to create and deliver the best value to stakeholders.
- **Innovation:** Create growth through innovation by focusing on employees' positive mindsets, seeking possibilities for new ideas and daring to think creatively, and being able to apply new digital technologies for increased job efficiency, all while continuing to learn and improve.
- **Responsibility for Society:** Creatively build society and environment, focus on employees working with awareness taking into account the impact on stakeholders for sustainable development, develop an environmentally conscious business, and have volunteer spirit to do for the public, community, society, and the nation.
- **Integrity & Ethics:** Create the power of good acts by focusing on employees' ability to perform properly, transparently, and as excellent employees of the company, with honesty and ethics at the forefront.
- **Trust & Respect:** Build trust and confidence, focus on employees in working together with trust and confidence, be open to opportunities and trust in others' potential capabilities, and be open to and respectful of others' diversity.

7.6 Other Key Information

Company Secretary

To comply with the corporate governance principles of listed companies under the category of directors' responsibilities and the terms of the Securities and Exchange Act, the Board appointed a Company Secretary to provide the Board with legal advice and remind them of assorted regulations that they need to know and comply with; hold meetings; supervise Board activities to enable them to perform efficiently and effectively in the best interests of PTT; prepare and maintain key documents, including directors' registration, Board meeting notices and minutes, annual reports; issue shareholders' meeting notices and minutes; and keep reports on vested interests reported by directors or management.

The Board has appointed Company Secretary since 2008. Since October 1, 2020, Mr. Nisit Phongvutiprapant has served as the Company Secretary.

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Company Secretary

Mr. Nisit Phongvutiprapant

Company Secretary
(October 1, 2020 - present)

Age: 51

Shareholding:
0.000003%

Education:
- Bachelor of Economics (Development Economics), Bangkok University

Company Secretary Training Record:
- Director Certification Program (DCP195/2014), Company Secretary Program (CSP 113/2020), Thai Institute of Directors Association (IOD)
- Advanced Management Program II (Class 1/2018), PTT Group Leadership and Learning Institute
- Leadership Development Program I (2013), PTT Group Leadership Development and Learning Institute
- Bain Academy Asia Pacific 2019 Program, Bain & Company SE Asia, Inc., Singapore

Professional Experience (past five years):
- October 1, 2020 - Present
  Senior Executive Vice President, PTT Oil and Retail Business Plc. (OR), seconded to Executive Vice President, Company Secretary and Corporate Relation, PTT Public Company Limited
- June 1, 2020 - September 30, 2020
  Senior Executive Vice President, Corporate Strategy, Innovation and Sustainability, OR
- February 1, 2020 - May 31, 2020
  Vice President, Strategy and Portfolio Management, OR
- May 1, 2019 - January 31, 2020
  Vice President, OR, seconded to PTT Oil Myanmar Co., Ltd.
- July 1, 2018 - April 30, 2019
  Vice President, International Business Development and Planning, OR
- May 17, 2017 - April 30, 2019
  Director, PTT Philippines Corporation
- 2012 - April 30, 2019
  Director, PTT (Lao) Co., Ltd.
- January 1, 2017 - June 31, 2018
  Vice President, International Business Development and Planning, PTT Public Company Limited

Related Key Positions Held:
- -None-

Important Special Activities:
- Director, Thai Company Secretary Club
- Vice Chairman and Treasurer, Power of Innovation Foundation
- Director, Executive Committee, Vidyasirimedhi Institute

Relationship with Executives:
- -None-

The Person supervising Accounting

The Executive Vice President, Global Business Services, PTT, is assigned by position to be directly responsible for PTT's accounting. Miss Jaroonsri Wankertphon has been holding the position since October 1, 2020, and is directly in charge of accounting management. She is qualified as an accountant under the criteria set by the Department of Business Development. **More profile details appear in Executive Profile in Attachment 1**.

Head of the Office of Corporate Audit

The Executive Vice President, Office of Corporate Audit, PTT, is by position assigned as Head of the Corporate Audit. Mr. Chadil Chavanalikikorn is the present head of Corporate Audit. More Profile details appear in Part 2 **"9. Internal Control and Connected Transactions"** and **details of the Head of the Office of Corporate Audit also appear in Attachment 3**.

Head of Compliance

The Senior Executive Vice President, Office of General Counsel, PTT, is by position assigned as Head of Compliance. Ms. Peangpanor Boonklum was appointed to the position and is currently responsible for PTT's compliance. More details about the Compliance Unit are presented in Part 2 **"9. Internal Control and Connected Transactions"** and **profile details of the Head of Compliance also appear in Attachment 1**.

Head of Investor Relations and Contact Information

Mr. Tanapon Prapapan, Investor Relations, was appointed Vice President, Investor Relations Department with effect from April 16, 2021, and can be contacted at Investor Relations, PTT, Tel.: 0-2537-3518-9, E-mail: ptt-ir@pttplc.com, or PTT's website (www.pttplc.com).

Audit Fee

This year, PTT and its subsidiaries paid a total of THB 163,034,402 (one hundred and sixty-three million thirty-four thousand four hundred and two) in audit fees to the office of the external auditors for the previous fiscal year. They also paid THB 48,267,690 (forty-eight million two hundred sixty-seven thousand six hundred ninety) for other services (non-audit fees) such as those for comfort letters issued for subsidiaries' debt management plans for debentures, audit fee according to the conditions in the investment promotion certificate, tax compliance service fees, and other certification fees in the previous fiscal year.

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8. Corporate Governance Milestones

8.1 Performance of the Board of Directors in 2021

8.1.1 Nomination, Development, and Performance Assessment of the Board

(1) Independent Directors

The Board of Directors, at the meeting No. 1/2013 on January 17, 2013, approved the revised definition of independence of directors, proposed by the Corporate Governance Committee which was more stringent than the criteria set by the Securities and Exchange Commission (SEC) and The Stock Exchange of Thailand (SET), and defined their roles, duties, and responsibilities. PTT published a handbook on their execution of duties and responsibilities, signed by the Chairman, on January 21, 2013. Board meeting No. 3/2021 dated March 18, 2021, approved the revision of roles and responsibilities of PTT's independent directors to be more updated and in line with regulation criteria of various agencies, which was signed by the Chairman of the Board on April 1, 2021. Essential elements of the revised handbook are:

Qualifications of independent directors

(1) Must not hold more than 0.5% of the total voting shares of PTT, its subsidiaries, associated and related companies of which PTT's major shareholders or PTT's controlling person, including the shares held by persons related to such independent director.

(2) Must not be or have not been involved as the management/ employee/ staff member/ adviser who earns a regular salary, or authorized controlling person of PTT, its subsidiaries, associated companies, related companies, or a juristic person of which PTT's major shareholders or PTT's controlling person during the period of two preceding years before the appointment. This forbidden characteristic excludes former government officials or consultants of the government agency which is PTT's majority shareholder or has controlling interest in PTT.

(3) Must not have blood relationship or relationship through legal registration as parents, spouses, siblings, and children, including the spouse of the children, of any other directors, management, major shareholders, authorized controlling person, or any person to be nominated as a director, management, or authorized controlling person of PTT or its subsidiary.

(4) Must never have engaged or not engage in a business relationship with PTT, its parent company, subsidiaries, associated or related companies, major shareholders, or controlling person in a way that could obstruct his or her exercise of independent discretion; including must never have been or be a significant shareholder or controlling person of parties with a business relationship with PTT, its parent company, subsidiaries, associated or related companies, major shareholders, or controlling person except where such association has ended at least two years before his or her appointment as an independent director.

The business relationship in the preceding paragraph includes engagement in normal business transactions for operation, property rent, asset or service transactions, financial assistance involving borrowing, guaranteeing, provision of assets as collateral, and similar behavior that incurs debts on the part of PTT or its contract counterpart to each other amounting to 3% or more of PTT's net tangible assets or THB 20 million (whichever is smaller). Calculation of such debts is to follow the method for connected transactions under the announcement of the Capital Market Supervisory Board on connected transaction criteria mutatis mutandis; such debts must, however, include all debts incurred during the entire year before the business relationship with the same party begins.

(5) Must never have been or not be an auditor for PTT, its parent company, subsidiaries, associated or related companies, major shareholders, or controlling person, and must not be a significant shareholder, controlling person, or partner of an audit office in which an auditor of PTT, its parent company, subsidiaries, associate or related companies, major shareholders, or controlling person serves, except where such association has ended at least two years before his or her appointment as an independent director.

(6) Must never have been or not be a professional service provider, including legal or financial adviser with a fee of more than THB 2 million a year paid by PTT, its parent company, subsidiaries, associated or related companies, major shareholders, or controlling person, and must not be a significant shareholder, controlling person, or partner of the professional service provider in question, except where such association has ended at least two years before his or her appointment as an independent director.

(7) Must not be a director appointed to represent PTT, a major shareholder, or a shareholder connected to PTT's major shareholder.

(8) Must not engage in similar businesses that compete significantly with PTT or its subsidiaries and must not be a significant partner in partnerships or director participating in business management, staff, employee, adviser on payroll, or hold more than 1% shares of the total voting shares of other companies that are in similar businesses and compete significantly with PTT or its subsidiaries.

(9) Must not have any other qualification that may compromise expression of independent views on PTT's businesses.

Independent directors with qualifications under (1) - (9) above may be assigned by the Board to decide on the business operations of PTT, its subsidiaries, associated companies, sister companies, juristic person, major shareholders, or controlling person that could pose conflicts of interest; such decisions will be collective decisions.

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If a person appointed by PTT as an independent director has or used to have a business relationship or professional service provision with PTT exceeding the value given under (4) or (6) of the previous paragraphs, PTT is allowed to relax such prohibitions on a business relationship or professional service provision with excessive value if it could secure the Board of directors' views regarding the criterion of Section 89/7 of the Securities and Exchange Act has illustrated that the appointment of such person will not affect his or her performance and independent expression of views. To this end, PTT must disclose the following information in the meeting notice to shareholders under the agenda item on consideration of independent director appointment:

(1) Business relationship or professional service provision depriving the qualifications of that person;
(2) Justification and necessity for appointing that person as an independent director;
(3) The PTT Board of directors' views on the appointment of that person as an independent director.

Under the (5) and (6) of the previous paragraph, "partner" means a person assigned by the audit office or professional service provider to serve as a signatory of the audit report or professional service report (as applicable) on behalf of the company.

In addition, these qualifications must not contradict applicable laws.

Incidentally, if independent directors serve in this position in PTT, its subsidiaries, associated companies, or sister companies, PTT must also disclose information about such service and the total compensation of such directors in the 56-1 One Report.

- Business relationship or professional service provision of independent directors in the past fiscal year
  -None-

Roles, duties, and responsibilities of PTT's independent directors

(1) Recommend essential and beneficial matters to PTT, shareholders, and minor shareholders to the Board and/or the President and Chief Executive Officer.
(2) Advocate roles and responsibilities of the Board and provide views commonly expected of independent directors for the benefit of PTT, its shareholders, and minor shareholders.
(3) Review matters to ensure PTT's compliance with laws dealing with independent directors and duly revise the definition of independent directors for suitability and legal completeness.
(4) Perform other Board-assigned duties provided that these actions do not compromise their independence.
(5) An independent director's term begins once he or she fulfills all the requirements under the definition of PTT's corporate governance; it ends when he or she lacks qualifications or completes the PTT term.
(6) The independent directors must hold their own meeting at least once a year.

Segregation of the Chairman and the President & CEO

To segregate policy-making duties from those of day-to-day management and to enable directors to look after and assess performance effectively, PTT has required that the Chairman and the President & CEO are always two persons. This is because the Chairman needs to oversee management's performance, guide, and assist it, but not to take part in or interfere with day-to-day management, which is the duty of the President & CEO under the authority delegated by the Board.

The current Chairman is an independent director. He exercises high-level leadership and ensures that directors do not fall under the influence of management by encouraging them to exercise their voting rights and strictly comply with CG principles.

Independence of the Chairman

Board Meeting No. 11/2020 on November 18, 2020, appointed Professor Dr. Thosaporn Sirisumphand, an independent director, as Chairman of the Board with effect from November 18, 2020. The appointment was endorsed by the State Enterprise Policy Office (SEPO) as required by the Cabinet resolution of August 6, 2019, on guidelines for the appointment of state enterprise directors, and the 2017 CG Code for Listed Companies. It would allow the work of the Chairman to be independent and boost confidence in the transparency of operations and fair treatment of all stakeholders.

(2) Nomination of Directors and the President & CEO

Nomination of Directors

In 2021, PTT nominated and appointed six new directors replacing directors who resigned, retired, or completed their terms at the Annual General Meeting of Shareholders (AGM):

- Mr. Payong Srivanich
  Independent Director
- Mr. Jatuporn Buruspat
  Independent Director
- Associate Professor Dr. Chayodom Sabhasri
  Independent Director
- Mr. Krisada Chinavicharana
  Director
- Mr. Phongsthorn Thavisin
  Director
- Associate Professor Dr. Narongdech Srukhosit
  Independent Director

PTT reappointed former directors who completed their terms at the 2021 AGM to another term, namely Mr. Danucha Pichayanan (Independent Director) and Mr. Auttapol Rerkpiboon (Director).

Nomination procedures are reported under Section 2, Corporate Governance, the topic of **Proposing Additional Meeting Agenda Items and Nominating Directors** and **Item 7.3 (2) The Nominating Committee.**

Nomination of the President & CEO/ succession planning

Nomination of the President & CEO/ succession planning is reported under Section 2 Corporate Governance, **Item 7.4 Information about executives.**

(3) Director Development

Training courses/ seminars/ engagement in PTT activities

The Board and management value regular participation in training and seminars concerning their competencies for their jobs. (Training details appear in directors' profiles in Attachment 1.) Most PTT directors (more than 90%) underwent training with the Thai Institute of Directors Association (IOD) and other leading entities and institutes as well as seminars on related topics.

At present, 13 directors were trained in courses related to director duties, namely 13 in the Director Certification Program (DCP) and 3 in the Director Accreditation Program (DAP), a total of 13 out of 15 directors, equivalent to 86.67%.

PTT supported and sponsored IOD membership for all directors to provide them with communication and more information channels useful for their directorships. PTT also delivers seminar information for directors to consider enrollment in curricula of their interest; this also applies to other continual seminars or curricula throughout the year. It regularly organizes in-house briefings by leading consultants' experts on useful business data. Finally, it organizes study trips for directors to other units or entities as seen fit to provide helpful insights for application to PTT's businesses for sustainable growth.

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In 2021, training and seminars to foster their work knowledge and PTT's activities include the items below.

Directors	Training/ Seminar/ Activity
Professor Dr. Thosaporn Sirisumphand	• In attendance at a visit by HRH Princess Maha Chakri Sirindhorn to VISTEC, KVIS, the Wangchan Valley Development Project, and the Nawat Agricultural Learning Center, Chitralada Technology Institute, November 15 - 17, 2021 • In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
POL. GEN. Rungroj Sangkram	• Risk Management Program for Corporate Leaders (RCL 23/2021), Financial Statements for Directors (FSD 44/2021), Thai Institute of Directors Association (IOD) • In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
Mr. Don Wasantapruek	• In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
GEN. Teerawat Boonyawat	• Director Certification Program (DCP 304/2021), Thai Institute of Directors Association (IOD) • In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
Mr. Danucha Pichayanan	• In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
M.L. Chayotid Kridakon	• In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
Mr. Krishna Boonyachai	• Ethical Leadership Program (ELP 23/2021), Risk Management Program for Corporate Leaders (RCL 22/2021), Successful Formulation & Execution of Strategy (SFE 36/2021), Director Leadership Certification Program (DLCP 3/2021), Thai Institute of Directors Association (IOD) • In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
Mr. Jatuporn Buruspat	• In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling • Director Orientation
Mr. Krisada Chinavicharana	• Director Orientation
Mrs. Premrutai Vinaiphat	• In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling
Mr. Phongsthorn Thavisin	• In attendance at a visit by HRH Princess Maha Chakri Sirindhorn to VISTEC, KVIS, the Wangchan Valley Development Project, and the Nawat Agricultural Learning Center, Chitralada Technology Institute, November 15 - 17, 2021 • Director Leadership Certification Program (DLCP 3/2021), Thai Institute of Directors Association (IOD) • Director Orientation
Associate Professor Dr. Chayodom Sabhasri	• Ethical Leadership Program (ELP 23/2021), Thai Institute of Directors Association (IOD) • In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling • Director Orientation
Mr. Payong Srivanich	• In-house briefing on the U.S. Antibribery Law and Trends by Sherman & Sterling • Director Orientation
Associate Professor Dr. Narongdech Srukhosit	• Director Orientation
Mr. Auttapol Rerkpiboon	• In attendance at a visit by HRH Princess Maha Chakri Sirindhorn to VISTEC, KVIS, the Wangchan Valley Development Project, and the Nawat Agricultural Learning Center, Chitralada Technology Institute, November 15 - 17, 2021 • In-house briefing on the authority, duties, and liabilities of directors and management by Weerawong, Chinnavat & Partners Limited (WCP)

The PTT Board also engaged in other corporate activities, such as business visits to PTT and PTT Group companies, environmental preservation activities in Chon Buri, Trat, and Phuket, PTT Inauguration Day, etc.

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(4) Board Self-assessment

In compliance with the CG policy, PTT required the Board to conduct self-assessment to scope its regular review of its performance. With the resolution of Board Meeting No. 7/2021 on July 15, 2021, the Board approved all five self-assessment forms with some modifications made to align with the State Enterprise Assessment Model (SE-AM), requiring quality or effectiveness assessment of the operation and improvement of policy, practice and/or operational procedures, based on previous assessment so that all directors can consider the assessment results more clearly. Details are as follows:

- Update and add questions in the assessment form of the entire Board on risk management and internal control and monitoring financial and operational reports, creating a sustainable organization.
- Revised the assessment form of roles and performance of the Chairman of the Board, satisfaction of specific committees and chairman of each committee, on the topic of satisfaction with the work of specific committees and chairman of each committee to reflect the efficient/ effective implementation of each specific committee in accordance with duties and responsibilities specified, which comply with the SE-AM criteria.

The five assessment forms are Assessment of the Board (Entire Board)/ Assessment of Individual Directors (Self-assessment)/ Individual Assessment of Other Directors (Cross-assessment)/ Assessment of Specific Committees (Self-assessment)/ and Assessment of Chairman's roles, duties, and performance along with satisfaction with specific committees and chairman of each committee. The five assessment forms stipulated the percentages corresponding to the levels of performance achieved in each topic: over 85% = excellent, over 75% = very good, over 65% = good, over 50% = fair, and below 50% = need improvement. The self-assessment findings were as follows:

1. **Assessment of the Board (Entire Board):** The assessment form comprised five assessment topics: Board policy, Board composition, Board practices, Board meeting, and Board training and development.

   The results indicated excellent/ most suitable overall performance, with an average score of 95.93%.
2. **Assessment of Individual Directors (Self-assessment):** The assessment form comprised six topics: accountability for decision-making and actions; responsibility for performing the duties with full ability and efficiency; equitable and fair treatment of all stakeholders; transparency of job performance and information disclosure; vision to create a long-term value; and business ethics.

   The overall results of the six topics indicated excellent conformance by most directors, with an average score of 98.93%.
3. **Individual Assessment of Other Directors (Cross-assessment):** The assessment form consisted of six identical categories as listed above for direct comparison.

   The cross-assessment results in these six topics indicated excellent conformance by most directors, with an average score of 98.93%.
4. **Self-assessment of Specific Committees (Entire Committees)** consisted of four topics: Board policy, Board composition, Board practices, and Board meetings.

   The results of the four committees on the four topics indicated efficient/ mostly suitable overall performance as follows:

   4.1 The Nominating Committee indicated excellent performance, with a score of 100.00%.

   4.2 The Remuneration Committee indicated excellent performance, with an average score of 98.61%.

   4.3 The Corporate Governance Committee indicated excellent performance, with an average score of 95.83%.

   4.4 The Enterprise Risk Management Committee indicated excellent performance, with an average score of 97.92%.
5. **Chairman's Roles & Duties and Performance Assessment, Satisfaction of the Committees and the Chairman of each.** The assessment of the Chairman consisted of eight topics, and ten topics on work satisfaction assessment, with an average score of 99.38%.
6. **Audit Committee's Performance Assessment**

   To comply with the best practices of The Stock Exchange of Thailand (SET) and the State Enterprise Policy Office (SEPO), as well as PTT's regulations on the Audit Committee and the Internal Audit Unit B.E. 2564 (2021), the Audit Committee must assess its audit performance by undertaking self-assessment at least once a year. The individual self-assessment or the entire committee's assessment is to be presented annually to the Board, specifying problems leading to unfulfilled objectives. This year, the Audit Committee's Meeting No. 9/2021 on September 9, 2021, endorsed the assessment forms for the Audit Committee, namely Assessment of Individual Directors (self-assessment), Individual Assessment of Other Directors (cross-assessment), and Assessment of the Committee (entire Committee). The Audit Committee Meeting No. 11/2021 of November 12, 2021, endorsed the assessment of its performance for 2021 and submitted the results together with the performance improvement plan to Board Meeting No. 12/2021 on December 16, 2021, with the following details:

   - **Assessment of the Entire Committee:** The assessment form consisted of eight assessment topics: structure, composition and office term/ meetings/ roles and responsibilities/ relationship with the internal auditor/ relationship with the external auditor/ relationship with management/ reporting/ quality consistency. The assessment criteria were 4 = regularly implemented, 3 = mostly implemented, 2 = sometimes implemented, 1 = never implemented.

     The results of the assessment of the entire Audit Committee were at the "mostly implemented" level, with an average score of 4.00.
   - **Assessment of Individual Directors (Self-Assessment):** The assessment form consisted of six topics: business knowledge/ specific expertise/ independence and fairness/ understanding of duties and responsibilities of members/ commitment to work and meetings/ and meeting attendance. The assessment criteria were 4 = excellent, 3 = good, 2 = fair, 1 = need improvement.

     The results of the Audit Committee's self-assessment were at "good" level, with an average score of 3.84.
   - **Cross-assessment:** The Cross-assessment form consisted of six topics identical to the list above for direct comparison.

     The results of the Audit Committee's cross-assessment indicated "excellent" overall performance, with an average score of 4.00.

PTT also analyzed the assessment topics to develop/ improve performance and formulated an annual plan for directorship efficiency enhancement to the Board for approval. In addition to developing the annual performance assessment forms for the Board, the Board has since 2017 begun gauging directors' efficiency and effectiveness by defining KPIs for their performance early in the year for measuring the Board's performance and determining their compensation.

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Director Orientation

For new directors, PTT arranges an orientation program on its business policies, capital structure, shareholding structure, business performance, information systems, as well as applicable laws and regulations. In addition, each director receives a Director's Handbook, which includes the following topics:

Director's Handbook:

1. Public Company Act
2. Securities and Exchange Act
3. Standard Qualifications of State Enterprise Directors and Employees Act
4. Emergency decree on Electronic Meetings, B.E. 2563 (2020)
5. Company Registration Certificate
6. Company Certificate
7. Company Objectives
8. Articles of Association
9. Company Regulations (16 regulations)
10. PTT Corporate Governance Handbook
11. Manual for Directors of Listed Companies
12. Principles and Guidelines on Corporate Governance for Stated-Owned Enterprises B.E. 2562 (2019)

Information Kit for Directors:

1. Overview business presentation of PTT
2. List of directors, specific committees, and management structure
3. Director Fiduciary Duty Check List
4. CG Principles for Listed Companies (CG Code)
5. Connected Transactions of Listed Companies
6. Guidance on Providing Information for Listed Company Management
7. PTT Plc. Company Profile (short version)
8. Annual Registration Statement/ Annual Report (Form 56-1 One Report)
9. Annual Registration Statement/ Annual Report (Form 56-1 One Report) Financial Report
10. Corporate Governance
11. Debenture Magazine ("Happiness")
12. Article: "Truth about Privatization"
13. PTT Way of Conduct
14. PTT Technology and Innovation Management Operating System
15. PLLI Course Catalog

This year, in the briefing to the new directors, the President & CEO along with senior management presented information about PTT, its management structure, strategies and policies on business operations and performance, and relevant information for their overview of the business operations. The above-mentioned documents and handbook for new directors were handed over. In 2021, three director orientations were arranged.

8.1.2 Meeting Attendance and Individual Directors' Compensation

(1) Board Meetings

PTT schedules its board meetings in advance for each month of the year. In 2021, the monthly meetings took place on the third Thursday of each month, with occasional special meetings on special agenda as seen fit. The Office of the President sends each director meeting notices, agenda with complete details and rationale, and supplementary documents with enough essential details for decision-making about seven days ahead of each meeting to give them time to study these. Directors consider the agenda through application software to streamline the process of agenda delivery and the paperwork involved, thus speeding up directors' work while efficiently providing them with adequate details for decision-making.

Since 2015, for each meeting, the Board has required regular follow-up agenda on the updates of implementation of Board observations and comments to ensure execution of PTT's strategies.

The Board's policy is that, for a given agenda item, if any director has potential conflicting interests with PTT, the secretariat will not deliver such agenda item to that director, who will not attend the meeting and abstain from voting on such agenda item. In voting, the minimum quorum of directors is two-thirds of all attending directors. If the quorum does not comply with this guideline, the discretion of the Chairman will be sought, a policy that is stated in the Corporate Governance Handbook.

For each agenda item, the minutes contain written comments and observations. The Board-certified minutes are filed for perusal by the directors and related parties. Each meeting normally takes 3 - 4 hours.

Due to the aggravating, widespread COVID-19 in Thailand in 2021, the Chairman of the Board allowed electronic meetings in observance of the COVID-19 safety and control measures. In 2021, PTT held a total of 19 Board meetings, 12 regular and 7 special ones. The special meeting is held annually to determine, review and approve PTT Group's vision, mission, directions, and strategies (five-year rolling). This year, the Board and management took part in reviewing such matters and approved the direction and strategy to scope and guide the work by business units, subsidiaries, and associates in developing enterprise and budgeting plans for 2022 - 2026. In addition, one non-executive meeting was held in June on the topic of PTT's businesses on various issues and recommendations to management for further business improvement, which is in line with the Principles and Guidelines on Corporate Governance for State-owned Enterprises B.E. 2562 (2019) as well as the guidelines given by the State Enterprise Policy Office. One independent directors' meeting was held in October 2021 on the topic of the direction in managing employees in PTT's potential pool. At every meeting, the Chairman allowed all directors to express their open and free views. The Board meetings are detailed below.

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Attendance of the Board and Five Specific Committee Meetings for 2021

Name	Special 1/2021	Special 2/2021	1/2021	2/2021	Special 3/2021	3/2021	Special 4/2021	4/2021	5/2021	6/2021	Special 5/2021	7/2021	Special 6/2021	Special 7/2021	8/2021	9/2021	10/2021	11/2021	12/2021
1. Professor Dr. Thosaporn Sirisumphand	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
2. POL. GEN. Rungroj Sangkram	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
3. Mr. Don Wasantapruek	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
4. GEN. Teerawat Boonyawat	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
5. Mr. Danucha Pichayanan	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
6. M.L. Chayotid Kridakon	/	X	/	/	X	/	/	/	/	/	/	/	/	/	/	/	/	/	/
7. Mr. Krishna Boonyachai	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
- Mrs. Nuntawan Sakuntanaga	/	/	/	/	/	/	Retired by rotation at the 2021 AGM												
8. Associate Professor Dr. Chayodom Sabhasri	Appointed, effective from April 9, 2021						/	/	/	/	/	/	/	/	/	/	/	/	/
- Professor Dr. Surapon Nitikraipot	/	/	/	/	/	/	Retired by rotation at the 2021 AGM												
9. Mr. Payong Srivanich	Appointed, effective from April 9, 2021						/	/	/	/	/	/	/	/	/	/	/	/	/
- Dr. Thon Thamrongnawasawat	/	/	/	/	/	/	Retired by rotation at the 2021 AGM												
10. Mr. Jatuporn Buruspat	Appointed, effective from April 9, 2021						/	/	/	/	/	/	/	/	/	/	/	/	/
- Mr. Chumpol Rimsakorn	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	Resigned, effective from October 1, 2021		
11. Mr. Krisada Chinavicharana	Appointed, effective from October 1, 2021																/	/	/
12. Mrs. Premrutai Vinaiphat	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
- Dr. Pailin Chuchottaworn	/	/	/	/	/	/	/	/	Resigned, effective from May 1, 2021										
13. Mr. Phongsthorn Thavisin	Appointed, effective from October 8, 2021																/	/	/
- Professor Dr. Kittipong Kittayarak	/	/	/	/	/	/	/	/	/	Resigned, effective from June 7, 2021									
14. Associate Professor Dr. Narongdech Srukhosit	Appointed, effective from October 8, 2021																/	/	/
15. Mr. Auttapol Rerkpiboon	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Total Attendance	**15**	**14**	**15**	**15**	**14**	**15**	**15**	**15**	**14**	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**15**	**15**	**15**
Total Directors	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**14**	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**15**	**15**	**15**

Directors	Board and Specific Committee Meetings in 2021						Appointment during the Year
	Board of Directors (Total 19)	Audit Committee (Total 18)	Corporate Governance Committee (Total 7)	Nominating Committee (Total 11)	Remuneration Committee (Total 4)	Enterprise Risk Management Committee (Total 13)	
1. Professor Dr. Thosaporn Sirisumphand	19/19						-
2. POL. GEN. Rungroj Sangkram	19/19	9/9	2/2	2/2	2/2		-
3. Mr. Don Wasantapruek	19/19			11/11			-
4. GEN. Teerawat Boonyawat	19/19				4/4		-
5. Mr. Danucha Pichayanan	19/19	7/7	5/5	0/1			-
6. M.L. Chayotid Kridakon	17/19					8/8	-
7. Mr. Krishna Boonyachai	19/19	18/18					-
8. Associate Professor Dr. Chayodom Sabhasri	13/13	11/11	1/1	2/2			April 9, 2021 (Replacing Mrs. Nuntawan Sakuntanaga)
9. Mr. Payong Srivanich	13/13			9/9	2/2		April 9, 2021 (Replacing Professor Dr. Surapon Nitikraipot)
10. Mr. Jatuporn Buruspat	13/13		6/6			7/8	April 9, 2021 (Replacing Dr. Thon Thamrongnawasawat)
11. Mr. Krisada Chinavicharana	3/3						October 1, 2021 (Replacing Mr. Chumpol Rimsakorn)
12. Mrs. Premrutai Vinaiphat	19/19					13/13	-
13. Mr. Phongsthorn Thavisin	3/3			3/3			October 8, 2021 (Replacing Dr. Pailin Chuchottaworn)
14. Associate Professor Dr. Narongdech Srukhosit	3/3		1/1				October 8, 2021 (Replacing Professor Dr. Kittipong Kittayarak)
15. Mr. Auttapol Rerkpiboon	19/19						-

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Attendance Record of Directors Who Retired/ Resigned in 2021 (Total: 6 directors)

Directors	Board and Specific Committee Meetings in 2021						Appointment during the Year
	Board of Directors (Total 19)	Audit Committee (Total 18)	Corporate Governance Committee (Total 7)	Nominating Committee (Total 11)	Remuneration Committee (Total 4)	Enterprise Risk Management Committee (Total 13)	
1. Mrs. Nuntawan Sakuntanaga	6/6		1/1				Retired by rotation at the 2021 AGM
2. Professor Dr. Surapon Nitikraipot	6/6		1/1	2/2			Retired by rotation at the 2021 AGM
3. Dr. Thon Thamrongnawasawat	6/6		1/1			4/4	Retired by rotation at the 2021 AGM
4. Dr. Pailin Chuchottaworn	8/8					5/5	Resigned, effective from May 1, 2021
5. Professor Dr. Kittipong Kittayarak	9/9	8/8					Resigned, effective from June 7, 2021
6. Mr. Chumpol Rimsakorn	16/16				4/4	10/10	Resigned, effective from October 1, 2021

Remark:
In 2021, a total of 19 Board meetings were held this year (12 regular and 7 special meetings).
** Reasons for meeting absence were prior scheduled official engagement or other urgent meetings. Leave of absence letters were duly forwarded to the Chairman ahead of the meetings.*

(2) Remuneration of Directors

PTT fairly and sensibly specifies the remuneration of directors, by appointing the Remuneration Committee to review directors' proper compensation. This year, the Remuneration Committee adopted the consideration practices for directors and specific committees, taking into account practices of other listed peer companies, leading domestic as well as international companies, and state enterprise companies, the corporate governance principles, PTT's financial performance, responsibilities of the Board, and economic growth and inflation. Directors' compensation consists of monthly allowance, meeting allowance, and bonuses. Directors appointed to specific committees receive additional allowances for additional responsibilities. Shareholder-approved directors' compensation rates are as follows:

Remuneration of Directors

The Directors' Remuneration was approved at the 2021 Annual General Meeting (AGM) held on Friday, April 9, 2021, as follows:

1. Monthly Fee and Meeting Attendance Fee for 2021, the rates of which remained the same.

1.1 Monthly fee and meeting attendance fee of the Board:
- Monthly fee of THB 30,000 per month per director with the Chairman receiving twice the amount of the director.
- Meeting attendance fee of THB 60,000 per meeting for those in attendance only and the Chairman shall receive 25% higher than members. The payment is limited to one meeting per month. In case where necessary, the attendance fee may be paid for more than one meeting a month but must not exceed 15 meetings per year.

1.2 Monthly fee and meeting allowance fee of specific committees shall be at **the same rate** as follows:

1.2.1 **Audit Committee**
- Monthly fee of THB 15,000 per month per director; the Chairman receives the same rate as members.
- Meeting attendance fee of THB 45,000 per meeting for those in attendance only. The Chairman receives 25% higher than members, and the secretary receives a monthly fee of THB 7,500 (same rate as last year).

1.2.2 The remuneration for other committees, namely **the Nominating Committee, the Remuneration Committee, the Corporate Governance Committee, the Enterprise Risk Management Committee** and other specific committees that may be appointed by the Board as necessary and appropriate in the future, shall be at **the same rate as last year** as follows:
- Monthly fee - None (same as last year)
- Meeting attendance fee of THB 30,000 per meeting for those in attendance only. The Chairman receives 25% higher than members.

1.3 Other benefits - None (same as last year)

A vehicle was provided to the Chairman to facilitate his duties only.

Directors' Bonuses in 2021

Bonus payouts for directors, at 0.05% of the net profit of 2021, corresponded with PTT's performance and net profit, with a maximum limit of THB 60 million for the entire Board. Bonuses were prorated with each director's term, with the Chairman receiving 25% higher than members.

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The Remuneration for Directors in 2021

Unit: THB

No.	Name	Days of Service Jan. – Dec. 2021	Bonus 2021	Meeting Allowance (Inclusive of Monthly Allowance)	Meeting Allowance (Specific Committee)	Total Allowance	Total Remuneration
1.	Professor Dr. Thosaporn Sirisumphand	365	4,698,617.64	1,845,000.00	-	1,845,000.00	6,543,617.64
2.	POL. GEN. Rungroj Sangkram	365	3,758,894.11	1,260,000.00	629,500.00	1,889,500.00	5,648,394.11
3.	Mr. Don Wasantapruek	365	3,758,894.11	1,260,000.00	412,500.00	1,672,500.00	5,431,394.11
4.	GEN. Teerawat Boonyawat	365	3,758,894.11	1,260,000.00	150,000.00	1,410,000.00	5,168,894.11
5.	Mr. Danucha Pichayanan	365	3,758,894.11	1,260,000.00	474,435.48	1,734,435.48	5,493,329.59
6.	M.L. Chayotid Kridakon	365	3,758,894.11	1,140,000.00	300,000.00	1,440,000.00	5,198,894.11
7.	Mr. Krishna Boonyachai	365	3,758,894.11	1,260,000.00	720,000.00	1,980,000.00	5,738,894.11
8.	Associate Professor Dr. Chayodom Sabhasri	266.5	2,800,098.17	801,500.00	515,564.52	1,317,064.52	4,117,162.69
9.	Mr. Payong Srivanich	266.5	2,800,098.17	801,500.00	330,000.00	1,131,500.00	3,931,598.17
10.	Mr. Jatuporn Buruspat	266.5	2,800,098.17	801,500.00	390,000.00	1,191,500.00	3,991,598.17
11.	Mr. Krisada Chinavicharana	92	905,810.10	270,000.00	-	270,000.00	1,175,810.10
12.	Mrs. Premrutai Vinaiphat	365	3,758,894.11	1,260,000.00	360,000.00	1,620,000.00	5,378,894.11
13.	Mr. Phongsthorn Thavisin	85	827,387.37	263,225.81	90,000.00	353,225.81	1,180,613.18
14.	Associate Professor Dr. Narongdech Srukhosit	85	827,387.37	263,225.81	30,000.00	293,225.81	1,120,613.18
15.	Mr. Auttapol Rerkpiboon[1/]	365	3,758,894.11	1,260,000.00	-	1,260,000.00	5,018,894.11
	Total		**45,730,649.87**	**15,005,951.62**	**4,402,000.00**	**19,407,951.62**	**65,138,601.49**

Remarks:

1/ Mr. Auttapol Rerkpiboon has been in full compliance with the terms of his employment contract as President & CEO for the remuneration that he received as a director from January 1 to December 31, 2021.

Remarks:

No. 8 Associate Professor Dr. Chayodom Sabhasri was appointed as an independent director on April 9, 2021.
No. 9 Mr. Payong Srivanich was appointed as an independent director on April 9, 2021.
No. 10 Mr. Jatuporn Buruspat was appointed as an independent director on April 9, 2021.
No. 11 Mr. Krisada Chinavicharana was appointed as a director on October 1, 2021.
No. 13 Mr. Phongsthorn Thavisin was appointed as a director on October 8, 2021.
No. 14 Associate Professor Dr. Narongdech Srukhosit was appointed as an independent director on October 8, 2021.

The Remuneration for Directors Who Completed the Terms and/or Resigned in 2021

Unit: THB

No.	Name	Days of Service Jan. – Dec. 2021	Bonus 2021	Meeting Allowance (Inclusive of Monthly Allowance)	Meeting Allowance (Specific Committee)	Total Allowance	Total Remuneration
1.	Mrs. Nuntawan Sakuntanaga	98.5	958,795.98	458,500.00	37,500.00	496,000.00	1,454,795.98
2.	Professor Dr. Surapon Nitikraipot	98.5	958,795.98	458,500.00	90,000.00	548,500.00	1,507,295.98
3.	Dr. Thon Thamrongnawasawat	98.5	958,795.98	458,500.00	150,000.00	608,500.00	1,567,295.98
4.	Dr. Pailin Chuchottaworn	120	1,168,076.29	540,000.00	150,000.00	690,000.00	1,858,076.29
5.	Professor Dr. Kittipong Kittayarak	157	1,553,507.31	636,000.00	415,500.00	1,051,500.00	2,605,007.31
6.	Mr. Chumpol Rimsakorn	273	2,853,084.01	990,000.00	390,000.00	1,380,000.00	4,233,084.01
	Total		**8,451,055.55**	**3,541,500.00**	**1,233,000.00**	**4,774,500.00**	**13,225,555.55**

Remarks:

No. 1 Mrs. Nuntawan Sakuntanaga was appointed as an Independent Director on July 1, 2014 and completed her term on April 9, 2021.
No. 2 Professor Dr. Surapon Nitikraipot was appointed as an Independent Director on April 12, 2018 and completed his term on April 9, 2021.
No. 3 Dr. Thon Thamrongnawasawat was appointed as an Independent Director on November 18, 2016 and completed his term on April 9, 2021.
No. 4 Dr. Pailin Chuchottaworn was appointed as an Independent Director on September 11, 2020 and resigned with effect from May 1, 2021.
No. 5 Professor Dr. Kittipong Kittayarak was appointed as an Independent Director on July 1, 2014 and resigned with effect from June 7, 2021.
No.6 Mr. Chumpol Rimsakorn was appointed a Director on December 21, 2018 and resigned with effect from October 1, 2021.

Directors' Remuneration Profile, 2018 – 2021

Unit: THB

Remuneration	2018		2019		2020		2021	
	Person	THB	Person	THB	Person	THB	Person	THB
Meeting Attendance	15	17,241,903.21	15	21,787,467.74	15	24,215,338.71	15	24,182,451.62
Bonus	15	45,125,342.45	15	46,475,302.07	15	18,882,904.18	15	54,181,705.42
Total		**62,367,245.66**		**68,262,769.81**		**43,098,242.89**		**78,364,157.04**

Remark:

The 2018 - 2021 directors' remuneration shown in the table includes the remuneration of the President & CEO who has already complied with the terms under the employment contract as President & CEO.

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Remuneration of PTT's Directors/ Independent Directors from being a Director/ an Independent Director of Subsidiaries* in 2021
(The table below presents remuneration paid to directors/ independent directors only for the period they served on PTT.)

Unit: THB

Name	Director Remuneration		Committee Meeting Allowance	Total Remuneration	Remarks
	Bonus***	Meeting Allowance and Monthly Allowance			
1. Professor Dr. Thosaporn Sirisumphand	-	218,750.00	-	218,750.00	The remuneration as a Director/ Chairman of the Board, ARUN PLUS Company Limited from June 28 to December 31, 2021
2. Dr. Pailin Chuchottaworn (Resigned with effect from May 1, 2021)	3,257,341.02	360,000.00	-	3,617,341.02	The remuneration as an Independent Director/ Chairman of the Board, Global Power Synergy Public Company Limited from January 1 to April 30, 2021
3. Mr. Don Wasantapruek	39,922.00	1,240,000.00	450,000.00	1,729,922.00	The remuneration as an Independent Director/ Chairman of the Nomination and Remuneration Committee, PTT Global Chemical Public Company Limited from January 1 to December 31, 2021
4. Mr. Danucha Pitchayanan	-	175,000.00	-	175,000.00	The remuneration as a Director, ARUN PLUS Company Limited from June 28 to December 31, 2021
5. Mr. Auttapol Rerkpiboon**	3,934,426.00	1,430,000.00	-	5,364,426.00	The remuneration as a Director, PTT Exploration and Production Public Company Limited from January 1 to December 31, 2021
	3,216,213.13	1,122,000.00	-	4,338,213.13	The remuneration as a Director/ Chairman of the Board, PTT Oil and Retail Public Company Limited from January 1 to December 31, 2021
	-	175,000.00	-	175,000.00	The remuneration as a Director, ARUN PLUS Company Limited from June 28 to December 31, 2021
6. M.L. Chayotid Kridakon	-	175,000.00	-	175,000.00	The remuneration as a Director, ARUN PLUS Company Limited from June 28 to December 31, 2021

Remarks:
* *According to the new International Financial Reporting Standards.*
** *Mr. Auttapol Rerkpiboon has complied with the terms under his employment contract as President & CEO.*
*** *Directors have received the 2021 annual bonuses (for the 2020 performance) for serving with PTT Global Chemical Public Company Limited, Global Power Synergy Public Company Limited and PTT Oil and Retail Business Public Company Limited, approved by the 2021 AGM of each company.*

8.1.3 Governance of Subsidiaries and Associates

Supervising, monitoring, and assessing PTT's implementation of corporate governance and anti-fraud and corruption, the Corporate Governance Committee assigns a policy and guidelines to the Governance, Risk and Compliance Management Committee (GRCMC), which is charged with steering corporate governance, operational risk management, internal control, and compliance. The Senior Executive Vice President, Office of General Counsel, the chairperson of GRCMC reporting directly to the Corporate Governance Committee, is responsible for steering and implementing plans for corporate governance and anti-fraud and corruption together with the definition of goals and KPIs approved by the Corporate Governance Committee and the Board. Part of these tasks is the governance of subsidiaries and associates.

A summary of PTT's promotion of compliance with the policy and guidelines for governance of subsidiaries and associates appears below:

1. Development of PTT Group Way of Conduct web portal, which is a database and communication channel among policy owners and administrating units of affiliates and PTT Group companies in pursuit of standardized implementation.
2. Site visits aimed at efficient mobilization of PTT Group management approach, communication aimed at setting goals and GRC strategies, and counseling on PTT Group management approach for affiliates.
3. Strengthening of the mastery of GRC and emphasis on various guidelines through knowledge sharing sessions and the following development programs for PTT Group companies:
   - MD on Board for senior management team members that are MDs or CEOs in PTT Group,
   - Secondment Development Program for PTT's executives and employees serving in affiliates.

PTT ensures its consideration of executives or outsiders from the Ministry of Finance's Director's Pool for appointment within PTT Group companies which are state enterprises, based on the Standard Qualifications of State Enterprise Directors and Officials Act. Chosen directors from the pool must make up no less than one-third of other directors of a given state enterprise. As of December 31, 2021, PTT had 21 members from the Director's Pool. It also ensures that PTT executives and such outsiders who serve as directors of PTT affiliates serve on no more than three PTT affiliates or other state enterprise affiliates. This is designed to lower risks of conflicts of interest and ensure conformance to applicable laws, as well as a Cabinet resolution of January 24, 2011, on fraud preventive measures at state enterprises, entitled

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"The appointment of senior government officials or persons as directors on multiple state enterprises", as proposed by NACC.

In addition, the Board defined guidelines and criteria for serving in various positions by PTT Group's executives. In 2015, the Board decided to adopt them as part of the CG Handbook.

8.1.4 Corporate Governance Policy and Guideline Compliance Control

(1) Internal Information Guideline

PTT has instituted a system for reporting trading of PTT Group's securities in advance. If PTT's personnel need to trade such securities, they must inform the Company Secretary through such a system at least two days in advance. In 2021, there were 6 reported transactions outside silent periods involving those whose jobs involved internal information; no major incidents occurred that impacted PTT.

(2) Conflicts of Interest

PTT requires disclosure of information to ward off conflicts of interest with PTT to in turn prevent activities that could cause conflicts as well as illegal or improper activities.

Preparation of reports on potential conflicts of interest with PTT

To prevent conflicts of interest, PTT requires all employees to annually file reports to disclose possible items where employees or their relatives develop conflicts of interest with PTT and each time this is discovered. This year, the Board, management, and all employees all filed their reports through the PTT intranet; no material cases were found. The disclosed items of conflicts of interest with PTT confirm acknowledgment that breach of ethics and PTT's code of conduct is regarded as a disciplinary offense, subject to disciplinary actions according to disciplinary procedures and severity.

Preparation of reports on vested interests of directors, management, and related parties

In the first quarter of this year, the Board developed a form for reporting vested interests of directors, the management, and related parties as basic information to manage vested interests for directors and senior management. The directors and management are to report such matters every year and with every change in circumstances. The Company Secretary is to compile and submit the copy to the Chairman of the Board and the Chairman of the Audit Committee to check and manage conflicts of interest. This year, however, no such cases have arisen.

(3) Corporate Governance, Code of Conduct, and Anti-fraud and Corruption Activities

The Corporate Governance Committee (CGC) (Board level) and the Governance, Risk and Compliance Management Committee (GRCMC) (management level) provide oversight and monitor PTT's execution of corporate governance, operational risk management, internal control, and compliance. GRMC serves as PTT's Anti-Fraud and Corruption Operation Center for State Enterprises and is charged with steering and implementing plans for corporate governance and anti-fraud and corruption together with the definition of goals and KPIs approved by the CGC and the Board. Besides its constant implementation and development as mentioned under Section 6 Corporate Governance on the topic of Anti-fraud and Corruption, this year PTT executed the following promotional activities on corporate governance, code of conduct, and anti-fraud and corruption:

- Organized training on corporate governance and anti-fraud and corruption for new employees together with delivering the CG Handbook to all of them for study and acknowledgment as their guidelines.
- Communicated in functional meetings, educational activities, and seminars including Town Hall, training on the investigation and fact-finding process, and conflict of interest by NACC speakers, basic knowledge on transparency risk management in transactions with the third parties.
- Developed PTT e-learning courses to communicate corporate governance, code of conduct, and anti-fraud and corruption measures for extensive self-study of all employees. The courses included CG e-learning, GRC, the Basics of Organic Act on Counter-Corruption B.E. 2561 (2018).
- Organized training on Operational Risk and Internal Control and communicated fraud risk management to representatives of all functions to establish a proper understanding of international standards of the principles for fraud risk management and applicable internal control measures so that they may apply these guidelines in their everyday life. This year saw a total of 11 functions involved.
- Assessed corporate governance and anti-fraud and corruption performance to develop related tasks. It was found that 97% commanded good understanding, 95% were satisfied with good to very good GRC communication, and 96% were satisfied with related implementation by PTT.
- Foster an ambiance of awareness through PTT's various internal media, including GRC intranet/ CG Intranet, GRC inquiries through GRChelpdesk @pttplc.com, CG reminders through CG Tips and Do-Don't, Lesson Learned via internal e-mail PR, CG Channel page in PTT Workplace for everyone's information about CG/ GRC, and knowledge sharing as well as engagement in activities of interest. PTT also requires GRC Talk as the subject to be part of agenda-based meetings for all functions e.g. PTTMC meeting, serving as a communication channel and promotional tool for CG/ GRC awareness.
- Organized a GRC Camp for the seventh consecutive year to develop PTT employee representatives as GRC agents for respective functions to communicate an understanding of GRC to fellow employees and duly apply such knowledge to their tasks. This year's activities were in the form of a virtual online camp, consisting of educational dialogue and sharing of GRC experience by senior management team members of GRC and business functions so that employees may adapt the knowledge to their jobs and advocate the business integrity culture.
- Valued corporate governance among PTT Group in line with the PTT Group Way of Conduct by appointing PTT Group Corporate Governance Committee, whose goal is to upgrade corporate governance standards for PTT Group to comparable levels and define action plans and relentlessly proactive guidelines for public relations through PTT Group CG Day, a campaign to promote and publicize corporate governance by PTT Group, namely PTT, PTTEP, GC, TOP, IRPC, GPSC and OR. Guests of honor from external agencies included representatives of SET, SEC, IOD, the Foundation of Anti-Corruption Networks, and the Office of the Ombudsman, along with business partners, the boards, management, and employees of PTT Group. In 2021, PTT hosted the event under the theme PTT Group CG Day 2021: The Power of Business Integrity in a virtual, online format to illustrate the commitment to driving PTT Group with CG principles while remaining committed to business conduct with CG of both existing and new businesses.
- Strived to form transparent networks for a robust Thai society by strongly advocating its business partners' declaration of the intention to join Thai Private Sector Collective Action Against Corruption (CAC) to lower risks of corrupt practices across the supply chain. In 2021, PTT educated and urged business partners to join CAC at the annual suppliers' seminar and the annual supplier seminars for NGV and gas distribution pipeline functions.
- Promoted and shared knowledge with external agencies to upgrade their corporate governance standards. Management team members served as speakers that shared their experience and concept of corporate governance on various occasions. Welcomed public and private entities, including educational institutions, on-site visits, where the experience was shared and observation was made on PTT's corporate governance practices.

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(4) Whistleblowing

All stakeholders can use this tool to contact, learn, and provide clues either inside the corporation through the intranet web board or outside through PTT website, phone, written notification, e-mail to Investor Relations, Office of the President, Corporate Communication and Branding, Good Governance and Corporate Ethics, or the Ordering and Customer Relations Center as follows:

Phone : 1365 CONTACT CENTER, 0-2537-2000
Website : www.pttplc.com
e-mail : Ordering & Customer Relations Center: 1365@pttor.com
Corporate Communication and Branding Department: corporate@pttplc.com
Office of the President: corporatesecretary@pttplc.com
Investor Relations Department: ptt-ir@pttplc.com
GRC Hotline: GRChelpdesk@pttplc.com
LINE@ : @contact1365

All questions, comments, and recommendations are forwarded to related units to act or remedy through the whistleblowing system, with follow-ups made through alerts under the e-mail system under applicable service level agreements (SLAs). If action is not completed, the next superior is reminded to take action. When the action is taken, the responsible unit informs the whistleblower and follows up again through inquiring about service satisfaction by a Contact Center officer. Executives monitor all information monthly to gauge trends and use them as guidelines for process and goods and service improvement to meet all stakeholders' needs. This year, excluding complaints about PTT Oil and Retail Business Public Company Limited (OR), 6,507 questions, comments, and recommendations were filed, most dealing with NGV discount cards, NGV fleet cards, and contacts of related internal units.

PTT enables the public to file grievances and complaints when coming across improper or unethical behavior of directors, executives, or employees. These are made known to the Audit Committee, Office of Corporate Audit, Good Governance and Corporate Ethics Department, and Human Resources Department. PTT listens to all complaints in an equitable, transparent, attentive, and fair manner, with suitable action periods and due safeguarding of confidential information and whistleblower protection.

To this end, Good Governance and Corporate Ethics Department is a center for grievances and whistleblowing, follow-ups of notifications, protection and fairness assurance for whistleblowers concerning corporate corrupt practices, including reports of investigation and punishment to management and relevant committees, apart from notification to related parties. This year, a total of 15 complaints were made through whistleblowing channels for fraud and non-compliance. After due consideration under the process, 13 were found to be without grounds for fraud, and 2 were under fact-finding processes.

(5) The Reporting of Securities Holding Portfolio

In 2021, PTT, by the Office of the President, issued a reminder on four occasions to each of the directors and management team on forbidding trading or transfer of PTT securities (1) between January 1 and February 28, 2021 (fiscal year 2020); (2) between April 1 and May 15, 2021 (first quarter budget of 2021); (3) between July 1 and August 15, 2021 (second quarter budget of 2021); (4) between October 1 and November 15, 2021 (third quarter budget of 2021). In addition, PTT defined a policy of avoiding securities trading of PTT Group outside these periods. Directors and management strictly complied with this. If necessary to trade PTT Group securities, they must inform the Company Secretary at least two days ahead.

Securities Portfolios of Directors, 2020 – 2021

No.	Name	Number of Shares			Remarks
		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
1.	Professor Dr. Thosaporn Sirisumphand	-	-	-	-
	Spouse and children under legal age	18,000	18,000	-	(No trading transaction of PTT shares in 2021)
2.	POL. GEN. Rungroj Sangkram	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
3.	Mr. Don Wasantapruek	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
4.	GEN. Teerawat Boonyawat	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
5.	Mr. Danucha Pichayanan	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
6.	M.L. Chayotid Kridakon	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
7.	Mr. Krishna Boonyachai	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
8.	Associate Professor Dr. Chayodom Sabhasri	N/A	-	-	Appointed on April 9, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
9.	Mr. Payong Srivanich	N/A	-	-	Appointed on April 9, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
10.	Mr. Jatuporn Buruspat	N/A	-	-	Appointed on April 9, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
11.	Mr. Krisada Chinavicharana	N/A	-	-	Appointed on October 1, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
12.	Mrs. Premrutai Vinaiphat	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-

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No.	Name	Number of Shares			Remarks
		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
13.	Mr. Phongsthorn Thavisin	N/A	10,000	-	Appointed on October 8, 2021 (No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	N/A	-	-	-
14.	Associate Professor Dr. Narongdech Srukhosit	N/A	-	-	Appointed on October 8, 2021
	Spouse and children under legal age	N/A	1,399	-	(No trading transaction of PTT shares in 2021)
15.	Mr. Auttapol Rerkpiboon	225,000	225,000	-	Information is shown in Securities Portfolio of Executives
	Spouse	43,000	43,000	-	-
	Children under legal age	-	-	-	-

Remark:
No PTT share was held by directors' spouses and children under legal age except those of No. 1, 14, and 15.

Securities Portfolios of Directors Who Completed Their Terms or Resigned in 2021

No.	Name	Number of Shares			Remarks
		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
1.	Mrs. Nuntawan Sakuntanaga	-	N/A	N/A	Completed her term on April 9, 2021 (No PTT share held during her directorship in 2021)
	Spouse and children under legal age	-	N/A	N/A	-
2.	Professor Dr. Surapon Nitikraipot	-	N/A	N/A	Completed his term on April 9, 2021 (No PTT share held during his directorship in 2021)
	Spouse and children under legal age	-	N/A	N/A	-
3.	Dr. Thon Thamrongnawasawat	-	N/A	N/A	Completed his term on April 9, 2021 (No PTT share held during his directorship in 2021)
	Spouse and children under legal age	-	N/A	N/A	-
4.	Dr. Pailin Chuchottaworn	100,000	N/A	N/A	Resigned, effective from May 1, 2021
	Spouse and children under legal age	-	N/A	N/A	-
5.	Professor Dr. Kittipong Kittayarak	-	N/A	N/A	Resigned, effective from June 7, 2021 (No PTT share held during his directorship in 2021)
	Spouse and children under legal age	-	N/A	N/A	-
6.	Mr. Chumpol Rimsakorn	-	N/A	N/A	Resigned, effective from October 1, 2021 (No PTT share held during his directorship in 2021)
	Spouse and children under legal age	-	N/A	N/A	-

Securities Portfolio of Executives, 2020 and 2021

No.	Name	Number of Shares			Remarks
		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
1.	Mr. Auttapol Rerkpiboon	225,000	225,000	-	(No trading transaction of PTT shares in 2021)
	Spouse	43,000	43,000	-	-
	Children under legal age	-	-	-	-
2.	Mr. Atikom Terbsiri	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
3.	Mr. Kris Imsang	100,000	100,000	-	(No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	-	-	-	-
4.	Mr. Noppadol Pinsupa	136,000	136,000	-	(There were trading transactions of PTT shares in 2021)
	Spouse	508,000	298,000	(210,000)	-
	Children under legal age	-	-	-	-
5.	Miss Pannalin Mahawongtikul	288,120	288,120	-	(No trading transaction of PTT shares in 2021)
6.	Mr. Terdkiat Prommool	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-

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		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
7.	Mr. Suchat Ramarch	N/A	160,800	-	Appointed on October 1, 2021
	Spouse and children under legal age	N/A	-	-	-
8.	Mr. Wuttikorn Stithit	141,210	141,210	-	(No trading transaction of PTT shares in 2021)
	Spouse	90,960	90,960	-	-
	Children under legal age	-	-	-	-
9.	Miss Peangpanor Boonklum	-	-	-	(No PTT share held)
10.	Mr. Disathat Panyarachun	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
11.	M.L. Peekthong Thongyai	N/A	-	-	Appointed on October 1, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
12.	Dr. Buranin Rattanasombat	214,190	214,190	-	(No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	-	-	-	-
13.	Mr. Chansak Chuenchom	N/A	-	-	Appointed on October 1, 2021 (No PTT share held)
	Spouse and children under legal age	N/A	-	-	-
14.	Mr. Montri Rawanchaikul	64,000	64,000	-	(No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	-	-	-	-
15.	Dr. Kongkrapan Intarajang	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
16.	Mr. Wirat Uanarumit	159,000	159,000	-	(No trading transaction of PTT shares in 2021)
	Spouse	12,000	12,000	-	-
	Children under legal age	-	-	-	-
17.	Mr. Chawalit Tippawanich	10,000	10,000	-	(No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	-	-	-	-
18.	Mr. Worawat Pitayasiri	-	-	-	(No PTT share held)
	Spouse and children under legal age	-	-	-	-
19.	Miss Jiraphon Kawswat	-	-	-	(No PTT share held)
20.	Mrs. Chanamas Sasnanand	N/A	130,000	-	Appointed on January 1, 2021 (No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	N/A	-	-	-
21.	Miss Wilaiwan Kanjanakanti	36,990	36,990	-	(No trading transaction of PTT shares in 2021)
22.	Miss Jaroonsri Wankertphon	26,000	26,000	-	(No trading transaction of PTT shares in 2021)

Remark :
No PTT share was held by executives' spouses and children under legal age except those of No. 1, 4, 8 and 16.

Securities Portfolios of Management Transferred/ Resigned/ Retired in 2021

No.	Name	Number of Shares			Remarks
		As of Dec. 31, 2020	As of Dec. 31, 2021	Change during the Year	
1.	Mr. Wittawat Svasti-Xuto	554,510	N/A	N/A	Retired on October 1, 2021 (No trading transaction of PTT shares in 2021)
	Spouse and children under legal age	-	N/A	N/A	-
2.	Mrs. Arawadee Photisaro	-	N/A	N/A	Retired on October 1, 2021 (There were trading transactions of PTT shares in 2021)
	Spouse	-	N/A	N/A	-
	Children under legal age	-	N/A	N/A	-
3.	Miss Duangporn Thiengwatanatham	77,000	N/A	N/A	Resigned effective from October 1, 2021 (No trading transaction of PTT shares in 2021)

Remark:
PTT has issued and offered 60,000,000 warrants to the President, management, PTT employees, and employees of PTT Group companies seconded to PTT consisting of two batches: PTT-W1 (40,000,000 units), offered in 2005, with the last exercise date on August 31, 2010, and PTT-W2 (20,000,000 units), offered in 2006, with the last exercise date on September 28, 2011. All warrants were exercised, and no new ones have been issued.

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(6) Filing of Assets and Debts to NACC

Under the Organic Act on Counter-Corruption B.E. 2561 (2018), PTT's directors and top executives, including directors and top executives in the companies where PTT holds more than 50% shares, are required to file a list of their assets and debts, including those of their spouses and children that are under the legal age, to the NACC each time they take up a position, every three years during their terms, and one year after leaving their positions. To this end, PTT issues a reminder to each of the directors and senior management as required.

(7) Declaration of Vested Interests in Meetings

At every board meeting, the Chairman reminds directors to conform to the policy on conflicts of interest on all agenda items, which requires those with vested interests to declare themselves to the meeting to abstain from voting or giving any views. In 2021, a total of 20 such notices were made to the Chairman at 19 Board meetings.

(8) Deliberation and Review of Related Transactions

The Audit Committee reviews related transactions and those with potential conflicts of interest that could undermine PTT's businesses to ensure conformance to the law and SET's criteria, all of which must be reported to the Board for approval.

8.2 Reports of Specific Committees' Performance This Past Year

The Board values corporate governance. The Board of Directors and five specific committees to consider significant matters: the Audit Committee, Nominating Committee, Remuneration Committee, Corporate Governance Committee, and Enterprise Risk Management Committee.

In 2021, the Board of Directors approved the improvement of authority, duties, and responsibilities of the Audit Committee to include the review of operations in accordance with the criteria of the State Enterprise Assessment Model (SE-AM) of the State Enterprise Policy Office and receiving of complaints and whistleblowing on fraud, malpractice, misconduct, and non-compliance. This is to comply with the guidelines set out in PTT Regulations on the Audit Committee and Internal Audit Unit B.E. 2564 (2021). The Board also approved the Enterprise Risk Management Committee to supervise customer and market management.

8.3 Report of the Audit Committee for 2021

8.3.1 Report of the Audit Committee

See on page 306 - 309

8.4 Report of the Specific Committees for 2021

8.4.1 Report of the Nominating Committee

See on page 310 - 311

8.4.2 Report of the Remuneration Committee

See on page 312

8.4.3 Report of the Corporate Governance Committee

See on page 313 - 315

8.4.4 Report of the Enterprise Risk Management Committee

See on page 316 - 317

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Report of the Audit Committee

PTT Plc.'s present Audit Committee is made up of three knowledgeable independent directors, chaired by Police General Rungroj Sangkram, Mr. Krishna Boonyachai, and Associate Professor Dr. Chayodom Sabhasri serving as members. Serving as secretary to this committee is Mr. Chadil Chavanalikikorn, Executive Vice President, Office of Corporate Audit. In 2021, the individual terms of the Committee are summarized as follows:

January 1st to May 19th, 2021

- Professor Dr. Kittipong Kittayarak
  Chairman
- Mr. Danucha Pichayanan
  Member
- Mr. Krishna Boonyachai
  Member

May 20th to June 6th, 2021

- Professor Dr. Kittipong Kittayarak
  Chairman
- Mr. Krishna Boonyachai
  Member
- Associate Professor Dr. Chayodom Sabhasri
  Member

June 7th to June 16th, 2021

- Mr. Krishna Boonyachai
  Member
- Associate Professor Dr. Chayodom Sabhasri
  Member

June 17th, 2021 to present

- Police General Rungroj Sangkram
  Chairman
- Mr. Krishna Boonyachai
  Member
- Associate Professor Dr. Chayodom Sabhasri
  Member

In 2021, the Committee executed its Board-assigned duties and those under its own charter, which agreed with SEC's best practices. It reviewed and advocated PTT's corporate governance, together with adequate risk management and internal control system, as well as enforcement of compliance. It ensured PTT's emphasis on being a transparent organization with efficient and effective internal audit activity, while aligning corporate goals, and transforming the Office of Corporate Audit to be a trustworthy partner for sustainable long-term value creation for PTT with due regard for satisfying stakeholders' expectations.

1. Advocated the upgrading of processes of governance, risk management, internal control, and compliance, with a focus on raising awareness of employees' careful and thoughtful actions, including the review of rules and regulations related to the operation together with the cautious internal control process. Another emphasis was on the review of the investigation process and disciplinary action to be appropriate and fair.

2. Supported the Management to set up goals as a model organization in terms of IT Governance to continuously improve operation and raise confidence in PTT's potential in all aspects i.e. Cybersecurity in conjunction with retaining information technology personnel through remuneration and career path, which is a key to support the organization's rapid development.

3. Encouraged the Management to enhance Safety Measures and apply Lesson Learnt to improve operational processes and establish preventive measures. The deployment of technology supported operation that enhanced safety standards and public confidence.

4. Provided recommendations to the Management on foreign investment using an in-depth study of those countries, political system, relevant laws, cultures, and traditions to determine investment directions. The Committee also encouraged the Management to closely monitor and evaluate the impact of the COVID-19 pandemic and flood, with continuously supported energy supply, production, distribution and various actions to the whole country. Moreover, the Committee advised the Management to focus on public communication by raising awareness regarding PTT's social and national operations, as well as increasing public knowledge to understand the fact of oil prices.

5. Assigned a policy on upgrading PTT Group's internal audit activity quality that lead to efficient, effective, credible, and professional practices. To focus on performance auditing, increasing the role of advisory that create more value to PTT and PTT Group, this is in line with the stakeholders' expectation. The Committee encouraged the internal auditors to acquire the professional certificate along with continuous personnel development. Furthermore, improving the development of the operating processes by using more technology in internal audit activity.

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In 2021, the Committee held 18 meetings, with attendance detailed below:

January 1st to May 19th, 2021:
7 meetings
- Professor Dr. Kittipong Kittayarak
  7 times
- Mr. Danucha Phichayanan
  7 times
- Mr. Krishna Boonyachai
  7 times

May 20th to June 6th, 2021:
1 meeting
- Professor Dr. Kittipong Kittayarak
  1 time
- Mr. Krishna Boonyachai
  1 time
- Associate Professor Dr. Chayodom Sabhasri
  1 time

June 7th to June 16th, 2021:
1 meeting
- Mr. Krishna Boonyachai
  1 time
- Associate Professor Dr. Chayodom Sabhasri
  1 time

June 17th to December 31st, 2021:
9 meetings
- Police General Rungroj Sangkram
  9 times
- Mr. Krishna Boonyachai
  9 times
- Associate Professor Dr. Chayodom Sabhasri
  9 times

Summary of Performance

1. Review of Financial Reports:

The Committee reviewed quarterly and annual financial reports together with consolidated financial reports with the Management, the Office of Corporate Audit, and the External Auditor. It asked the External Auditor about the accuracy and completeness of financial reports, adjustment of material account entries and accounting projections affecting such reports, adequacy, and suitability of account recording, audit scope, information disclosure that was accurate, complete, and adequate, as well as its own freedom. All these elements ensured that the preparation of financial reports abided by legal requirements as well as accounting standards under generally accepted accounting principles that were credible and timely, and that adequate information was disclosed for users' benefit.

2. Review of Risk Management Process:

In conjunction with the Management, the Committee regularly reviewed the efficiency and effectiveness of the risk management process as well as the policy, action plans, and risk management approach that affect PTT Group's operations. It also provided advice for process improvement for unforeseen events.

3. Review of Internal Control Process Effectiveness:

The Committee reviewed PTT's internal control with the Office of Corporate Audit every quarter by examining its operation, resource consumption, stewardship of properties, prevention or reduction of errors or damage, losses, waste, or fraud, the credibility of financial reports, including, compliance with laws, regulations, and Cabinet resolutions. No significant problems or material shortcomings were detected. This year's assessment outcomes of internal control against SET's best practices and the Ministry of Finance's Internal Control Standards for Government Agencies, B.E. 2561 (2018), according to PTT management, were that PTT had indeed designed adequate and appropriate control mechanisms, with ongoing compliance.

4. Review of Governance Process:

The Committee reviewed the process of compliance with applicable laws and regulations, business protocols, related party transactions or those with potential conflicts of interest, and connected transactions among PTT Group to ensure sensible conformance to normal business terms. The Committee also reviewed the complaint handling and whistleblowing process.

5. Review of the Implementation According to State Enterprise Assessment Model (SE-AM) of State Enterprise Policy Office, Ministry of Finance:

The Committee reviewed PTT's operating process according to the SE-AM together with the Office of Corporate Audit and related agencies per year, covering eight areas of operation i.e. corporate governance and leadership, strategic planning, risk management and internal control, stakeholder and customer management, digital technology, human capital management, knowledge management and innovation management, and internal audit by monitoring the implementation of relevant observations/ recommendations to ensure that PTT's operating process complied with the SE-AM, with continuous improvement.

6. Review of Internal Audit Activity:

The Committee reviewed the Office of Corporate Audit's strategic plans, annual and long-term internal audit plans, conformance to the plans, internal audit findings and recommendations. To this end, it advised and monitored corrective and proactive actions for significant aspects of good governance and adequate internal control. It considered amending the internal audit charter and reviewed the annual budget of the Office, its professional personnel development, recruitment, rotation, training plans, and confirmation of the organizational independence of the internal audit activity. Also reviewed were the office's adequacy and suitability of resources, KPIs, and the annual merit consideration for the Executive Vice President heading the Office. The Committee also supervised continuing quality and task improvement of the Office of Corporate Audit.

7. Quality Assurance of the Audit Committee:

The Committee reviewed its own charter and assessed its own performance as a group and individuals (self-assessment and cross-assessment) against SET's best practices to ensure efficient, fruitful performance. Overall assessment result for the Committee as a group was "regularly perform", result for self-assessment was "good", and result for cross-assessment was "excellent". Action plans to improve its own performance were set. Finally, the Committee reported its performance outcomes to the Board every quarter, with comments noted for value addition and process improvement of governance, risk management, and internal control supervision as well as compliance with PTT's regulations.

8. Appointment of the External Auditor for 2022:

The Committee considered and endorsed the auditor from EY Office Company Limited to be the External Auditor of PTT for 2022 for the Board's concurrence and the shareholders' approval at the 2022 AGM, together with its audit fees. The Committee also met exclusively with the External Auditor on one occasion in absence of PTT management to discuss about the audit scope, guidelines, and plans together with its performance freedom and comments with a focus on accurate, complete, and adequate presentation of data.

In summary, the Audit Committee executed its charter duties and responsibilities with due competence, care, prudence, and freedom while providing comments and advice for the equitable benefit of all stakeholders. Its view is that PTT's financial statements are accurate, credible, and align with generally accepted accounting standards. In addition, PTT practiced compliance with applicable laws and business obligations, together with good governance, adequate risk management and internal control, conformance to rules along with efficient and effective internal audit activity.

Police General Rungroj Sangkram
Chairman of the Audit Committee

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Report of the Nominating Committee

The present Nominating Committee consists of three directors, chaired by Mr. Don Wasantapruek, independent director, with Mr. Payong Srivanich, independent director, and Mr. Phongsthorn Thavisin, director, as members. The Company Secretary or the Executive Vice President, Company Secretary and Corporate Relation serves as its secretary.

This year, the Committee executed Board-assigned duties with due prudence, transparency, and fairness and updated its approach to align with up-to-date business strategies with due regard for shareholders' and stakeholders' best interests. In 2021, the committee held 11 meetings as highlighted below:

- Nominated directors to replace those who were due to retire by rotation, based on diverse information, from various professions with suitable qualifications under applicable laws and regulations, PTT's Articles of Association, and the corporate governance code. Nominated candidates must be duly competent, skillful, and qualified for PTT's business strategies, based on an analysis of the PTT Board Skill Matrix and the Director's Pool of the Ministry of Finance and Thai Institute of Directors Association (IOD). Their track records as well as past to present roles must ensure shareholders' confidence. Their background must also be unblemished experiences and without conflicts of interest with PTT. The names of qualified candidates were tabled for the Board's concurrence for appointment by the AGM. Those names must also have the endorsement of a Sub-Committee for the Screening Committee for State Enterprise Committee along with the endorsement of the Chairman, State Enterprise Policy Committee, in keeping with the Cabinet resolution on state enterprise director's appointment guidelines dated August 6, 2019.
- Nominated directors to replace those resigning during the year. To this end, the Committee carefully tabled qualified names along with their profiles to the Board for appointment. The names must also secure prior concurrence from the State Enterprise Policy Committee.
- Nominated directors for specific committees, based on their compositions, qualifications, expertise, competencies, related skills, and suitability (Skill Matrix) for the Board's appointment, with the exception of the Nominating Committee itself, which is to be appointed by the Board. The suitability of specific committees must be considered in accordance with the company's vision, strategy, and sustainability goals.
- Reviewed the Board Skill Matrix as well as the matrix for the five specific committees whether they are still aligned with PTT's strategies and determined KPIs to measure the Board's performance (in addition to the Board assessment) and tabled the findings for the Board's comments.
- Considered and screened the appointment, transfer, and promotion of Executive Vice President levels and above, and provided guidelines for the appointment, transfer, or promotion of the management level for appropriateness, including considering the succession plan of senior executives for continuous growth of the organization.
- Consulted each other on the driving/ supervision of the Board's performance guidelines for sustainable development.
- Improved the regulations on the nomination and appointment of the Board of Directors, and improved its own performance to be more thorough, suitable, timely, and aligned with PTT's corporate governance code.

In 2021, the Board gave minor shareholders the opportunity to nominate directors, but no such nomination was put forward for the 2021 AGM. For transparency, other details appear in this 56-1 One Report.

Don W.

Mr. Don Wasantapruek
Chairman of the Nominating Committee

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Report of the Remuneration Committee

In 2021, the Board of Directors appointed the Remuneration Committee, which consists mainly of independent directors. The Committee is chaired by General Teerawat Boonyawat, independent director, with Mr. Payong Srivanich, independent director, and Mr. Krisada Chinavicharana, director, as members. The Company Secretary or the Executive Vice President, Company Secretary and Corporate Relation serves as its secretary.

The Committee performed its duties with prudence and care by screening and commenting on key issues for the Board's consideration. In 2021, the committee held 4 meetings as highlighted below:

- Considered the 2021 remuneration for the Board and its specific committees, based on PTT's performance and business size, practices of listed companies of the same industry and leading ones worldwide, along with Board responsibilities and the outcomes of Board assessment under various topics defined in the annual assessment forms. The remuneration was tabled for the Board's concurrence and subsequent proposal for approval at the 2021 AGM.
- Reviewed assessment guidelines for the President & CEO's performance to decide his new remuneration, based on factors linked to the agreement of the annual performance assessment for state enterprise between PTT and the State Enterprise Policy Office, his performance against the corporate vision, together with his managerial ability, leadership, self-assessment, and assessment by all individual directors. All these had gone into the Committee's consideration before tabling its views to the Board for approval.
- Considered and made recommendations on organizational restructuring at the macro level to be in line with corporate direction and strategy according to the new vision "Powering Life with Future Energy and Beyond".
- Acknowledged and commented on the assessment of senior executive vice presidents.
- Considered details of appropriate guidelines for improving variable bonuses for employees and executives and considered guidelines for variable bonus of directors as recommended by shareholders in the 2021 AGM, and provided recommendations on the formulation of annual performance estimates for salary increase and bonus, for the Board's consideration, to align with PTT's annual performance evaluation statistics approved by State Enterprise Policy Office.

For transparency, the Remuneration Committee has disclosed the pays of all directors and specific committee members together with management's pays in this 56-1 One Report.

General Teerawat Boonyawat
Chairman of the Remuneration Committee

Report of the Corporate Governance Committee

The current Corporate Governance Committee is made up of three independent directors, namely Mr. Danucha Pichayanan (Chairman), Mr. Jatuporn Buruspat (member), and Associate Professor Dr. Narongdech Srukhosit (member). Senior Executive Vice President, Organization Effectiveness and Corporate Governance and Senior Executive Vice President, Office of General Counsel are serving as secretaries.

PTT Board of Directors is committed to guiding the Company to become a model corporation of transparency, integrity, honesty, accountability, with zero tolerance to any form of fraud and corruption, while adhering to business conduct under corporate governance (CG) principles, ethical standards, a Code of Business Conduct, and PTT's sustainability management standards for continuous development and enhancement of our CG efficiency. This will in turn foster fairness and trust among all stakeholders, as well as drive key policies to PTT Group companies through PTT Group Way of Conduct for sustainable growth throughout the value chain.

The Board has assigned this Committee to propose CG guidelines and oversee the operations of the directors and management to ensure conformance to CG principles of PTT, the Securities and Exchange Commission (SEC), and The Stock Exchange of Thailand (SET), as well as recommendations from the Corporate Governance Assessment Report and the ASEAN Corporate Governance Scorecard (ACGS), the Ten International Principles of the UN Global Compact (UNGC), and the Dow Jones Sustainability Index (DJSI).

In 2021, the Committee held seven meetings as planned to supervise, monitor, and evaluate performance in the areas of corporate governance, operational risk management and internal control, and compliance (GRC), anti-fraud and corruption, sustainability management (SM), as well as corporate social responsibility (CSR), as highlighted below:

Information Disclosure and Transparency

- Prepared 56-1 One Report and disclosed PTT's quarterly performances and material information for shareholders, investors, and the public, complete with material, adequate, credible, and timely details through assorted channels, including SET's publicity channels and PTT website (www.pttplc.com). The core units taking charge of information distribution were Investor Relations Department and Corporate Communication and Branding Department.
- Disclosed 3-dimension sustainability performance information i.e. Environmental, Social and Governance (ESG) through 56-1 One Report under the topic of Driving Business for Sustainability, as well as integrating sustainability performance into the topics of Risk Management, Management's Discussion and Analysis, and Corporate Governance. The information was made public on PTT's website under the topic of Sustainability, by applying Global Reporting Initiative (GRI), Sustainability Reporting Standard, Oil and Gas Sector Disclosure (OGSD), Integrated Reporting (IR) of the International Integrated Reporting

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Council (IIRC), the United Nations Global Compact (UNGC), and the Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation of the World Economic Forum (WEF). PTT's unwavering support for the UN Sustainable Development Goals (SDGs) was confirmed, as was the adoption of Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) in reporting its climate change operations. In addition, information disclosure was reviewed by independent external agencies on a yearly basis for entrusted confidence. PTT encouraged and supported PTT Group companies to disclose their information in compliance with SEC's and SET's directions that aspire listed companies to disclose their sustainability performance on a par with international practices.

Rights of Shareholders and Equitable Treatment of Shareholders

- Held the 2021 AGM and provided in advance adequate and timely information on the date, time, venue, and agenda, as well as all information relevant to matters needing decisions at the AGM. Informed the shareholders about meeting rules and distributed such information on PTT's website before sending out meeting notices to give shareholders adequate time to study details. Facilitated their full exercising of meeting and voting rights under the safety measures in attending the AGM amid the COVID-19 epidemic. As a result, PTT achieved an "outstanding" score on the AGM Checklist assessment.
- Allowed shareholders to propose additional agenda items and nominate directors for election in advance from September 1 to November 30, 2021, under the criteria prescribed by PTT.
- Required all directors and executives to disclose vested interests of themselves and related parties for 2021 so that the Board might review PTT's transactions with potential conflicts of interest and decide in PTT's best interests. Required directors with potential vested interests on any meeting agenda items to abstain, refrain from commenting, and skip such agenda items.
- Required all directors, executives, and employees to report by paper form or electronically report their conflicts of interest for 2021 on PTT Intranet, which was fully implemented, and no significant conflicts were found.
- Required all directors and executives to report their securities portfolios as required by law and assigned the Company Secretary to compile and report these to the Board every quarter.
- Ensured enforcement of the Insider Trading Guidelines by asking the directors and management to refrain from PTT Group companies' securities trading. If such trading is necessary, for transparency they must notify the Company Secretary ahead of time.

Responsibilities of the Board

- Assessed Board performance using 5 types of forms: overall, self-assessment, cross-assessment, specific committee assessment, and duty and performance assessment of the Chairman, satisfaction with performance of specific committees and chairman of each specific committee. The 2021 results were "outstanding."
- Encouraged directors to attend training courses to develop directorship competencies, such as courses hosted by the Thai Institute of Directors Association (IOD) and other relevant institutes, as well as holding in-house courses and sessions by inviting experts to provide information related to the Board's work.
- Studied business management practices in PTT Group and matters relevant to energy and related businesses.
- Held one meeting among the independent directors.
- Held one non-executive meeting.

Corporate Governance, Operational Risk Management and Internal Control, Compliance (GRC) and Anti-fraud and Corruption

- Endorsed PTT's CG policy, anti-fraud and corruption policy, and Revision 5 of Corporate Governance, Ethical Standards and Code of Business Ethics Handbook, including the short- (2021 Year Plan) and long-term GRC and anti-fraud and corruption action plans, as well as setting goals for further cascading for implementation, followed by continuous monitoring and recommendations to bring PTT's CG standards up to international par.
- Granted policies and advised the Governance, Risk and Compliance Management Committee (GRCMC), which is responsible for overseeing compliance with CG, operational risk management and internal control and compliance. GRCMC also serves as PTT's Anti-Fraud and Corruption Operation Center for State Enterprises.
- Provided internal control assessments of operational processes within PTT and PTT Group companies, by assessing risks and effectiveness of control activities and developing control activities to reduce risks to acceptable levels.

- Continuously supported and pushed PTT's legal and regulatory compliance processes and managed the non-compliance practices by defining reporting processes and follow-up on tangible corrective actions to prevent and reduce the likelihood of repeated non-compliance in the future. At present, no incidents of non-compliance with substantial impacts on the organization were found.
- Provided policies and recommendations to management to formulate PTT Group governance policies by developing PTT Group Way of Conduct, a collection of management guidelines, principles, and work processes in various dimensions of PTT and PTT Group companies that align and harmonize with one another, thereby aiding the oversight of all PTT Group companies to adopt the same standard.
- Advocated and urged PTT's business partners to declare their intention to join the Private Sector Collective Action Coalition Against Corruption (CAC).

Social Responsibility and Sustainable Development

- Defined PTT Group Sustainability Management Framework by committing to corporate citizenship that values the three dimensions of Environmental, Social and Governance as operating policy in tandem with business, as well as defining a social responsibility direction towards communities at all operating sites whose wellbeing PTT aims to improve. PTT's stewardship also extends to social network communities across the country under the two-aspect operations, namely Social - development of human resources, communities' livelihood towards a low-carbon society, and social economics, and Environment - protecting, restoring, and promoting sustainable use of land and marine ecosystems, while raising natural resource and environmental preservation awareness, as well as focusing on waste management and conducting businesses that design processes for efficient resource circulation in the value chain. PTT has introduced PTT Group's expertise to support communities' potential for their sustainable self-development through a three-level operating model.

1. Lead by Champions, in which each company is responsible for leading the focus on social projects based on topics linked to its business, expertise, and strengths.

2. Collaboration Approach is a joint operation of PTT Group by mobilizing expertise from each company to integrate or jointly support resources to achieve the common goals.

3. Independent Organization/ Affiliates are independent enterprises that PTT Group engages in their support, namely the Sustainable Future Foundation, Sarn Palung Social Enterprise Company Limited, and the Green Globe Institute.

Awards of Pride

Thanks to our firm commitment to operating businesses with CG, social responsibility, and sustainability management for continuous standard enhancement, in 2021 PTT earned extensive acclaim from domestic and international entities, as highlighted below:

- Passed S&P Global Sustainability Performance Assessment and was selected as a member of DJSI for the 10th consecutive year in the World Index and Emerging Market Index.
- Commendation Award from the 10th Integrity Award presented by the Office of the National Anti-Corruption Commission (NACC).
- NACC Integrity & Transparency Assessment (ITA) with the assessment result of 94.26 points or at the A level from the NACC in accordance with the 2021 criteria.
- "Excellent" ranking from the Corporate Governance Report of Thai Listed Companies 2021 for the 13th consecutive year.
- Sustainability Awards of Honor, the highest SET Awards in the Sustainability Excellence Awards category from The Stock Exchange of Thailand in collaboration with the Banking and Finance Magazine.
- Outstanding Low Carbon and Sustainable Business Index (LCSi) Award from the Greenhouse Gas Management Organization (Public Organization) for the 3rd consecutive year.

Mr. Danucha Pichayanan
Chairman of the Corporate Governance Committee

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Report of the Enterprise Risk Management Committee

PTT Public Company Limited values corporate risk management as an indispensable tool for coping with risk factors from outside and inside the corporation, including the COVID-19 epidemic, volatile world economy, various uncertainties, and emerging risks that are increasingly complex and severe. Since all these could compromise business outcomes, risk management plays such a critical role in alleviating these impacts and steering PTT toward its business goals.

The Enterprise Risk Management Committee (ERMC) has supported the Board's performance under corporate governance principles to keep risk management efficient and effective for goal achievement while aligning with corporate vision and direction as well as mitigating impacts of business uncertainties. The key is to ensure shareholders and stakeholders that PTT's risk management system can indeed handle these risks in all dimensions.

In 2021, ERMC held a total of 13 meetings as highlighted below:

1. Steered Risk Management to Ease Business Impacts:

Key global situations that may affect PTT Group's business operations were monitored. PTT has proactive measures focusing on management to reduce the likelihood of all risk incidents, with reactive measures if a risk event occurs to minimize the impact on organizational goals. It defined comprehensive risk management plans for all situations. In 2021, the "Risk Appetite Statement" was adjusted to be in line with the changing circumstances to ensure that PTT's risk management process is appropriate and effectively implemented.

2. Oversaw Corporate Stakeholder Management:

This was designed to make such management complete and embrace comprehensive management of all stakeholders. ERMC endorsed the following matters:

2.1 Stakeholder management strategies
2.2 Stakeholder management objectives and scope
2.3 Stakeholder groups
2.4 Critical corporate issues for stakeholders together with operating guidelines.

This included the drive for implementation by all functions and monitoring of operation and outcomes of management assessment. ERMC also provided comments and advice for goal achievement.

3. Supervised the Management of Corporate Innovations:

To ensure a complete innovation management process with efficient and systematic innovation and technology management for increased innovation effectiveness that meets PTT's strategic objectives and core goals, as well as resource optimization, thereby contributing to sustainable growth, the following matters were endorsed by ERMC:

3.1 Innovation management policy
3.2 Innovation management master plan

This included driving, giving comments and suggestions for PTT's innovation management to achieve tangible results and business goal achievement, leveraging business in accordance with the purpose.

4. Considered and Commented on Large-scale Investment-related Agendas:

ERMC rigorously considered risk issues and risk management practices, advised on the pros and cons of business decisions to make the investment worth the opportunity cost and suitable for the business context, as well as carefully commented on current and new businesses PTT wants to grow in the future in line with its strategic business direction before submitting for approval to the Board.

5. Closely Monitored Corporate Risk Management Every Quarter in 2021:

ERMC advocated leading KRIs (Key Risk Indicators) and lagging KRIs and counseled management on the improvement of its management practices by revising risk management plans in line with prevailing business strategies and contexts. Finally, the Committee reported its performance results to the Board. This year, ERMC urged and closely monitored the outcomes of price hedging processes under highly volatile markets.

6. Screened the List of 2022 Corporate Risks and Sought Endorsement of the Board:

To this end, a list of corporate risk items and risk management plans was integrated with the preparation of the annual corporate plans. Risk management plans have thus become more explicit and aligned with corporate business directions, strategies, and objectives. Implementation was cascaded throughout the corporation to efficiently address risks and promptly handle them.

In addition, the Board approved ERMC to have supervisory responsibility for customer and market management beginning in 2022.

On the whole, ERMC and PTT's risk management task force are committed to maintaining and developing the efficiency of risk management for effective and proper performance as well as keeping risks manageable. Ultimately, this would sustainably support business goal achievement in the long-term amid challenging circumstances.

M.L. Chayotid Kridakon
Chairman of the Enterprise Risk Management Committee

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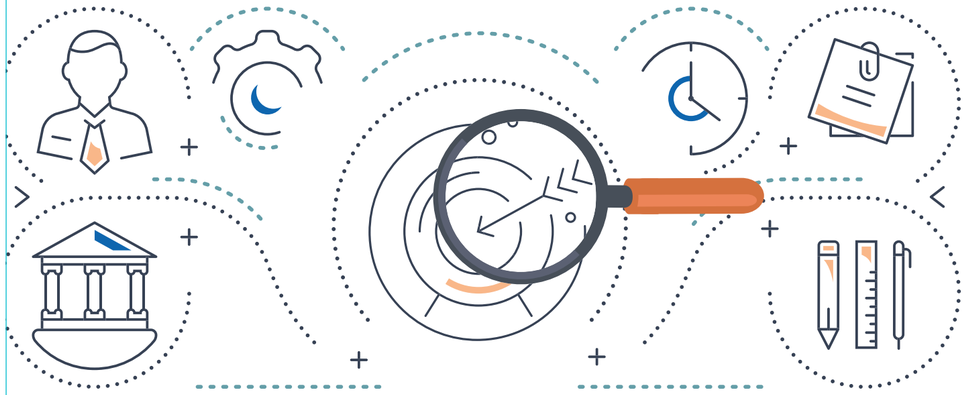

9. Internal Control and Connected Transaction

9.1 Internal Control

PTT implements its internal control by the international standard of the Committee of Sponsoring Organizations of the Treadway Commission (COSO) to achieve these objectives: Operation, Reporting, and Compliance.

At the Board Meeting No. 12/2021 on December 16, 2021, with all the 10 independent directors (3 of whom were the Audit Committee) in attendance, the Board reviewed the internal control assessment report prepared by the management following the form of the Securities and Exchange Commission (SEC) together with the internal control adequacy assessment review result of the Audit Committee. The Board regarded PTT's internal control as adequate and suitable, with consistent conformance to criteria. Its assigned unit responsible for internal control focused on laying down a system embracing all activities that was adequate and suitable for its businesses for efficient and effective achievement of internal control objectives. Its financial and other reports were transparent, reliable, timely, so was compliance with applicable laws and regulations.

PTT has further improved its procedures and systems to support internal control and ensure the efficient and speedier system's detection of problems or risks. PTT's internal control system can be summarized by COSO components as seen below:

(1) Control Environment

PTT commands a sound overall control environment that is adequate for business efficiency and effectiveness. Its executives have promoted a corporate culture focusing on integrity and ethics as a role model with the following implementations:

- The Board and executives take the control environment and corporate culture seriously by defining policies for internal control, risk management, corporate governance (CG), anti-fraud and corruption, compliance, and giving and receiving of gifts, assets, or other benefits. These policies are announced for all to acknowledge and observe and training and internal/external public relations about them are organized. Regular monitoring and assessment are in place. The Board, executives, and employees must acknowledge such guidelines in writing and conform to the Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook (CG Handbook).
- Integrity and ethics form part of the SPIRIT corporate values to stress transparent business conduct and collaboration in the power of virtue, which explicitly embraces their everyday duties, decision-making, and treatment of all stakeholders, including business partners, customers, and third parties. PTT values equitable treatment based on fair competition, mutual respect of rights, nurturing of relations and cooperation, and strict honoring of contracts. All executives and employees prepare reports disclosing items of potential conflicts of interest with PTT annually or upon every related incident.
- Setting good corporate governance as a part of the organization's vision, mission, and values by considering the 3 aspects of equilibrium which include Environmental, Social, and business operation under good Governance principles (ESG), and integrated management of stakeholders with the strategy of Business Integrity as part of the operation.
- Its structure is based on the "Three Lines Model" management approach focusing on ensuring everyone's understanding and strictly complying with regulations and duties and responsibilities. To this end, it aims at prevention and solution by those on the job, systematic operation with total segregation of authority for approving, account recording, payment and receipt of payment, and verification and stewardship of assets, which results in effective checks and balances. In addition, under PTT's structure the Office of Corporate Audit has a clear and independent reporting line to the Audit Committee, which is marked by decentralization of power to business units, thus giving due flexibility to communication for their duties and responsibility.
- PTT defines a written policy and procedure for human resource (HR) development, including procedures for planning and administering the overall workforce in both short and long terms. In place is an annual analysis and revision of manpower, as well as analysis, planning, and definition of key succession processes by defining policies, regulations, tools, selection, assessment of potential, and plans for developing those in the potential pool for key positions. All these are compatible with business directions, as well as compliance. PTT reviews the suitability of audit authority segregation for checks and balances for efficient internal control and communicates to applicable units to prepare for recruitment and prepare expenditure budgets to meet HR needs.

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(2) Risk Assessment

PTT recognizes the importance of risk management to achieve business objectives as well as those of compliance and preparation of credible reports under changes that impact its businesses due to internal and external factors. It views risk management as a critical component of every business process that must be interconnected.

- PTT defines corporate risk management policy for all to conform to. At every level, risks are to be assessed, including those of corruption. For corporate risks, management is systematically undertaken by its various management committees. Operational risks fall under the oversight of respective executives. The Enterprise Risk Management Committee (ERMC) steers and supports corporate risk management in line with business strategies and goals as well as shifting circumstances and provides advice on guidelines for monitoring and assessment to the Corporate Plan and Risk Management Committee (CPRC) to manage overall risks for maximum efficiency. It is the responsibility of all units to manage and control risks to manageable levels (risk appetite), as clearly stated in the functional descriptions of all units.
- A third-party screening process has been developed for greater efficiency and prudence together with fostering credibility and confidence in engagement with business partners and stakeholders for standardized and suitable analysis and assessment of suppliers, customers, business partners, and employees.
- The Business Continuity Management (BCM) process is applied to the COVID-19 situation management to assess guidelines for business, workforce communication, and preparation of resources and business processes for employees' uninterrupted and safe work without impacts on key goals. In addition, PTT holds annual crisis management and business continuity training to ensure the readiness of emergency management as well.

(3) Control Activities

PTT defines control activities to lower risks to achieve its objectives as described below.

- The Management Committee (MC) reviews financial and other reports of all business groups and regularly reviews performance to ensure conformance to regulations, protocols, and job manuals. PTT defines written policies and procedures, including those for performance assessment of all employees, which relies on KPIs to take control of administrative activities suitable, adequate, and auditable. Portions of businesses have been identified for key risks, and mechanisms have been defined to control and minimize errors. Regular performance reviews by the management are in place, including financial, procurement, and general administrative transactions.
- Systematic delegation of duties to personnel groups ensures proper checks and balances. Authority is duly and fully segregated for approval, information compilation, transaction recording, receipt and disbursement of cash, reviews of inspection and stewardship of properties. In place is an internal control system for finance and accounting dealing with cash collection, cash retention, receipt and disbursement, bank deposits, and cash advances. These follow the rules with complete, accurate, and regular recording. Systematic and consistent storage of accounting documents, both documents and information, is in place to comply with the law. Should PTT engage in transactions with the major shareholder, directors, executives, or their related parties, it would apply strict measures to ensure that each such transaction secures the required approval every time and for every item. Parties with vested interests will not take part in the approval of such an item. PTT also closely monitors subsequent actions.
- PTT Group Way of Conduct serves as a mechanism and guidelines for steering the policies and business conduct among PTT Group. Multi-level Governance ensures a single implementation standard for all. The internal control policy is grouped under strategic alignment, with a report submitted to PTT annually. Site visits to PTT Group companies are arranged to engage in sharing, counseling, and recommending ideas on internal control development, including GRC and PTT Group Way of Conduct.
- Policies, regulations, and procedures are constantly reviewed to ensure their suitability, for example, corporate governance policy, anti-fraud and corruption policy, Corporate Governance, Ethical Standards, and Code of Business Ethics Handbook (CG Handbook), Fraud and Corruption Risk Assessment Manual, regulations for finance and accounting, procurement, etc. to comply with law, rules, regulations, including risks and current situations.
- PTT defines its requirement on the standard for compliance with the ICT policy to control, develop, or execute change management to its computer work systems. The practical guidelines embrace various work procedures, including requesting, testing, and migrating for actual application, and major system maintenance, e.g., data backup. Also in place are policies and requirements for ICT policy compliance for controlling key infrastructure, including the security of network systems and operation centers and access control to wireless networks. PTT develops infrastructure for emergencies by leveraging the BCM standard to sustain uncertainty, thus it can provide continuous services, with annual plan drills. Should its businesses be affected by COVID-19, procedures have been amended in line with the Ministry of Public Health's measures, including delivery and transmission of documents, to allow uninterrupted businesses.
- Operations controls by humans are designed, such as document validation, data accuracy review, as well as those controlled by ICT system in accordance with regulations and requirements through ERP, procurement, expense disbursement systems, etc. Controls are both for prevention, detection, and correction. Continuous Control Monitoring and Auditing System (CCMS) is in place to assist in scrutinizing and monitoring irregularities, as well as potential fraud in the procurement process. (Procure to Pay) and the process of receiving orders until payment (Order to Cash: O2C)
- PTT values the steering of sustainability management together with security, safety, health, and environment (SSHE), all of which are likened to a vital shield against risks or impacts, and efficiently as well as effectively lowering potential losses suffered by all stakeholders, assets, work processes, data, and the surroundings. This would bring about business sustainability while extending performance in all aspects of excellence for vision and goal attainment. In 2021, tools and processes for sustainability management are defined under the "State Enterprise Assessment Model" section 4.1 policy and job manual and strategic implementation of corporate social responsibility in process (CSR in Process) and section 9.2 policy and job manual and development of strategic sustainability, required by the State Enterprise Policy Office for sustainability management supervisory structure. In the sustainability management governance structure, the Board looks after, monitors, and provides policies as well as recommendations on sustainability management and SSHE; the Corporate Governance Committee (CGC) reviews, orders, and comments on the outcomes of strategic and plan implementation, key sustainability, and SSHE goals and indicators every quarter. The PTT Management Committee, led by the President & CEO, screens, orders, and comments monthly, supported by subcommittees at the management level for specific matters and management practices at the strategic level and operating level for sustainability and SSHE, namely Governance, Risk and Compliance Management Committee (GRCMC), PTT Group Sustainability Management Committee (GSMC) and Corporate Plan and Risk Management Committee (CPRC). To this end, centralized departments are Good Governance and Corporate Ethics, Sustainability Strategy, and Corporate Planning and Budgeting Departments, which would report to related committees e.g., GRCMC and CGC on a quarterly basis. Details about sustainability management and SSHE management appear under Section 3 "Driving Business for Sustainability" of this 56-1 One Report.

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(4) Information & Communication

PTT values quality ICT systems since ICT supports effective internal control. Below are its management guidelines:

- Managing data by classifying levels of confidentiality; defining guidelines for storing key documents and control documents, and internal and external operation-supporting data to ensure that key information related to business is accurate, complete, adequate, and timely and that an efficient data analytics and storage system is in place to ensure that the data used are credible and adequate for timely decision-making.
- Formulating various internal communication channels, namely Town Hall, intranet communication, electronic mail, orientation, and Learning Management System.
- Creating communication channels with external stakeholders, including the website and Facebook. Directly responsible units regularly disclose key data to all stakeholders. PTT set up its 1365 Contact Center to centralize data provision covering integrated goods and services for interested parties. It allows shareholders to propose AGM agenda items and nominate directors in advance, thus promoting corporate governance under the rights of shareholders and equitable treatment.
- Inaugurating clear grievance channels and management guidelines so that employees and third parties can be assured that their complaints will be transparently, fairly, confidentially, and honestly considered in due time.

In 2021, PTT has forged ahead with a new vision, “Powering Life with Future Energy and Beyond.” PTT’s key mission is to create energy security by supplying sufficient energy to meet the needs of the country. Nevertheless, PTT looks to future energy that will play a greater role, which is the springboard of the operational strategy in line with the future energy business, including new trends beyond in non-energy business opportunities. The Board, therefore, approved and pushed ahead with the Digital Roadmap implementation to drive innovations for business efficiency, lower business costs and competition expenses by focusing on outcomes that comprehensively and equitably meet all stakeholders’ needs with the application of digital technology.

Due to the outbreak of the COVID-19, PTT manages its digital business support to enable prompt adjustment to change and engage in uninterrupted business. To elaborate, PTT’s digital management enables employees to work from home efficiently and safely as normal.

In addition, PTT has established the Data Governance Framework to ensure that information is accurate, complete, safe, and reliable while supervising the optimization of growing data from data analytics in decision making.

The Board also emphasizes cybersecurity, which is on the rise. This year saw a wide variety of cyberattacks worldwide through networks, applications, data, Cloud, and the Internet of Things (IoT), wreaking havoc to organizations in several aspects, including data ransom expenses, business disruption impacts, and worst of all, loss of customers’ confidence in the organization. Cyber threats are therefore a common topic of value. Aware of cybersecurity, the Board has planned and installed preventive hardware through cooperation with PTT DIGITAL in three aspects. First, technology, systems, and hardware. Second, the process for dealing with cyber threats and reporting with the Cyber Security Operation Center (CSOC); all CSOC personnel are internationally certified experts, their potential can thus be confided. Third, users; to ensure that PTT’s cybersecurity is indeed efficient and that employees are poised to handle cyber threats; users are therefore exposed to activities and tools to relentlessly forge awareness of cybersecurity e.g., phishing mail and digital culture. To this end, PTT in conjunction with PTT DIGITAL hired third parties to attempt to penetrate PTT’s system (penetration test); the test outcomes have helped PTT improve the system. In 2021, PTT adopted multi-factor authentication technology to be enforced throughout PTT to enhance the security of users’ part in verifying their identity before entering PTT’s system via mobile devices in addition to logging in to normal system access.

(5) Monitoring & Evaluation Activities

PTT commands a process for monitoring and assessing the adequacy of internal control and defines guidelines for improvement to ensure system efficiency and effectiveness:

- Assess the efficiency and effectiveness at least annually by requiring top management to conduct such assessment by themselves according to their assigned roles through the Control Self-Assessment (E-CSA) forms and by requiring all departments and direct-report departments and divisions to assess risks and internal control by themselves against the Governance, Risk and Compliance (GRC) guidelines. They are also to develop internal control improvement plans for high-risk processes and regularly follow up the outcomes of such improvement at least quarterly.
- Regularly monitor and report the implementation outcomes of strategic plans, laws, and regulations (inside and outside PTT and PTT Group).

This year, the Office of Corporate Audit also reviewed internal control practices to ensure that they are adequate, suitable, and consistently practiced. If a given item needed improvement, procedures would be discussed with management to define implementation guidelines along with improvement plans to ward off or lower risks and monitor execution to ensure that audit and review findings are promptly remedied. This is reported every quarter to the Audit Committee, indicating that PTT’s internal control system for this year is adequate, efficient, and effective, a view shared by the external auditor.

Internal Audit System

The Office of Corporate Audit is an independent unit that directly reports to the Audit Committee. It fosters assurance and provides advice to ensure that business processes are duly equipped with efficient CG, risk management, and internal control practices in support of corporate objectives.

The Office commands an annual audit plan and three-year audit plans in line with PTT’s business strategic direction and a risk-based approach to key corporate risks, encompassing PTT Group’s domestic and international businesses. It reports findings to the Audit Committee for consideration and forwards them to the Board for acknowledgment every quarter. Regular monitoring is undertaken for actions in response to the office’s recommendations. In its course of work, the office freely expresses its opinions. No conflicts have arisen between audited units and the office that cannot be resolved.

Head of the Office of Corporate Audit

At the Meeting No. 5/2019 on May 16, 2019, the Board appointed Mr. Chadil Chavanalikikorn, Executive Vice President, Office of Corporate Audit, with effect from July 1, 2019, citing his mastery of PTT’s business. Equipped with expertise, skills, and experience in internal audit, he is familiar with the business undertaking, good governance, risk assessment, and internal control at the business and overall levels and was therefore regarded as suitable for the position. The Audit Committee approved the appointment, transfer, performance assessment, and annual merit pay increase of this position.

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Biography of the Head of Corporate Audit

Mr. Chadil Chavanalikikorn

Age: 55

Education
- Bachelor of Engineering, Kasetsart University
- Master of Business Administration, Kasetsart University
- Certified Internal Auditor (CIA), The Institute of Internal Auditors

Training
- Senior Energy Executive, Thailand Energy Academy, Ministry of Energy
- Administrative Psychological Operation: Institute of Security Psychology, National Defence Studies Institute
- Anti-Corruption Training Program for Public Officials, NACC
- Senior Executive Program (SEP), Sasin Graduate Institute of Business Administration
- Leadership Development Program II, PTT-Harvard Business School: PLLI
- Leadership Development Program II, PTT-IMD: PLLI
- Leadership Succession Program (LSP): IRDP
- Successful Formulation & Execution of Strategy (SFE 17/2013), Anti-Corruption: The Practical Guide (ACPG 2/2013), Company Secretary Program (CSP 65/2015), Independent Observer Program (IOP 1/2016), Thai Institute of Directors Association (IOD)

Working Experiences (ย้อนหลัง 5 years)
- 2016 - 2017
  Vice President, Internal Audit Department
- 2017 - 2018
  Executive Vice President, Sustainability Management
- 2018 - 2019
  Executive Vice President, Corporate Governance
- 2019 - Present
  Executive Vice President, Office of Corporate Audit

Key Related Directorship
- -None-

Relations with the Management
- -None-

Compliance Unit

PTT inaugurated Compliance Department, which governs legal and regulatory compliance of PTT with detailed roles, duties, and responsibilities defined in the Compliance Charter, under the Office of General Counsel and reports directly to the Senior Executive Vice President, Office of General Counsel (biography shown in Information of Executives Section), indirectly reporting to the Governance, Risk and Compliance Management Committee (GRCMC) and the Corporate Governance Committee (CGC), respectively.

Compliance Department centralizes corporate compliance and oversees all personnel and all business units under PTT to fully comply with all external and internal laws, rules, regulations, directives, procedures, and announcements controlling all facets of PTT businesses, both inside and outside. Compliance routinely works with the 2nd Line of Defense to collect and develop a data depository on laws and regulations governing PTT operations and businesses and is tasked to analyze and assess legal risks and impacts on the operational activities of PTT. Compliance's duties include providing consultations, supports, supervisions, and reviews of the 1st Line of Defense to ensure compliance of PTT with all laws and regulations. Compliance also constantly develops and nurtures compliance culture through continuous organization of legal learning and development sessions, consultancy services, and publications and dissemination of data and information related to laws, rules, and regulations governing operations and businesses. In 2021, communication sessions on laws and regulations as well as compliance behaviors and practices were organized e.g., internal e-mails, online learning, virtual classroom, legal podcast, infographics on key legal summaries, and Tips & Tricks on how to work with compliance. PTT personnel has also been promoted to adhere to laws and regulations, corporate governance, and business ethics through Tone from the top in Compliance Role Model project: doing good you can; don't ignore, which is to communicate key messages from top management as food for thought or direction via e-mail to promote compliance culture from top management. In addition, non-compliance management has been implemented by showcasing non-compliance incidents (if any) to find prevention and reduce repeating cases in the future. Whistleblowing has also been continuously communicated by launching video clips requesting and supporting employees not to bear with fraud or non-compliance. Whistleblowing channels have been promoted. These compliance efforts are intended to nurture compliance values and culture and to enhance understanding of legal and compliance issues concerning individual job responsibilities and the awareness of consequences of non-compliance. Thanks to correct work practices and strict adherence to legal and regulatory compliance of all, PTT can rest assured that all operations and businesses are uninterrupted by legal risks while striving to become a sustainable zero non-compliance organization.

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9.2 Connected Transactions

The connected transactions in 2021 are summarized below:

(Details of connected transactions during the past 3 years can be found from https://investor.pttplc.com/th/downloads/one-report.)

9.2.1 Connected Transactions with Shareholders

In 2021, the Company had no connected transactions with shareholders.

9.2.2 Connected Transactions between PTT and Parties with the Common Major Shareholder

Transactions for PTT's products sold/ services rendered to parties with the common major shareholder with potential conflicts

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Electricity Generating Authority of Thailand (EGAT)	63,632.34	Ministry of Finance, PTT's major shareholder, has control over EGAT.	–
State Railway of Thailand (SRT)	1,519.49	Ministry of Finance, PTT's major shareholder, has control over SRT.	–
Bangkok Mass Transit Authority (BMTA)	1,395.03	Ministry of Finance, PTT's major shareholder, has control over BMTA.	–
Port Authority of Thailand (PAT)	851.60	Ministry of Finance, PTT's major shareholder, has control over PAT.	–
Others	581.56		
Total	**67,980.02**		

Transactions for products/ services PTT bought/ received and other expenses from parties with the common major shareholder with potential conflicts

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Provincial Electricity Authority (PEA)	931.48	Ministry of Finance, PTT's major shareholder, has control over PEA.	PTT's director, Mr. Danucha Pichayanan, is a PEA director.
Electricity Generating Authority of Thailand (EGAT)	319.32	Ministry of Finance, PTT's major shareholder, has control over EGAT.	–
Metropolitan Electricity Authority (MEA)	261.92	Ministry of Finance, PTT's major shareholder, has control over MEA.	–
Airports of Thailand Plc. (AOT)	4.67	Ministry of Finance, PTT's major shareholder, has control over AOT.	–
Others	19.86		
Total	**1,537.25**		

Interests received from parties with the common major shareholder with potential conflicts

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
TMBThanachart Bank Plc. (TTB)	23.57	Ministry of Finance, PTT's major shareholder, holds more than 10.00% shares in TTB.	PTT's director, Mr. Chumpol Rimsakorn, is a director, Chairman of the Credit Committee, member of the Board of Executive Directors, and member of the Nomination, Remuneration and Corporate Governance Committee of TTB.
Total	**23.57**		

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Trade accounts receivable, other accounts receivable, and advance payments to parties with the common major shareholder with potential conflicts

Trade Accounts Receivable

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Electricity Generating Authority of Thailand (EGAT)	6,289.21	Ministry of Finance, PTT's major shareholder, has control over EGAT.	–
Bangkok Mass Transit Authority (BMTA)	178.69	Ministry of Finance, PTT's major shareholder, has control over BMTA.	–
State Railway of Thailand (SRT)	153.83	Ministry of Finance, PTT's major shareholder, has control over SRT.	–
Port Authority of Thailand (PAT)	73.72	Ministry of Finance, PTT's major shareholder, has control over PAT.	–
Others	71.12		
Total	**6,766.57**		

Other Accounts Receivable

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Thailand Post Co., Ltd. (THP)	0.01	Ministry of Finance, PTT's major shareholder, has control over THP.	–
Total	**0.01**		

Advance Payment

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Expressway Authority of Thailand (EXAT)	0.32	Ministry of Finance, PTT's major shareholder, has control over EXAT.	–
Total	**0.32**		

Trade accounts payable and other accounts payable to parties with the common major shareholder with potential conflicts

Trade Accounts Payable

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Industrial Estate Authority of Thailand (IEAT)	26.92	Ministry of Finance, PTT's major shareholder, has control over IEAT.	–
Total	**26.92**		

Other Accounts Payable

Party with the Common Major Shareholder	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Electricity Generating Authority of Thailand (EGAT)	312.79	Ministry of Finance, PTT's major shareholder, has control over EGAT.	–
State Railway of Thailand (SRT)	44.21	Ministry of Finance, PTT's major shareholder, has control over SRT.	–
Aeronautical Radio of Thailand Co., Ltd. (AEROTHAI)	18.52	Ministry of Finance, PTT's major shareholder, has control over AEROTHAI.	–
Industrial Estate Authority of Thailand (IEAT)	5.93	Ministry of Finance, PTT's major shareholder, has control over IEAT.	–
Others	5.99		
Total	**387.44**		

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9.2.3 Connected Transactions between PTT and Subsidiaries, Joint Ventures, Associates and Other Related Parties

Transactions for PTT's products sold/ services rendered to subsidiaries, joint ventures, associates and other related parties

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
PTT Global Chemical Plc. (GC)	271,569.11	PTT Group owns 48.18% of GC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director, Mr. Don Wasantapruek, is GC's director. PTT's executives, namely Mr. Noppadol Pinsupa, M.L. Peekthong Thongyai, Mr. Disathat Panyarachun, are GC's directors. PTT's executive, Dr. Kongkrapan Intarajang, is a director & the Board's secretary and CEO of GC.
IRPC Plc. (IRPC)	164,665.06	PTT Group owns 48.05% of IRPC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Kris Imsang, is IRPC's Chairman of the Board. PTT's executives, namely Miss Peangpanor Boonklum, Mr. Chansak Chuenchom, are IRPC's directors. PTT's executive, Mr. Chawalit Tippawanich, is a director & the Board's secretary and President & CEO of IRPC.
Thai Oil Plc. (TOP)	114,454.44	PTT Group owns 48.03% of TOP's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executives, namely Miss Pannalin Mahawongtikul, Mr. Terdkiat Prommool, Mr. Suchat Ramarch, Dr. Buranin Rattanasombat, are TOP's directors. PTT's executive, Mr. Wirat Uanarumit, is a director & the Board's secretary and CEO & President of TOP.
PTT Oil and Retail Business Plc. (OR)	28,583.12	PTT Group owns 75.00% of OR's shares.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, Dr. Buranin Rattanasombat, are OR's directors. PTT's executive, Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
PTT International Trading Pte. Ltd. (PTTT)	24,051.61	Wholly owned by PTT Group.	PTT's executive, Mr. Disathat Panyarachun, is Chairman of the Board of PTTT. PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTTT.
PTT International Trading London Ltd. (PTTT LDN)	12,948.15	Wholly owned by PTT Group.	
Global Power Synergy Plc. (GPSC)	12,372.35	PTT Group owns 75.23% of GPSC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executives, namely Mr. Atikom Terbsiri, Mr. Noppadol Pinsupa, Mr. Wuttikorn Stithit, Dr. Kongkrapan Intarajang, Mr. Wirat Uanarumit, are GPSC's directors. PTT's executive, Mr. Worawat Pitayasiri, is a director & the Board's secretary and President & CEO of GPSC.
Others	49,036.33		

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Joint Ventures			
HMC Polymers Co., Ltd. (HMC)	6,768.33	PTT Group owns 41.44% of HMC's shares. No shares held by PTT's related parties with potential conflicts.	–
PTT Asahi Chemical Co., Ltd. (PTTAC)	4,846.83	PTT Group owns 50.00% of PTTAC's shares. No shares held by PTT's related parties with potential conflicts.	–
Nava Nakorn Electricity Generating Co., Ltd. (NNEG)	2,512.42	PTT Group owns 30.00% of NNEG's shares. No shares held by PTT's related parties with potential conflicts.	–
District Cooling System and Power Plant Co., Ltd. (DCAP)	1,776.48	PTT Group owns 35.00% of DCAP's shares. No shares held by PTT's related parties with potential conflicts.	–
Others	102.55		
Associates			
Bangpa-in Cogeneration Co., Ltd. (BIC)	3,222.00	PTT Group owns 25.00% of BIC's shares. No shares held by PTT's related parties with potential conflicts.	–
Vinythai Plc.	270.01	PTT Group owns 24.98% of Vinythai Plc.'s shares. No shares held by PTT's related parties with potential conflicts.	–
Other Related Party			
Ratchaburi Power Co., Ltd. (RPCL)	6,783.78	PTT Group owns 15.00% of RPCL's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Worawat Pitayasiri, is RPCL's director.
Total	**703,962.57**		

Transactions for products/ services PTT bought/ received from subsidiaries, joint operations

Joint Ventures, Associates, and Other Related Parties

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
PTT Exploration and Production Plc. (PTTEP)	99,568.62	PTT Group owns 65.29% of PTTEP's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is PTTEP's director. PTT's executive, Mr. Atikom Terbsiri, is PTTEP's director. PTT's executive, Mr. Montri Rawanchaikul, is PTTEP's CEO.
PTT International Trading Pte. Ltd. (PTTT)	77,740.23	Wholly owned by PTT Group.	PTT's executive, Mr. Disathat Panyarachun, is PTTT's Chairman of the Board. PTT's executive, Mrs. Chanamas Sasnanand, is PTTT's director.
PTT International Trading London Ltd. (PTTT LDN)	19,682.23	Wholly owned by PTT Group.	–
PTT Global Chemical Plc. (GC)	19,591.30	PTT Group owns 48.18% of GC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director, Mr. Don Wasantapruek, is GC's director. PTT's executives, namely Mr. Noppadol Pinsupa, M.L. Peekthong Thongyai, Mr. Disathat Panyarachun, are GC's directors. PTT's executive, Dr. Kongkrapan Intarajang, is a director & the Board's secretary and CEO of GC.
PTTEP Siam Ltd.	16,806.86	Wholly owned by PTT Group.	–

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Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
PTT Oil and Retail Business Plc. (OR)	16,304.74	PTT Group owns 75.00% of OR's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, Dr. Buranin Rattanasombat, are OR's directors. PTT's executive, Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
PTTEP International Ltd.	15,572.54	Wholly owned by PTT Group.	–
PTT LNG Co., Ltd. (PTTLNG)	9,402.53	Wholly owned by PTT Group.	PTT's executive, Mr. Atikom Terbsiri, is Chairman of the Board of PTTLNG.
PTTEP SP Ltd.	7,538.48	Wholly owned by PTT Group.	–
PTTEP MENA Ltd.	2,847.15	Wholly owned by PTT Group.	–
Others	1,215.47		
Joint Operations			
Moattama Gas Transportation Co., Ltd. (MGTC)	14,185.08	PTT Group owns 25.50% of MGTC's shares. No shares held by PTT's related parties with potential conflicts.	–
Andaman Transportation Ltd. (ATL)	9,213.54	PTT Group owns 80.00% of ATL's shares. No shares held by PTT's related parties with potential conflicts.	–
Others	8,146.44		
Joint Venture			
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	1,442.64	PTT Group owns 50.00% of TTM(T)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Others	22.95		

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Associates			
Thai Petroleum Pipeline Co., Ltd. (Thappline)	5.44	PTT Group owns 49.21% of Thappline's shares. No shares held by PTT's related parties with potential conflicts.	–
Eastern Fluid Transport Co., Ltd. (EFT)	0.32	PTT Group owns 37.65% of EFT's shares. No shares held by PTT's related parties with potential conflicts.	–
Other Related Party			
Dhipaya Insurance Plc. (TIP)	82.87	As of December 31, 2021, the Group did not hold shares in TIP.	–
Total	**319,369.43**		

Interests received from subsidiaries, joint ventures, associates, and other related parties

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Treasury Center Co., Ltd. (PTT TCC)	1,271.80	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Others	6.32		
Total	**1,278.12**		

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Interests paid by subsidiaries, joint ventures, associates, and other related parties

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Treasury Center Co., Ltd. (PTT TCC)	2,015.90	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Others	20.62		
Joint Venture			
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	43.00	PTT Group owns 50.00% of TTM(T)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Total	**2,079.52**		

Trade accounts receivable, other accounts receivable, advance payments, short-term loans, and long-term loans to subsidiaries, joint ventures, associates, and other related parties

Trade Accounts Receivable

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
PTT Global Chemical Plc. (GC)	19,532.22	PTT Group owns 48.18% of GC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director, Mr. Don Wasantapruek, is GC's director. PTT's executives, namely Mr. Noppadol Pinsupa, M.L. Peekthong Thongyai, Mr. Disathat Panyarachun, are GC's directors. PTT's executive, Dr. Kongkrapan Intarajang, is a director & the Board's secretary and CEO of GC.
Thai Oil Plc. (TOP)	12,844.72	PTT Group owns 48.03% of TOP's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executives, namely Miss Pannalin Mahawongtikul, Mr. Terdkiat Prommool, Mr. Suchat Ramarch, Dr. Buranin Rattanasombat, are TOP's directors. PTT's executive, Mr. Wirat Uanarumit, is a director & the Board's secretary and CEO & President of TOP.
IRPC Plc. (IRPC)	10,200.87	PTT Group owns 48.05% of IRPC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Kris Imsang, is IRPC's Chairman of the Board. PTT's executives, namely Miss Peangpanor Boonklum and Mr. Chansak Chuenchom, are IRPC's directors. Mr. Chawalit Tippawanich, is a director & the Board's secretary and President & CEO of IRPC.
PTT Oil and Retail Business Plc. (OR)	3,114.38	PTT Group owns 75.00% of OR's shares.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, Dr. Buranin Rattanasombat, are OR's directors. Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
PTT International Trading Pte. Ltd. (PTTT)	2,806.92	Wholly owned by PTT Group.	PTT's executive, Mr. Disathat Panyarachun, is Chairman of the Board of PTTT. PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTTT.
Others	8,995.12		

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Joint Ventures			
HMC Polymers Co., Ltd. (HMC)	765.04	PTT Group owns 41.44% of HMC's shares. No shares held by PTT's related parties with potential conflicts.	–
PTT Asahi Chemical Co., Ltd. (PTTAC)	396.86	PTT Group owns 50.00% of PTTAC's shares. No shares held by PTT's related parties with potential conflicts.	–
Nava Nakorn Electricity Generating Co., Ltd. (NNEG)	279.91	PTT Group owns 30.00% of NNEG's shares. No shares held by PTT's related parties with potential conflicts.	–
Others	226.13		
Associates			
Bangpa-in Cogeneration Co., Ltd. (BIC)	367.14	PTT Group owns 25.00% of BIC's shares. No shares held by PTT's related parties with potential conflicts.	–
Vinythai Plc.	44.10	PTT Group owns 24.98% of Vinythai Plc.'s shares. No shares held by PTT's related parties with potential conflicts.	–
Other Related Party			
Ratchaburi Power Co., Ltd. (RPCL)	1,259.39	PTT Group owns 15.00% of RPCL's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Worawat Pitayasiri, is RPCL's director.
Trade accounts receivable	**60,832.80**		
Less allowance for doubtful accounts	-		
Total trade accounts receivable	**60,832.80**		

Other Accounts Receivable

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
PTT Oil and Retail Business Plc. (OR)	736.08	PTT Group owns 75.00% of OR's shares.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, Dr. Buranin Rattanasombat, are OR's directors. PTT's executive, Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
PTT International Trading London Ltd. (PTTT LDN)	360.39	Wholly owned by PTT Group.	–
PTT Treasury Center Co., Ltd. (PTT TCC)	255.22	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Others	549.18		
Joint Venture			
Trans Thai-Malaysia (Malaysia) Sdn. Bhd. (TTM(M))	18.06	PTT Group owns 50.00% of TTM(M)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Others	33.81		
Associates			
Eastern Fluid Transport Co., Ltd. (EFT)	6.61	PTT Group owns 37.65% of EFT's shares. No shares held by PTT's related parties with potential conflicts.	–
Thai Petroleum Pipeline Co., Ltd. (Thappline)	(1.15)	PTT Group owns 49.21% of Thappline's shares. No shares held by PTT's related parties with potential conflicts.	–

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		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Other Related Party			
Sarn Palung Social Enterprise Co., Ltd. (SPSE)	0.21	Wholly owned by PTT Group.	–
Other accounts receivable	**1,958.41**		
Less allowance for doubtful accounts	-		
Total Other Accounts Receivable – Net	**1,958.41**		

Short-Term Advance Payment

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	10.25	Wholly owned by PTT Group.	PTT's executive, Mr. Terdkiat Prommool, is Chairman of the Board of PTT DIGITAL.
Total	**10.25**		

Short-Term Loans

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Treasury Center Co., Ltd. (PTT TCC)	4,278.92	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Total Short-Term Loans	**4,278.92**		
Less allowance for doubtful accounts	-		
Grand Total Short-Term Loans	**4,278.92**		

Long-Term Loans

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Treasury Center Co., Ltd. (PTT TCC)	119,596.25	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Total Long-Term Loans	**119,596.25**		
Less allowance for doubtful accounts	-		
Total	**119,596.25**		

Trade Accounts Payable

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
PTT Exploration and Production Plc. (PTTEP)	10,269.00	PTT Group owns 65.29% of PTTEP's shares. No shares held by PTT's related parties with potential conflicts	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is PTTEP's director. PTT's executive, Mr. Atikom Terbsiri, is PTTEP's director. PTT's executive, Mr. Montri Rawanchaikul, is PTTEP's CEO.
PTT International Trading Pte. Ltd. (PTTT)	5,355.62	Wholly owned by PTT Group.	PTT's executive, Mr. Disathat Panyarachun, is the Chairman of the Board of PTTT. PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTTT.

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
PTT Oil and Retail Business Plc. (OR)	3,240.22	PTT Group owns 75.00% of OR's shares. No shares held by PTT's related parties with potential conflicts.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, and Dr. Buranin Rattanasombat, are OR's directors. PTT's executive, Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
Others	11,450.52		
Joint Operations			
Moattama Gas Transportation Co., Ltd. (MGTC)	2,800.58	PTT Group owns 25.50% of MGTC's shares. No shares held by PTT's related parties with potential conflicts.	–
Andaman Transportation Ltd. (ATL)	1,712.63	PTT Group owns 80.00% of ATL's shares. No shares held by PTT's related parties with potential conflicts.	–
Orange Energy Co., Ltd.	249.52	PTT Group owns 53.95% of Orange Energy Co., Ltd.'s shares. No shares held by PTT's related parties with potential conflicts.	–
B 8/32 Partners Ltd.	249.52	PTT Group owns 25.00% of B8/32 Partners Ltd.'s shares. No shares held by PTT's related parties with potential conflicts.	–
Taninthayi Pipeline Co., LLC (TPC)	238.74	PTT Group owns 19.32% of TPC's shares. No shares held by PTT's related parties with potential conflicts.	–
Joint Venture			
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	273.34	PTT Group owns 50.00% of TTM(T)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Total	**35,839.69**		

Other Accounts Payable

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
IRPC Plc. (IRPC)	2,797.02	PTT Group owns 48.05% of IRPC's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Kris Imsang, is IRPC's Chairman of the Board. PTT's executives, namely Miss Peangpanor Boonklum, Mr. Chansak Chuenchom are IRPC's directors. PTT's executive, Mr. Chawalit Tippawanich, is a director & the Board's secretary and President & CEO of IRPC.
PTT Oil and Retail Business Plc. (OR)	2,116.76	PTT Group owns 75.00% of OR's shares.	PTT's director/ executive, Mr. Auttapol Rerkpiboon, is OR's Chairman of the Board. PTT's executives, namely Mr. Kris Imsang, Mr. Disathat Panyarachun, Dr. Buranin Rattanasombat, are OR's directors. PTT's executive, Miss Jiraphon Kawswat, is a director & the Board's secretary and acting President & CEO of OR.
PTT Treasury Center Co., Ltd. (PTT TCC)	848.27	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	831.56	Wholly owned by PTT Group.	PTT's executive, Mr. Terdkiat Prommool, is the Chairman of the Board of PTT DIGITAL.
Others	720.83		

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Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Joint Ventures			
Map Ta Phut Air Products Co., Ltd. (MAP)	5.51	PTT Group owns 51.00% of MAP's shares. No shares held by PTT's related parties with potential conflicts.	–
Nava Nakorn Electricity Generating Co., Ltd. (NNEG)	3.13	PTT Group owns 30.00% of NNEG's shares. No shares held by PTT's related parties with potential conflicts.	–
Suez Environmental Services Co., Ltd. (SES)	2.48	PTT Group owns 40.00% of SES's shares. No shares held by PTT's related parties with potential conflicts.	–
Others	6.07		
Associates			
Bangpa-in Cogeneration Co., Ltd. (BIC)	6.83	PTT Group owns 25.00% of BIC's shares. No shares held by PTT's related parties with potential conflicts.	–
Thai Petroleum Pipeline Co., Ltd. (Thappline)	1.56	PTT Group owns 49.59% of Thappline's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Dr. Buranin Rattanasombat, is Thappline's director.
Others	0.64		
Other Related Party			
Ratchaburi Power Co., Ltd. (RPCL)	31.80	PTT Group owns 15.00% of RPCL's shares. No shares held by PTT's related parties with potential conflicts.	PTT's executive, Mr. Worawat Pitayasiri, is RPCL's director.
Total	**7,372.46**		

Short-Term Loans

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
ARUN PLUS Co., Ltd. (ARUN PLUS)	2,729.19	Wholly owned by PTT Group.	PTT's director, Professor Dr. Thosaporn Sirisumphand, is the Chairman of the Board of ARUN PLUS. PTT's directors, namely Mr. Danucha Pichayanan, M.L. Chayothid Kridakon, are directors of ARUN PLUS. PTT's director/ executive, Mr. Auttapol Rerkpiboon, is a director of ARUN PLUS. PTT's executive, Mr. Noppadol Pinsupa, is a director of ARUN PLUS.
PTT LNG Co., Ltd. (PTTLNG)	1,615.32	Wholly owned by PTT Group.	PTT's executive, Mr. Atikom Terbsiri, is the Chairman of the Board of PTTLNG's.
PTT Tank Terminal Co., Ltd. (PTT TANK)	990.22	Wholly owned by PTT Group.	PTT's executive, Mr. Kris Imseng, is the Chairman of the Board of PTT TANK. PTT's executive, M.L. Peekthong Thongyai, is a director of PTT TANK.
Others	1,882.63		
Total	**7,217.36**		

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Long-Term Loans

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Treasury Center Co., Ltd. (PTT TCC)	49,489.92	Wholly owned by PTT Group.	PTT's executive, Mrs. Chanamas Sasnanand, is a director of PTT TCC.
Total	**49,489.92**		

Liabilities under Leases due within One Year

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiary			
PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	1.50	Wholly owned by PTT Group.	PTT's executive, Mr. Terdkiat Prommool, is the Chairman of the Board of PTT DIGITAL.
Others	1.38		
Joint Venture			
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	431.12	PTT Group owns 50.00% of TTM(T)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Total	**434.00**		

Liabilities under Long-Term Leases

Related Party	2021 (THB million)	Relationship	
		Shareholding (As of December 31, 2021)	Management (As of December 31, 2021)
Subsidiaries			
Business Services Alliance Co., Ltd. (BSA)	1.24	Wholly owned by PTT Group.	PTT's executive, Mr. Terdkiat Prommool, is BSA's Chairman of the Board. PTT's executive, Mr. Suchat Ramarch, is BSA's director.
EVME PLUS Co., Ltd. (EVME PLUS)	0.11	Wholly owned by PTT Group.	–
Joint Venture			
Trans Thai-Malaysia (Thailand) Co., Ltd. (TTM(T))	2,695.91	PTT Group owns 50.00% of TTM(T)'s shares. No shares held by PTT's related parties with potential conflicts.	–
Total	**2,697.26**		

9.2.4 PTT's Connected Transactions Resulted from the Following Agreements with Key Conditions Being Summarized below:

(1) Transactions between PTT and state enterprises

Transactions

- **Sales of natural gas**

PTT signed gas sales agreements (GSAs) with a state enterprise, the Electricity Generating of Thailand (EGAT). During January - September 2021, there were 2 GSAs as follows:

1. GSA between PTT and EGAT, dated June 19, 2020.
2. GSA for Nam Phong Power Plant between PTT and EGAT, dated February 2, 2006.

However, PTT and EGAT settled on the terms of the new GSA to replace GSA No. 2. The new GSA has been in effect since October 2021, and as a result, there are currently 2 GSAs as follows:

1. GSA between PTT and EGAT, dated June 19, 2020.
2. GSA for Nam Phong Power Plant between PTT and EGAT, dated September 20, 2021.

Remark: PTT has a liquefied natural gas purchase agreement with EGAT dated October 1, 2021, in accordance with the ERC's resolution, which is applicable from October 2021 until the conclusion of EGAT's liquefied natural gas imports by 2021.

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- **Sales of fuels and petroleum products**

The ministerial regulation prescribing state-promoted or state-supported supply and procurement procedures through the selection and specific procurement methods B.E. 2560 (2017), Division 7, required central and provincial government agencies and state enterprises (excluding EGAT) to purchase state-supported energy and natural resource supply of 10,000 liters or more by specific procurement methods from PTT, or otherwise, they can buy such supply through selection or invitation to bid. Currently, PTT sells fuels to the following state enterprises which still insisted on buying fuels from PTT: Bangkok Mass Transit Authority (BMTA), State Railway of Thailand (SRT), EGAT, and the Transport Company Limited. As for state enterprises having outstanding payments, PTT could charge interest at the rate according to the contractual terms.

(2) Transactions between PTT and PTT Exploration and Production Public Company Limited (PTT's Subsidiary)

Transactions

PTTEP and its subsidiaries produce and sell crude oil, natural gas, condensate, and liquefied petroleum gas (LPG). PTT was the major buyer of these in 2021 (68% by volume). PTT had a 25-30-year long-term natural gas purchase arrangement with PTTEP, including annual minimum contractual volumes. PTT also engaged into crude oil and condensate supply agreements with PTTEP, while selling natural gas to PTTEP. PTT's petroleum product pricing to PTTEP is consistent with global market prices and identical to the project partners' selling prices to PTT. PTT obtains fuel from PTTEP at competitive standard reference prices and under sensible conditions.

Normal business transactions or those supporting normal business transactions

Item	Amount as of December 31, 2021	Justification and Sensibility
1.1 Sale of petroleum products Natural gas 598,805.49 million cubic feet Crude oil 13.58 million barrels Condensate 12.29 million barrels Liquefied petroleum gas 67,662.24 metric tons	THB 151,070 million	Pricing of petroleum products aligns with global market prices and identical to the project partners' selling prices sold to PTT.
1.2 Purchase of fuels Natural gas 16.57 million cubic feet	THB 4.29 million	PTTEP's Board of Directors approved a 5-year (2019 - 2023) fuel supply agreement with PTT. The prices under the agreement were based on competitive standard reference market prices and sensible terms.

(3) Transactions between PTT and Petrochemical and Refining Affiliates

Transactions

PTT signed crude oil, condensate and feedstock supply agreements, refined and petrochemical product purchase agreements and gas sales agreements for process feedstock with its petrochemical and refining affiliates. PTT also signed LPG sales agreement, service agreement for storage and distribution of refined products, leases and subleases of oil terminals for its subsidiaries in the oil and retail business. The purchase price is the market price of the business as summarized below.

(4) Transactions between PTT and its affiliates of the New Business and Infrastructure Business Group Transactions and contracts with Global Power Synergy Public Company Limited (GPSC)

PTT signed a Gas Sales Agreement with GPSC to feed gas for power generation, which is considered as a normal business transaction, with prices and conditions based on competitive standard referenced market prices.

9.2.5 Sensibility of Connected Transactions

Procurement of goods, raw materials, or services from related entities aims to maximize mutual benefits in business operations within PTT Group and support national energy security. Such transactions are regarded as normal business practices. The volume of goods or raw materials bought or sold by PTT or services provided or received by related parties are in accordance with PTT's needs and business operations. Such prices and services are as agreed in contracts, leading to commercial benefit to both PTT and related parties without any benefits transferring or irregular transaction.

9.2.6 Policy Relating to Future Connected Transactions

PTT's future connected transactions will be conducted as part of its normal businesses without special favors or transfers of benefit between PTT, subsidiaries, associated companies, related companies, and shareholders. Pricing policy will continue to be at arm's length, and the prices of products supplied by PTT's subsidiaries will be at the market-based. Disclosure of connected transactions are according to SEC's and SET's regulations and the accounting standard for related parties/ entities disclosures announced by the Federation of Accounting Professions.

9.2.7 Appraisal Price for Related Transactions

-None-

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Details of Financial Report, see in
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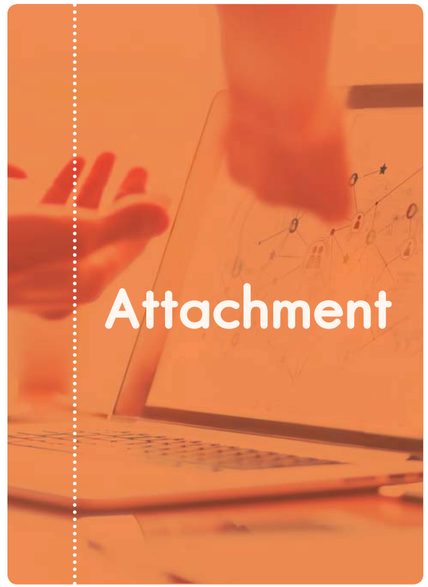

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PTT Board of Directors

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1. Professor Dr. Thosaporn Sirisumphand
   Independent Director/ Chairman
2. POL. GEN. Rungroj Sangkram
   Independent Director/
   Chairman of the Audit Committee
3. Mr. Don Wasantapruek
   Independent Director/
   Chairman of the Nominating Committee/
   Authorized Director
4. GEN. Teerawat Boonyawat
   Independent Director/
   Chairman of the Remuneration Committee
5. Mr. Danucha Pichayanan
   Independent Director/
   Chairman of the Corporate Governance Committee
6. M.L. Chayotid Kridakon
   Director/
   Chairman of the Enterprise Risk Management Committee/
   Authorized Director
7. Mr. Krishna Boonyachai
   Independent Director/
   Member of the Audit Committee

8. Associate Professor Dr. Chayodom Sabhasri
   Independent Director/ Member of the Audit Committee
9. Mr. Payong Srivanich
   Independent Director/
   Member of the Remuneration Committee/
   Member of the Nominating Committee
10. Mr. Krisada Chinavicharana
    Director/ Member of the Remuneration Committee
11. Mr. Jatuporn Buruspat
    Independent Director/
    Member of the Corporate Governance Committee/
    Member of the Enterprise Risk Management Committee
12. Mrs. Premrutai Vinaiphat
    Director/
    Member of the Enterprise Risk Management Committee
13. Mr. Phongsthorn Thavisin
    Director/ Member of the Nominating Committee/
    Authorized Director
14. Associate Professor Dr. Narongdech Srukhosit
    Independent Director/
    Member of the Corporate Governance Committee
15. Mr. Auttapol Rerkpiboon
    Director/ Secretary to the Board/ Authorized Director/
    President and Chief Executive Officer

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PTT Executives

As of December 31, 2021

1. Mr. Auttapol Rerkpiboon
   President and Chief Executive Officer
2. Mr. Atikom Terbsiri
   Chief Operating Officer,
   Upstream Petroleum and Gas Business Group
3. Mr. Kris Imsang
   Chief Operating Officer,
   Downstream Petroleum Business Group
4. Mr. Noppadol Pinsupa
   Chief New Business and Infrastructure Officer
5. Miss Pannalin Mahawongtikul
   Chief Financial Officer
6. Mr. Terdkiat Prommool
   Senior Executive Vice President,
   Corporate Strategy and Sustainability
7. Mr. Suchat Ramarch
   Senior Executive Vice President,
   Organization Effectiveness and Corporate Governance
8. Miss Peangpanor Boonklum
   Senior Executive Vice President,
   Office of General Counsel
9. Mr. Wuttikorn Stithit
   Senior Executive Vice President, Gas Business Unit
10. M.L. Peekthong Thongyai
    Senior Executive Vice President,
    Downstream Business Group Alignment
11. Mr. Disathat Panyarachun
    Senior Executive Vice President, International Trading Business Unit

12. Dr. Buranin Rattanasombat
    Senior Executive Vice President, Innovation and New Ventures
13. Mr. Chansak Chuenchom
    Senior Executive Vice President, Engineering and Infrastructure
14. Mr. Montri Rawanchaikul
    Chief Executive Officer,
    PTT Exploration and Production Public Company Limited
15. Dr. Kongkrapan Intarajang
    Chief Executive Officer,
    PTT Global Chemical Public Company Limited
    (Changed the name of the position to
    Chief Executive Officer and President,
    effective from January 1, 2022)
16. Mr. Wirat Uanarumit
    Chief Executive Officer and President,
    Thai Oil Public Company Limited
17. Mr. Chawalit Tippawanich
    President and Chief Executive Officer,
    IRPC Public Company Limited
18. Mr. Worawat Pitayasiri
    President and Chief Executive Officer,
    Global Power Synergy Public Company Limited
19. Miss Jiraphon Kawswat
    Acting President and Chief Executive Officer,
    PTT Oil and Retail Business Public Company Limited
20. Mrs. Chanamas Sasnanand
    Executive Vice President, Group Corporate Finance and Strategy
21. Miss Wilaiwan Kanjanakanti
    Executive Vice President, Group Accounting and Tax Policy
22. Miss Jaroonsri Wankertphon
    Executive Vice President, Global Business Services

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Professor Dr. Thosaporn Sirisumphand
Independent Director/ Chairman
Age (Year) 61

- Appointed as Independent Director
  November 6, 2020
- Appointed as Chairman
  November 18, 2020

(%) of Share Possession

0.000063
(own 0;
spouse 0.000063)

Family Relationship among Directors and Executives

-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
Education • Bachelor of Public Administration (Honors), Chulalongkorn University • Master of Public Administration, Pi Alpha Alpha (National Honor Society for Public Affairs and Administration), Northern Illinois University, USA • Ph.D. in Policy Analysis, Public Administration and Comparative Politics, Northern Illinois University, USA **Certification** • Director Certification Program (DCP 80/2006), Finance for Non-Finance Directors (FND 30/2006), Director Certification Program Update (DCPU 4/2015), Thai Institute of Directors Association (IOD) • Capital Market Academy Leader Program, (Class of 10th), Capital Market Academy (CMA) • The Program for Senior Executives on Justice Administration, Batch 15, Judicial Training Institute, National Justice Academy	August 23, 2018 - November 30, 2020	Director/ Chairman	Thai Oil Public Company Limited
	July 1, 2018 - September 30, 2020	Director and Chairman of Corporate Governance Committee	Bank of Thailand
	June 29, 2018 - September 30, 2020	Secretary General	Office of the National Economic and Social Development Council (NESDC)
	Octotber 2016 - June 28, 2018	Secretary General	Office of the Public Sector Development Commission (OPDC)
	2014 - September 2016	Advisor	Prime Minister's Office
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	November 6, 2020 - Present	Independent Director, PTT Public Company Limited	
	November 18, 2020 - Present	Chairman, PTT Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	March 12, 2019 - Present	Chairman of the Board, Tourism Authority of Thailand	
	June 28, 2021 - Present	Director, ARUN PLUS Company Limited	
	July 5, 2021 - Present	Chairman, ARUN PLUS Company Limited	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
• Certificate, Executive Program in Energy Literacy for a Sustainable Future, Class of 4th, Thailand Energy Academy (TEA) • Corporate Governance: Effectiveness and Accountability in the Boardroom 2014, Kellogg School of Management, Northwestern University, USA • IOD Chairman Forum: "The Role of Chairman in Leading Strategic Risk Oversight" • Global Anti-corruption and Integrity Forum 2018, OECD, Paris, France • Seminar: "How to Transform Your Business to Become an Exponential Company in a Digital Era", Faculty of Commerce and Accountancy, Chulalongkorn University • IOD Chairman Forum: "Leading Boardroom Through Disruption: What Directors Should Know?"	**Other Experiences/ Other Activities (In the Previous Year)**		
	December 25, 2018 - Present	Member of Council of State	
	January 29, 2016 - Present	Member of Chulalongkorn University Council	
	July 29, 2020 - Present	Commission Member, Office of the Public Sector Development Commission (OPDC)	
	November 17, 2020 - Present	Director, National Science and Technology Development Board	
	December 1, 2020 - Present	Director, National Strategy Committee	
	June 5, 2018 - Present	Advisor to the Board, Thailand Institute of Justice (Public Organization)	

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POL. GEN. Rungroj Sangkram
Independent Director/
Chairman of the Audit Committee
Age (Year) 62

- Appointed as Independent Director
  July 3, 2020
- Appointed as Chairman of the Audit Committee
  June 17, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Art, Public Administration, Faculty of Social Science, (Class of 34th), Royal Police Cadet Academy • Master of Art, Faculty of Social Science, Kasetsart University **Certification** • Director Certification Program (DCP 298/2020), Risk Management Program for Corporate Leaders (RCL 23/2021) and Financial Statements for Directors (FSD 44/2021), Thai Institute of Directors Association (IOD) • Diploma, The National Defence Course (Class of 53rd), National Defence College • Advanced Police Administration Program (Class of 23rd), Institute of Police Administration Development	2016 - 2019	Deputy National Police Chief	Royal Thai Police
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	July 3, 2020 - Present	Independent Director, PTT Public Company Limited	
	June 17, 2021 - Present	Chairman of the Audit Committee, PTT Public Company Limited	
	April 9, 2021 - June 17, 2021	Chairman of the Corporate Governance Committee, PTT Public Company Limited	
	December 17, 2020 - April 9, 2021	Member of the Nominating Committee, PTT Public Company Limited	
	July 3, 2020 - April 9, 2021	Member of the Remuneration Committee, PTT Public Company Limited	
	July 10, 2020 - Present	Independent Director/ The Corporate Governance Committee, Asset World Corp Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Mr. Don Wasantapruek
Independent Director/ Chairman of the Nominating Committee/
Authorized Director
Age (Year) 63

- Appointed as Independent Director
  July 26, 2014, April 11, 2016 (re-elected),
  April 11, 2019 (re-elected)
- Appointed as Chairman of the Nominating Committee
  December 23, 2018
- Appointed as Authorized Director
  August 19, 2016

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Industrial Engineering, University of New South Wales, Sydney, Australia • Master of Industrial Engineering, University of New South Wales, Sydney, Australia **Certification** • Director Accreditation Program (DAP 117/2015), Role of the Nomination and Governance Committee Program (RNG 7/2015), Thai Institute of Directors Association (IOD) • Thailand's 5th National Conference on Collective Action Against Corruption "Tackling Corruption through Public-Private Collaboration" (October 16, 2014) • Certificate, Executive Program in Energy Literacy for a Sustainable Future (Class of 6th), Thailand Energy Academy (TEA) • Seminar "Incorporation of State Investment Corporation" (July 13, 2015) • Briefing on International Anti-Corruption... International Cases and Practices, IOD (October 14, 2015) • Seminar Anti-Corruption: Leadership Role of the Board in Driven the Organization toward the Draft of the Development of Corporate Governance and Enterprise Management Act...and Good Corporate Governance (October 17, 2016) • PTT Board Briefing	2018 - 2019	Director to the Nomination and Remuneration Committee	PTT Global Chemical Public Company Limited
	2015 - 2018	Director to the Corporate Governance Committee	PTT Global Chemical Public Company Limited
	2014 - 2018	Member of the Corporate Governance Committee	PTT Public Company Limited
	2009 - Present	Self-employed	-
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	2014 - Present	Independent Director, PTT Public Company Limited	
	December 23, 2018 - Present	Chairman of the Nominating Committee, PTT Public Company Limited	
	November 1, 2015 - Present	Independent Director, PTT Global Chemical Public Company Limited	
	November 1, 2019 - Present	Chairman of the Nomination and Remuneration Committee, PTT Global Chemical Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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GEN. Teerawat Boonyawat
Independent Director/
Chairman of the Remuneration Committee
Age (Year) 61

- Appointed as Independent Director
  April 11, 2019
- Appointed as Chairman of the Remuneration Committee
  April 11, 2019

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science Program, Chulachomklao Royal Military Academy • Master of Business Administration, Kasetsart University **Certification** • Director Accreditation Program (DAP 169/2020) and Director Certification Program (DCP 303/2021), Thai Institute of Directors Association (IOD) • Diploma, The National Defence Course (Class of 58th), National Defence College • Joint War College (Class of 41st)	October 2020 - September 2021	Deputy Commander-in-Chief	Royal Thai Army
	October 2018 - September 2020	Member of Board of Directors	Defence Technology Institute
	October 2018 - September 2020	Secretary, General	Internal Security Operations Command (ISOC)
	2018 - September 2020	Chief of Staff	Royal Thai Army
	2017	Deputy Chief of Staff	Royal Thai Army
	2012 - September 2021	Royal Guard	
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	April 11, 2019 - Present	Independent Director/ Chairman of the Remuneration Committee, PTT Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Mr. Danucha Pichayanan
Independent Director/
Chairman of the Corporate Governance Committee
Age (Year) 51

- Appointed as Independent Director
  April 12, 2018
  April 9, 2021 (re-elected)
- Appointed as Chairman of the Corporate Governance Committee
  June 17, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering, Chulalongkorn University • M.S. Engineering Management, George Washington University, USA **Certification** • Director Certification Program (DCP 211/2015), Thai Institute of Directors Association (IOD) • Certificate, Executive Program in Energy Literacy for a Sustainable Future (Class of 10th), Thailand Energy Academy (TEA) • Certificate, The Civil Service Executive Program for Senior Civil Servants (Class 78/2013), Office of the Civil Service Commission • Senior Executive Certificate in Anti-Corruption Strategic Management (Class 7/2016), Office of the National Anti-Corruption Commission	October 1, 2020 - Present	Secretary General	Office of the National Economic and Social Development Council (NESDC)
	October 1, 2016 - September 30, 2020	Deputy Secretary General	Office of the National Economic and Social Development Council (NESDC)
	2019 - January 31, 2020	Director/ Member of the Risk Management Committee/ Chairman of the Steering Committee of TG MRO Campus Project and TG Business Development at U-Tapao Airport Project	Thai Airways International Public Company Limited
	April 25, 2018 - April 11, 2019	Member of the Enterprise Risk Management Committee	PTT Public Company Limited
	2016 - June 2019	Board Member	Broadcasting and Telecommunications Research and Development Fund for the Public Interest (BTFP)
	2016 - June 2019	Sub-Committee of the Project Evaluation and Research Fund	Broadcasting and Telecommunications Research and Development Fund for the Public Interest (BTFP)
	2016 - June 2019	Sub-Committee of the Research Fund Policy and Strategic	Broadcasting and Telecommunications Research and Development Fund for the Public Interest (BTFP)

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)	
	Time Period	Position / Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)	
	April 12, 2018 - Present	Independent Director, PTT Public Company Limited
	June 17, 2021 - Present	Chairman of the Corporate Governance Committee, PTT Public Company Limited
	May 20, 2021 - June 17, 2021	Member of the Nominating Committee/ Member of the Corporate Governance Committee, PTT Public Company Limited
	April 11, 2019 - May 20, 2021	Member of the Audit Committee, PTT Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)	
	2013 - Present	Director, Provincial Electricity Authority
	October 1, 2020 - Present	Director, Bank of Thailand
	June 28, 2021 - Present	Director, ARUN PLUS Company Limited
	Other Experiences/ Other Activities (In the Previous Year)	
	October 12, 2020 - Present	Board Member, The Board of Investment of Thailand (BOI)
	2020 - Present	Director, National Science and Technology Development Board
	2020 - Present	Member of EEC Policy Committee, Eastern Economic Corridor (EEC)
	2020 - Present	Secretary, Private Sector Business Advisory Committee, Center for COVID-19 Situation Administration Office of the National Economic and Social Development Council
	2020 - Present	Director, Government Pension Fund
	2015 - Present	Member, Public Service Obligation Committee

M.L. Chayotid Kridakon
Director/ Chairman of the Enterprise Risk Management Committee/ Authorized Director
Age (Year) 54

- Appointed as Director December 16, 2020
- Appointed as Chairman of the Enterprise Risk Management Committee May 1, 2021
- Appointed as Authorized Director June 17, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Economy History, University of London, UK **Certification** • Corporate Governance for Capital Market Intermediaries (CGI 12/2016), Thai Institute of Directors Association (IOD) • Top Executive Program (Class of 4th), Capital Market Academy (CMA)	October 1, 2009 - November 18, 2020	Managing Director	JPMorgan Securities (Thailand) Limited
	October 1, 2009 - November 18, 2020	Director	JPMorgan Securities (Thailand) Limited
	October 1, 2009 - November 18, 2020	Senior Country Officer	JPMorgan Chase Bank
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	December 16, 2020 - Present	Director, PTT Public Company Limited	
	May 1, 2021 - Present	Chairman of the Enterprise Risk Management Committee, PTT Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	January 5, 2021 - August 10, 2021	Chairman of the Board, National Telecom Public Company Limited	
	August 1, 2004 - Present	Director, The Thai Silk Company Limited	
	May 11, 2007 - November 19, 2021	Member of Assets Management Committee, Vajiravudh College	
	June 28, 2021 - Present	Director, ARUN PLUS Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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Mr. Krishna Boonyachai
Independent Director/ Member of the Audit Committee
Age (Year) 57

- Appointed as Independent Director
  July 3, 2020
- Appointed as Member of the Audit Committee
  July 3, 2020

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Economic, Faculty of Economics, Kasetsart University • Graduate Diploma Program of Management Project Management, Muban Chombueng Rajabhat University **Certification** • Director Certification Program (DCP 288/2020), Advanced Audit Committee Program (AACP 38/2020), Role of the Chairman Program (RCP 46/2020), Risk Management Program for Coporate Leaders (RCL 22/2021), Ethical Leadership Program (ELP 23/2021), Successful Formulation & Execution of Strategy (SFE 36/2021), and Director Leadership Certification Program (DLCP 3/2021), Thai Institute of Directors Association (IOD) • Top Executive Program (Class of 24th), Capital Market Academy (CMA) • Top Executive Program in Commerce and Trade (TEPCoT) (Class of 11th), Commerce Academy, The University of the Thai Chamber of Commerce	2010 - 2020	Chief Relationship Officer	Thai Management Association (TMA)
	2020 - July 2020	Sub-Committee on Corporate Governance and Corporate Social Responsibility	Metropolitan Waterworks Authority
	2014 - 2016	Director, Industrial Engineering	The Engineering Institute of Thailand Under H.M. The King's Patronage
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	July 3, 2020 - Present	Independent Director/ Member of the Audit Committee, PTT Public Company Limited	
	December 12, 2020 - Present	Independent Director/ Chairman/ Member of Audit Committee, TQR Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	2020 - March 2, 2021	Independent Director/ Member of the Audit Committee, Primo Service Solutions Company Limited	
	May 1, 2021 - Present	Independent Director/ Chairman/ Member of the Audit Committee, Euro Asia Total Logistics Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	Chief Consulting Officer, Nuttabhum Foundation	
	2020 - Present	Chief Consulting Officer, TKI Perpetual Company Limited	
	2019 - Present	Sub-Committee on Supporting the Affairs of Commerce, Committee of Commerce and Industry, The Senate	
	2020 - Present	Sub-Committee on Monitoring National Reform on Economic, Committee on Monitoring National Reform on Economics, Monetary and Finance, The Senate	

Associate Professor Dr. Chayodom Sabhasri
Independent Director/ Member of the Audit Committee
Age (Year) 57

- Appointed as Independent Director
  April 9, 2021
- Appointed as Member of the Audit Committee
  May 20, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Economics (Second Class Honor), Chulalongkorn University • Diploma in Economics, The London School of Economics and Political Science, University of London, UK • M.Sc. Economics, The London School of Economics and Political Science, University of London, UK • Ph.D. Economics, University of Wisconsin-Madison, USA **Certification** • Director Accreditation Program (DAP 155/2018), Advanced Audit Committee Program (AACP 33/2019), Board Nomination and Compensation Program (BNCP 7/2019), Director Certification Program (DCP 271/2019), Driving Company Success with IT Governance (ITG 16/2021) and Ethical Leadership Program (ELP 23/2021), Thai Institute of Directors Association (IOD)	1994 - Present	Professor in the Faculty of Economics	Chulalongkorn University
	2012 - 2016	Dean of the Faculty of Economics	Chulalongkorn University
	2019 - 2020	Executive Director, Technology Development Fund for Education (EDTECH Fund)	Ministry of Education
	2015 - 2020	Investment Sub-Committee, Government Pension Fund (GPF)	Ministry of Finance
	2018 - 2019	Head of the Working Group for Review of Laws, Regulatory Guillotine Unit Projects	Thailand Development Research Institute (TDRI)
	2017 - 2019	Subcommittee of Personnel Management System Development in Higher Education Institutions	Office of the Higher Education Commission, Ministry of Education
	2019 - 2020	Sub-Performance Agreement Committee (Sub-PAC for SFIs)	State Enterprise Policy Office (SEPO), Ministry of Finance
	2016 - 2018	Sub-Performance Agreement Committee (Sub-PAC for SFIs)	State Enterprise Policy Office (SEPO), Ministry of Finance
	2012 - 2018	Performance Agreement Committee for State Owned Enterprises (PAC)	State Enterprise Policy Office (SEPO), Ministry of Finance

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• Senior Executive Program in Energy Science (Class of 14th), Thailand Energy Academy (TEA) • Diploma, National Defence College, The National Defence Course (Class of 57th) • Top Executive Program (Class of 17th), Capital Market Academy (CMA) • Corporate Governance for Directors and Senior Executives of State Enterprises and Public Organizations Program (Class of 6th), King Prajadhipok's Institute, State Enterprise Policy Office and Office of the Public Sector Development Commission	**Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)**		
	April 9, 2021 - Present	Independent Director, PTT Public Company Limited	
	May 20, 2021 - Present	Member of the Audit Committee, PTT Public Company Limited	
	April 9, 2021 - May 20, 2021	Member of the Nominating Committee, PTT Public Company Limited	
	April 22, 2021 - Present	Independent Director, Kiatnakin Phatra Bank Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	1999 - Present	Director, Meyer Industries Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	Expert members on the Board National Urban Planning Policy, Ministry of Interior	
	2021 - Present	Subcommittee on the Board National Urban Planning Policy, Ministry of Interior	
	2020 - Present	Subcommittee on the implementation of the Act, Private higher education institution 2003, Ministry of Higher Education, Science, Research and Innovation	
	2020 - Present	Governance and Ethics Committee, Burapha University	
	2020 - Present	Subcommittee to consider the amendment of laws that impede people's occupation and business operations, Strategic Transformation Office	
	2020 - Present	Member of the Risk Oversight Committee, Academic Committee on Economic and Monetary Affairs, The Securities and Exchange Commission (SEC)	
	2019 - Present	Academic Committee on Economic and Monetary Affairs, Parliament (Senate)	
	2018 - Present	Honorary Committee, Member of the Public Debt Management Policy and Supervision Committee (MPO), Ministry of Finance	
	2017 - Present	Evaluation Committee, Thai Health Promotion Foundation	
	2016 - Present	Member of Chulalongkorn University Council, Chulalongkorn University	

Mr. Payong Srivanich
Independent Director/
Member of the Nominating Committee/
Member of the Remuneration Committee
Age (Year) 53

- Appointed as Independent Director
  April 9, 2021
- Appointed as Member of the Nominating Committee
  April 9, 2021
- Appointed as Member of the Remuneration Committee
  April 9, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)	
	Time Period	Position / Organization/ Company
Education • BS in Industrial Engineering, University of Arizona, Tucson, Arizona, USA • MBA, University of Pittsburgh, Pennsylvania, USA **Certification** • Director Certification Program (DCP 223/2016), Thai Institute of Director Association (IOD) • Cybersecurity, Cyber Resilience & Privacy Risk in the Era of Digital Transformation 2018, ACIS Professional Center • Training and Development for High Executive Project, Royal Thai Police • TIJ Executive Program on the Rule of Law and Development: RoLD 2019 Thailand Institute of Justice (TIJ) • Security Awareness 2021, Krung Thai Bank Public Company Limited	November 8, 2016 - Present	President Krung Thai Bank Public Company Limited
	July 8, 2020 - March 9, 2021	Corporate Secretary Krung Thai Bank Public Company Limited
	2015 - 2016	Senior Executive Vice President - Head of Global Markets Group Krung Thai Bank Public Company Limited
	2016	Director Krungthai-AXA Life Insurance Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)	
	April 9, 2021 - Present	Independent Director/ Member of the Remuneration Committee/ Member of the Nominating Committee, PTT Public Company Limited
	November 8, 2016 - Present	Executive Director/ Member of the Risk Oversight Committee/ President, Krung Thai Bank Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)	
	2020 - Present	Chairman, National Digital ID Company Limited
	2017 - Present	Chairman, National ITMX Company Limited
	2021 - Present	Director, KTB Advisory Company Limited
	Other Experiences/ Other Activities (In the Previous Year)	
	2020 - Present	Chairman, Thai Bankers' Association
	2020 - Present	Private Sector Committee, Board of the Office of SMEs Promotion, The Office of SMEs Promotion

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	Time Period	Position	Organization/ Company
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	Director, National Strategic Committee, Office of the National Economic and Social Development Council	
	2020 - Present	Director, Eastern Economic Corridor (EEC) Policy Committee, Eastern Economic Corridor (EEC)	
	2020 - Present	Director, Commission Policy on Private Participation in State Affairs, State Enterprise Policy Office	
	2020 - Present	Director, Private business advisory board under Center for COVID-19 Situation Administration (CCSA), Office of the National Economic and Social Development Council	
	2020 - Present	Committee, The Board of Anti-Corruption Organization of Thailand Foundation, Anti-Corruption Organization of Thailand Foundation	
	2020 - Present	Advisor, Bureaucracy System Development Subcommittee about Studying and Setting Guidelines the Thailand National Digital Trade Platform Office of the Public Sector Development Commission	
	2020 - Present	Committee, Capital Market Development Commission, Fiscal Policy Office	
	2020 - Present	Chairman, Analyze and Propose Economic Management Measures in the Urgent Period Subcommittee under the Executive Committee on Economic Situation Affected by the Coronavirus 2019 Outbreak, Office of the National Economics and Social Development Council	
	2020 - Present	Director, Payment Systems Committee (PSC), Bank of Thailand	
	2020 - Present	Board Member, Thailand Board of Investment (BOI)	
	2020 - Present	Co-Chairmen, The Joint Standing Committee on Commerce, Industry and Banking (JSCCIB)	
	2020 - Present	Chairman, Development of Database Systems and Information Technology in Public Financial Institutions Subcommittee	
	2020 - Present	Director, The ASEAN Bankers Association (ABA)	
	2019 - Present	Senior Expert Committee, The National Financial Institution Development Board	
	2018 - Present	The MOF Big Data Steering Committee, Ministry of Finance	

Mr. Krisada Chinavicharana
Director/ Member of the Remuneration Committee
Age (Year) 58

- Appointed as Director
  October 1, 2021
- Appointed as Member of the Remuneration Committee
  October 1, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • LL.B., Chulalongkorn University, Bangkok, Thailand • M.B.A., University of New Haven, USA **Certification** • Director Certification Program (DCP 184/2014), Thai institute of Directors Association (IOD) • Executive Program (56/2017), Office of the Civil Service Commission • Thailand National Defence College Graduate of Year 2011 (Batch 54th) • Project of Senior Executives Improvement: Executive of State Agencies (ESA 2) 2010, Office of the Civil Service Commission • Financial Instrument and Markets 2004, Harvard Business School • Certificate, Leadership Program (Class 18), Capital Market Academy • The Executive Program in Energy Literacy for a Sustainable Future TEA Class 11, Thailand Energy Academy • Proactive and Integrated Justice Management (Class 4/2006), Office of Justice Affairs	2020 - Present	Permanent Secretary	Ministry of Finance
	2018 - 2020	Director General	Thai Customs, Ministry of Finance
	2017 - 2018	Director General	The Excise Department, Ministry of Finance
	2015 - 2018	Director	Bangchak Corporation Public Company Limited
	2014 - 2017	Executive Director	The Fiscal Policy Office, Ministry of Finance
	2017 - 2019	Director	Bank for Agriculture and Agricultural Cooperatives
	2015 - 2019	Director	Deposit Protection Agency (DPA)
	2018	Director	PTT Public Company Limited
	2016 - 2017	Director	Muang Thai Insurance Public Company Limited
	2014 - 2017	Director	Bank of Thailand
	2014 - 2017	Director	Aeronautical Radio of Thailand Ltd.
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2021 - Present	Director/ Member of the Remuneration Committee, PTT Public Company Limited	
	January 25, 2019 - January 20, 2021	Director/ Member of the Nomination Committee, Airports of Thailand Public Company Limited	
	April 22, 2020 - January 20, 2021	Member of the Remuneration Committee, Airports of Thailand Public Company Limited	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	January 28, 2021 - September 30, 2021	Director,	Bangchak Corporation Public Company Limited
	2020 - September 30, 2021	Director,	BCPG Public Company Limited
	February 7, 2020 - Present	Director,	Krung Thai Bank Public Company Limited
	October 28, 2020 - Present	Chairman,	Krung Thai Bank Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	2015 - 2021	Director,	Erawan Hotel Public Company Limited
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	Director,	Government Pension Fund
	2020 - Present	Director,	The Securities and Exchange Commission, Thailand

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Mr. Jatuporn Buruspat
Independent Director/ Member of the Corporate Governance Committee/ Member of the Enterprise Risk Management Committee
Age (Year) 57

- Appointed as Independent Director
  April 9, 2021
- Appointed as Member of the Corporate Governance Committee
  April 9, 2021
- Appointed as Member of the Enterprise Risk Management Committee
  May 1, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Arts in Political Science, Chulalongkorn University • Master of Arts in Political Science, Chulalongkorn University • Master of Science (Forest Resource and Environment Administration), Kasetsart University **Certification** • Director Certification Program (DCP 129/2010), Thai Institute of Directors Association (IOD) • Diploma, National Defence College, The National Defence Course (Class 55) • The Executive Program in Energy Literacy for a Sustainable Future (Class of 15th), Thailand Energy Academy (TEA)	2019 - Present	Permanent Secretary	Ministry of Natural Resources and Environment
	2017 - 2019	Director-General, Department of Marine and Coastal Resources	Ministry of Natural Resources and Environment
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	April 9, 2021 - Present	Independent Director/ Member of the Corporate Governance Committee,	PTT Public Company Limited
	May 1, 2021 - Present	Member of the Enterprise Risk Management Committee,	PTT Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	August 11, 2015 - January 7, 2021	Independent Director,	TOT Public Company Limited
	Other Experiences/ Other Activities (In the Previous Year)		
	2019 - Present	Chairman of the Board,	Forest Industry Organization
	2019 - Present	Director,	Highland Research and Development Institute (Public Organization)
	2019 - Present	Director,	Biodiversity - Based Economy Development Office (Public Organization)

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Mrs. Premrutai Vinaiphat
Director/
Member of the Enterprise Risk Management Committee
Age (Year) 59

- Appointed as Director
  July 3, 2020
- Appointed as Member of the Enterprise Risk Management Committee
  July 3, 2020

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science (Geology), Chiang Mai University • Master of Engineering (Mineral Economics), McGill University, Montreal, Canada **Certification** • Director Certification Program (DCP 269/2019), Risk Management Program for Corporate Leaders (RCL 20/2020), Boardroom Success through Financing and Investment (BFI 9/2020), Thai Institute of Directors Association (IOD) • Certificate, Executive Program in Energy Literacy for Sustainable Future, (Class of 13th), 2019, Thailand Energy Academy (TEA) • The Program of Senior Executives on Justice Administration (Class of 22nd), Judicial Training Institute • Leadership 4.0 Program, The ICT Society for Social Development Association • Diploma, National Defence College, The National Defence Course (Class 57/2014), National Defence College of Thailand (NDC)	October 1, 2020 - Present	Deputy Permanent Secretary	Ministry of Energy
	2019 - 2020	Inspector General	Ministry of Energy
	Febuary 18, 2019 - July 15, 2020	Director/ Director to the Risk Management Committee	PTT Global Chemical Public Company Limited
	2018 - 2019	Director-General	Department of Mineral Fuels, Ministry of Energy
	2018	Inspector General	Ministry of Energy
	2018	Independent Director and Member of the Corporate Governance and Social Responsibility Committee	Ratchaburi Electricity Generating Holding Public Company Limited
	2016 - 2017	Deputy Director-General	Department of Mineral Fuels, Ministry of Energy
	2015 - 2016	Director	Petroleum Concession Management Bureau, Department of Mineral Fuels, Ministry of Energy

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)	
	Time Period	Position / Organization/ Company
• World Fiscal Systems for Oil and Gas, UK • Executive Development Program "Leadership with Vision and Virtue" (Class of 71st), Office of the Civil Service Commission • Development of Management Competency and Leadership Program for Talent Network "Leadership & Change", Office of the Civil Service Commission, Japan • Top Level Energy Administration (Class of 2nd), Ministry of Energy • International Petroleum Management Certificate Program, USA • Law of the Sea, Malaysia • Managing Managers in the Energy Industry, USA	**Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)**	
	July 3, 2020 - Present	Director/ Member of the Enterprise Risk Management Committee, PTT Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)	
	-	-
	Other Experiences/ Other Activities (In the Previous Year)	
	-	-

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Mr. Phongsthorn Thavisin
Director/
Member of the Nominating Committee/ Authorized Director
Age (Year) 62

- Appointed as Director
  October 8, 2021
- Appointed as Member of the Nominating Committee
  October 8, 2021
- Appointed as Authorized Director
  December 16, 2021

(%) of Share Possession
0.000035
(own 0.000035;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science (Petroleum and Natural Gas Engineering), The Pennsylvania State University, USA **Certification** • Director Certification Program (DCP 223/2016) and Director Leadership Certification Program (DLCP 3/2021), Thai Institute of Directors Association (IOD) • Capital Market Leader Program (Class of 27th), Capital Market Academy • Energy Literacy Leadership Program (Class of 7th), Thailand Energy Academy • Senior Executive Program (SEP-19), Sasin Graduate Institute of Business Administration of Chulalongkorn University • Advanced Naval Studies Program (Class 40/2008), Institute of Advanced Naval Studies • PTT Group EVP Leadership Development, PTT • PTT Executive Leadership, General Electric, GE, New York, USA • Breakthrough Program for Senior Executive, IMD • The National Defense Course (2013 - 2014), Thai National Defense College • Director's Briefing - Corporate Strategy beyond the Crisis, a Chairman/ Board Perspective, Bain & Company, Inc. • CERAWeek 2019 in Houston, Texas, USA	October 1, 2020 - September 30, 2021	Chief Executive Officer	PTT Exploration and Production Public Company Limited
	January 1, 2019 - September 30, 2020	Senior Executive Vice President, PTT, Reporting to Chief Operating Officer, Upstream Petroleum and Gas Business Group working on a secondment as President and Chief Executive Officer	PTT Exploration and Production Public Company Limited
	January 1, 2019 - September 30, 2020	Director/ President and Chief Executive Officer	PTT Exploration and Production Public Company Limited
	October 1, 2018 - December 31, 2018	Director/ Chief Executive Officer	PTT Exploration and Production Public Company Limited
	October 1, 2018 - December 31, 2018	Senior Executive Vice President, PTT, working on a secondment as Chief Executive Officer	PTT Exploration and Production Public Company Limited
	November 1, 2017 - September 30, 2018	President, Exploration and Production/ Acting Executive Vice President, Business Transformation and Organization Group	PTT Exploration and Production Public Company Limited
	January 1, 2016 - October 31, 2017	Chief Operating Officer, Production Asset and Operations Support Group/ Acting Executive Vice President, Operations Support Group	PTT Exploration and Production Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 8, 2021 - Present	Director/ Member of the Nominating Committee, PTT Public Company Limited	
	October 1, 2018 - September 30, 2021	Director, PTT Exploration and Production Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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Associate Professor Dr. Narongdech Srukhosit
Independent Director/
Member of the Corporate Governance Committee
Age (Year) 43

- Appointed as Independent Director
  October 8, 2021
- Appointed as Member of the Corporate Governance Committee
  October 8, 2021

(%) of Share Possession
0.000005
(own 0;
spouse 0.000005)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
Education • Bachelor of Law (First Class Honours), Chulalongkorn University • LL.M., University of Cambridge, UK • Ph.D. (Doctor of Philosophy (Law)), University of Edinburgh, UK **Certification** -	2001 - Present	Associcate Professor	Facalty of Law, Chulalongkorn University
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 8, 2021 - Present	Independent Director/ Member of the Corporate Governance Committee, PTT Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	2016 - Present	Director, C & C International Venture Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2019 - Present	Expert in Administrative Law, The Stock Exchange of Thailand	
	2020 - Present	Director, Board of Student Development Policy Chulalongkorn University Council	
	2017 - Present	Ditector, Committee of Undergraduate's Complain and Appeal, Chulalongkorn University	
	2016 - Present	Director, Chulalongkorn University Intellectual Property Institute	
	2019 - Present	Director, Committee of Evaluation of University Executive Performance, Suan Dusit University Council	
	2018 - Present	Subcommittee on the Regulatory Screening for Political Parties, Office of The Election Commission of Thailand	
	2018 - Present	Subcommittee on Appeal Screening, Accounting Professions Governance Committee, Department of Business Development Ministry of Commerce	
	2019 - Present	Subcommittee of Law, Neighbouring Countries Economic Development Cooperation Agency	
	2017 - Present	Editor, Asian Journal of Comparative Law (Cambridge University Press)	

Mr. Auttapol Rerkpiboon
Director/ Secretary to the Board/ Authorized Director/
President and Chief Executive Officer
Age (Year) 56

- Appointed as Director/ Secretary to the Board
  May 13, 2020
  April 9, 2021 (re-elected)
- Appointed as Authorized Director
  May 13, 2020
- Appointed as President and Chief Executive Officer, PTT Public Company Limited
  May 13, 2020

(%) of Share Possession
0.000939
(own 0.000788;
spouse 0.000151)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
Education • Bachelor of Engineering (Civil Engineering), Chulalongkorn University • Master of Economics Program, National Institute of Development Administration • Diploma of Petroleum Management, College of Petroleum Studies, Oxford, England (British Council Scholarship) **Certification** • Director Certification Program (DCP 173/2013), Company Secretary Program (CSP 14/2005), Thai Institute of Directors Association (IOD) • Executive Development Program (EDP), (Class of 1st), Thai Listed Companies Association (TLCA) • The National Defence Course (Class of 58th), National Defence College • Advanced Certificate Course in Politics and Governance in Democratic System for Executives, (Class of 14th), King Prajadhipok's Institute • Capital Market Academy Leadership Program, (Class of 20th), Capital Market Academy (CMA)	May 13, 2020 - Present	President and Chief Executive Officer	PTT Public Company Limited
	October 1, 2017 - May 12, 2020	Chief Operating Officer, Downstream Petroleum Business Group (October 1, 2017 - September 30, 2018 Acting Senior Executive Vice President, Downstream Business Group Alignment, PTT)	PTT Public Company Limited
	December 12, 2018 - May 12, 2020	Chairman	PTT Tank Terminal Company Limited
	April 11, 2018 - July 31, 2020	Director/ Chairman of the Risk Management Committee/ Member of the Nomination and Remuneration Committee	Thai Oil Public Company Limited
	September 29, 2020 - December 22, 2020	Advisor	Committee of Red Cross Lottery Tickets Supporting the Thai Red Cross Society 2020
	May 1, 2018 - July 16, 2020	President	Marketing Association of Thailand

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 12th), Thailand Energy Academy (TEA) • Executive Program on Rule of Law and Development: RoLD (Class of 2nd), Thailand Institute of Justice (TIJ) • NIDA-Wharton Executive Leadership Program 2009, The Wharton School of the University of Pennsylvania, USA • PTT Executive Leadership, General Electric, GE, New York, USA • Rule of Law for Democracy (Class of 8th), College of the Constitutional Court	October 6, 2017 - September 29, 2020	Director	The Royal Automobile Association of Thailand under Royal Patronage
	October 1, 2015 - October 1, 2018	Director/ Director to the Corporate Governance Committee/ Director to the Risk Management Committee	PTT Global Chemical Public Company Limited
	November 2015 - September 2017	Chairman	PTT Retail Management Company Limited
	October 1, 2015 - September 30, 2017	Senior Executive Vice President - Oil Business Unit	PTT Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	May 13, 2020 - Present	Director/ Secretary to the Board/ President and Chief Executive Officer, PTT Public Company Limited	
	August 1, 2020 - Present	Director, PTT Exploration and Production Public Company Limited	
	December 22, 2015 - Present	Chairman, PTT Oil and Retail Business Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	June 28, 2021 - February 15, 2022	Director, ARUN PLUS Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	October 9, 2020 - Present	Committee Member, Suan Luang Rama IX Foundation	
	October 2, 2020 - Present	Advisory Board, The Institute of Energy for Industry	
	Jun 2020 - Present	Committee Member, Ruamchit Normklao Foundation for Thai Youth under the patronage of H.R.H. the Queen	
	July 27, 2018 - Present	Committee Member, Payment Systems Committee (PSC), Bank of Thailand	
	November 6, 2016 - Present	Vice President, Swimming Association Thailand	
	2019 - Present	Honorary Advisor, The National Institute of Development Administration Alumni Association under the Royal Patronage (NIDA)	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Other Experiences/ Other Activities (In the Previous Year)		
	March 2020 - Present	Expert Committee of NIDA Council, The National Institute of Development Administration (NIDA)	
	2018 - Present	Honorary Advisor, Thai-Laos Business Council	
	May 29, 2020 - Present	Member of Trustee, Petroleum Institute of Thailand	
	May 13, 2020 - Present	Vice Chairman, Thailand Energy Academy	
	May 2020 - Present	Committee Member, OUR Khung BangKachao	
	May 13, 2020 - Present	Committee Member, Green Globe Institute	
	June 8, 2020 - Present	Chairman, Power of Innovation Foundation	
	August 24, 2020 - Present	Chairman, Power For Sustainable Future Foundation	
	August 31, 2020 - Present	Expert Committee of Vidyasirimedhi Institute Council, Vidyasirimedhi Institute of Science and Technology (VISTEC)	
	May 22, 2020 - Present	President, PTT Group Employee Association	
	May 13, 2020 - Present	Advisory Board, PTT Natural Gas Business Saving Co-Operative, Limited	
	March 25, 2021 - Present	Director, Thai Foundation	
	November 9, 2021 - Present	Promoting Social Cooperation Committee, Princess Maha Chakri Award Foundation	
	June 8, 2020 - July 20, 2021	Chairman, Power of Learning Foundation	
	November 12, 2021 - December 27, 2021	Advisory Committee of Fund Raising Committee, Thai Red Cross Society, Chulalongkorn University	
	June 30, 2021 - December 31, 2021	Managing Director, Thai Red Cross Society 2021	

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Mr. Atikom Terbsiri
Chief Operating Officer,
Upstream Petroleum and Gas Business Group
Age (Year) 59

- Appointed as Chief Operating Officer, Upstream Petroleum and Gas Business Group September 1, 2019

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Business Administration, Assumption University • Master of Business Administration (Finance & International Business), High Distinction, Armstrong University, USA **Certification** • Director Certification Program (DCP 125/2009), Risk Management Program for Corporate Leaders (RCL 4/2016), Role of the Chairman Program (RCP 41/2017), Thai Institute of Directors Association (IOD) • Executive Education Program, Harvard Business School, Harvard University, USA • Advanced Security Management Program, (Class of 1st), National Defence College • The State, Private Sector and Political Sectors Course, (Class of 5th), National Defence College • Capital Market Academy Leader Program, (Class of 17th), Capital Market Academy (CMA) • Certificate, Executive Program on Energy Literacy for a Sustainable Future, (Class of 6th), Thailand Energy Academy (TEA)	September 1, 2019 - Present	Chief Operating Officer, Upstream Petroleum and Gas Business Group	PTT Public Company Limited
	October 1, 2019 - December 31, 2019	Chairman	Sakari Resources Limited
	January 9, 2018 - August 31, 2019	Executive Director	Thailand Swimming Association
	February 2018 - February 2019	Chairman of Petroleum Refining Industry Club	The Federation of Thai Industries
	April 2017 - April 2019	Director	Thai Listed Companies Association
	2015 - August 31, 2019	Member of the Risk Management Committee	Global Power Synergy Public Company Limited
	2014 - August 31, 2019	Director	Global Power Synergy Public Company Limited
	May 18, 2015 - August 31, 2019	Member of Council	Vidyasirimedhi Institute of Science and Technology
	2014 - August 31, 2019	Director/ Member of the Risk Management Committee and the Secretary to the Board of Directors	Thai Oil Public Company Limited
	October 1, 2014 - August 31, 2019	Senior Executive Vice President, PTT, working on a secondment as President and Chief Executive Officer	Thai Oil Public Company Limited

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• Crisis Management Course, PLLI, PTT • Seminar: Anti-corruption: Leadership Role of the Board • Seminar: 2018 PTIT Annual Dinner: Clean Energy and Smart Transportation: Global Trend for Sustainable World	2014 - September 14, 2019	Chairman	TOP SPP Company Limited
	2014 - August 31, 2019	Chairman	Thai Lube Base Public Company Limited
	2014 - August 31, 2019	Chairman	Thaioil Marine Company Limited
	2014 - August 31, 2019	Chairman	Thaioil Solvent Company Limited
	2014 - August 31, 2019	Chairman	Thaioil Power Company Limited
	2014 - August 31, 2019	Chairman	LABIX Company Limited
	2014 - August 31, 2019	Chairman	Thai Paraxylene Company Limited
	2014 - March 29, 2019	Chairman	TOP Solvent Company Limited
	November 20, 2014 - August 31, 2019	Director	Power of Innovation Foundation and Power of Learning Foundation
	2012 - August 31, 2019	Member of Trustee (as Company representative)	Petroleum Institute of Thailand
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2019 - Present	Director/ Member of the Risk Management Committee, PTT Exploration and Production Public Company Limited	
	January 1, 2020 - Present	Director, Global Power Synergy Public Company Limited	
	June 18, 2020 - Present	Member of the Nomination and Remuneration Committee, Global Power Synergy Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	October 1, 2019 - Present	Chairman, PTT LNG Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2018 - Present	Member, Backdoor Listing Transaction Committee, The Stock Exchange of Thailand	
	2018 - Present	Director, The Federation of Thai Industries (Term 2018 - 2020 and Term 2020 - 2022)	
	January 31, 2012 - Present	Executive Director, Thailand Energy Academy	

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Mr. Kris Imsang
Chief Operating Officer,
Downstream Petroleum Business Group
Age (Year) 56

- Appointed as Chief Operating Officer, Downstream Petroleum Business Group June 1, 2020

(%) of Share Possession
0.00035
(own 0.00035;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Civil Engineering), Chulalongkorn University **Certification** • The Role of the Board in IT Governance, Year 2020 and Director Certification Program (DCP 139/2010), Thai Institute of Directors Association (IOD) • Leadership Development Program III, (Class of 2nd), PTT Leadership and Learning Institute (PLLI) • Certificate in Top Executives in the PoomPalungPandin Program, Chulalongkorn University • Top Executive Program, (Class of 23rd), Capital Market Academy (CMA) • Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 9th), Thailand Energy Academy (TEA) • Diploma, National Defence College, The National Defence Course, Class 62, Thailand National Defence College • Certificate Course in Good Governance for Medical Executives, King Prajadhipok's Institute and the Medical Council of Thailand	June 1, 2020 - Present	Chief Operating Officer, Downstream Petroleum Business Group	PTT Public Company Limited
	November 1, 2019 - May 31, 2020	Senior Executive Vice President, Downstream Business Group Alignment	PTT Public Company Limited
	January 23, 2019 - February 5, 2020	Vice Chairman	Power For Sustainable Future Foundation
	November 8, 2018 - October 31, 2020	Chairman	Social Enterprise Club
	February 28, 2019 - July 13, 2020	Committee	Vidyasirimedhi Institute of Science and Technology
	October 1, 2018 - October 31, 2019	Senior Executive Vice President, Corporate Governance and Regulatory Affairs	PTT Public Company Limited
	2017 - 2019	Member of Corporate Governance Committee	IRPC Public Company Limited
	December 2018 - October 31, 2019	Director	Sport Services Alliance Company Limited
	September 8, 2017 - October 31, 2019	Chairman	Sarn Palung Social Enterprise Company Limited
	December 23, 2015 - November 30, 2019	Chairman	Energy Complex Company Limited
	July 2, 2019 - October 31, 2019	Strategic Committee	Anti-Corruption and Good Governance Enhancement (Term 2019 - 2020)
	August 9, 2019 - October 31, 2019	Executive Board	Green Globe Institute
	August 9, 2019 - October 31, 2019	Member	Green Globe Institute
	July 18, 2019 - October 31, 2019	Sustainable OUR Khung BangKaChao Working Team	OUR Khung BangKaChao
	July 3, 2019 - October 31, 2019	Sustainable OUR Khung BangKaChao Advisory Board	OUR Khung BangKaChao
	July 11, 2018 - October 31, 2019	Chairman	Water Resource Management Committee (TBCSD)
	March 30, 2016 - August 31, 2019	Committee	Kamnoetvidya Science Academy
	January 1, 2018 - September 30, 2018	Senior Executive Vice President, Organization Management and Sustainability	PTT Public Company Limited
	February 1, 2016 - December 31, 2017	Senior Executive Vice President, Human Resources and Organization Excellence	PTT Public Company Limited
	2017 - 2019	Advisor	Chulalongkorn University Alumni Association
	2015 - 2017	Deputy Secretary General (Term 2015 - 2017)	Chulalongkorn University Alumni Association
	2015 - January 31, 2016	Executive Vice President, Retail Marketing	PTT Public Company Limited

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	Time Period	Position	Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	December 2, 2017 - Present	Director, IRPC Public Company Limited	
	January 19, 2021 - Present	Chairman, IRPC Public Company Limited	
	March 2019 - January 18, 2021	Member of the Nomination and Remuneration Committee, IRPC Public Company Limited	
	January 21, 2021 - Present	Director, PTT Oil and Retail Business Public Company Limited	
	January 27, 2021 - Present	Member of the Nomination and Remuneration Committee, PTT Oil and Retail Business Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	September 11, 2020 - Present	Chairman, PTT Tank Terminal Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	August 22, 2019 - Present	Honorary Board Member, Social Enterprise Promotion Board	
	August 20, 2020 - Present	Vice President - FTI Academy Board Jobs, The Federation of Thai Industries (Term 2020 - 2022)	
	June 1, 2020 - Present	Executive Director, Thailand Energy Academy	
	February 2021 - Present	Board of Trustees, Sirindhorn International Institute of Technology (SIIT)	

Mr. Noppadol Pinsupa
Chief New Business and Infrastructure Officer
Age (Year) 57

- Appointed as Chief New Business and Infrastructure Officer
  October 1, 2021
  (Changed the name of the position from Chief Technology and Engineering Officer with effect from October 1, 2021)

(%) of Share Possession
0.001519
(own 0.000476;
spouse 0.001043)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Electrical Engineering), Chulalongkorn University • Master of Engineering (Electrical Engineering), Chulalongkorn University **Certification** • Director Certification Program (DCP 146/2011), Financial Statements for Directors (FSD 12/2011), Thai Institute of Directors Association (IOD) • Leadership Development Program III, PTT Leadership and Learning Institute • Breakthrough Program For Senior Executives International Leading Business School (IMD), Lausanne, Switzerland • Assessor Training Program, Thailand Quality Award (TQA) • Seminar “Briefing on International Anti-Corruption…International Cases and Practices” (October 14, 2015), Thai Institute of Director Association (IOD) • Mitsui-Harvard Business School Global Management Academy 2015 Japan - USA • G-20Y Summit 2015 France	October 1, 2021 - Present	Chief New Business and Infrastructure Officer (Changed the name of the position from Chief Technology and Engineering Officer with effect from October 1, 2021)	PTT Public Company Limited
	December 1, 2020 - September 30, 2021	Senior Executive Vice President, Innovation and Digital	PTT Public Company Limited
	July 3, 2020 - November 30, 2020	Senior Executive Vice President, PTT, reporting to Chief Operating Officer, Downstream Petroleum Business Group working on a secondment as President and Chief Executive Officer	IRPC Public Company Limited
	July 3, 2020 - November 30, 2020	Director/ Member of the Risk Management Committee/ President and Chief Executive/ Secretary of the Board of Directors	IRPC Public Company Limited

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• Program for Senior Executive on Justice Administration, (Class of 19th/2014), Judicial Training Institute • Top Executives Program, (Class of 22nd), Capital Market Academy (CMA) • The National Defence Course, (Class of 60th), National Defence College • Executive Program on Rule of Law and Development (RoLD Program), Thailand Institute of Justice (TIJ) (2017) • Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 14th), Thailand Energy Academy (TEA)	February 1, 2019 - July 3, 2020	Senior Executive Vice President, PTT, reporting to Chief Operating Officer, Downstream Petroleum Business Group working on a secondment as President	IRPC Public Company Limited
	February 1, 2019 - July 3, 2020	Director/ Member of the Risk Management Committee/ President/ Secretary of the Board of Directors	IRPC Public Company Limited
	May 2019 - November 2020	Chairman	IRPC Oil Company Limited
	March 2019 - November 2020	Director	IRPC Oil Company Limited
	March 2019 - December 2020	Chairman	IRPC A&L Company Limited
	March 2019 - November 2020	Chairman	IRPC Technology Company Limited
	March 2019 - December 2020	Chairman	iPolymer Company Limited
	January 2019 - November 2020	Director	UBE Chemicals (Asia) Public Company Limited
	August 2019 - November 2020	Vice Chairman	PTT Energy Solutions Company Limited
	February 1, 2019 - November 30, 2020	Executive Director	Thailand Energy Academy
	November 1, 2019 - December 24, 2020	Member of Vidyasirimedhi Institute Council	Vidyasirimedhi Institute of Science and Technology (VISTEC)
	February 2019 - August 2019	Chairman	PTT Energy Solutions Company Limited
	October 2017 - January 2019	Chairman	PTT Global LNG Company Limited
	2017	Chairman	PTT LNG Company Limited

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	2015 - January 30, 2019	Director/ Member of the Risk Management Committee	Thai Oil Public Company Limited
	October 1, 2015 - January 31, 2019	Senior Executive Vice President, Gas Business Unit	PTT Public Company Limited
	2014 - 2018	Chairman	PTT Natural Gas Distribution Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	December 1, 2020 - January 19, 2021	Director/ Member of the Corporate Governance Committee, IRPC Public Company Limited	
	January 20, 2021 - September 30, 2021	Director/ Member of the Nomination and Remuneration Committee, IRPC Public Company Limited	
	April 7, 2021 - September 30, 2021	Director/ Member of the Corporate Governance Committee, PTT Oil and Retail Business Public Company Limited	
	October 1, 2021 - Present	Director/ Director to the Nomination and Remuneration Committee, PTT Global Chemical Public Company Limited	
	November 1, 2021 - Present	Director/ Member of the Nomination and Remuneration Committee/ Chairman of the Risk Management Committee, Global Power Synergy Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	December 2, 2020 - January 30, 2021	Chairman, PTT Digital Solutions Company Limited	
	December 4, 2020 - October 18, 2021	Director, Alpha Com Company Limited	
	April 2019 - January 2021	Chairman, IRPC Polyol Company Limited	
	January 4, 2021 - October 18, 2021	Chairman, Global Renewable Power Company Limited	
	June 28, 2021 - Present	Director, ARUN PLUS Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2019 - Present	Advisor, Chulalongkorn University Alumni Association Under The Royal Patronage of His Majesty The King (Term 2019 - 2021)	
	March 3, 2021 - November 17, 2021	Member of the Executive Committee, Vidyasirimedhi Institute of Science and Technology	

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Miss Pannalin Mahawongtikul
Chief Financial Officer
Age (Year) 57

- Appointed as Chief Financial Officer
  October 1, 2018
  (The person supervising Finance and Accounting)

(%) of Share Possession
0.001009
(own 0.001009)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Accounting, Thammasat University • Master of Business Administration, Thammasat University **Certification** • Director Certification Program (DCP 279/2019) and Strategic Board Master Class (SBM 9/2020), Thai Institute of Directors Association (IOD) • Capital Market Academy Leader Program, (Class of 24th), Capital Market Academy (CMA) • Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 15th), Thailand Energy Academy (TEA) • Leadership Succession Program (LSP), (Class of 6th), Institute of Research and Development for Public Enterprises • CMA-Greater Mekong Subregion (CMA-GMS), (Class of 1st), Capital Market Academy • PTT-HBS Leadership Development Program II, Harvard Business School	October 1, 2018 - Present	Chief Financial Officer	PTT Public Company Limited
	May 8, 2018 - September 30, 2018	Director	PTTEP Energy Holding (Thailand) Company Limited
	January 1, 2016 - September 30, 2018	Executive Vice President, PTT, working on a secondment as Executive Vice President, Finance and Accounting Group	PTT Exploration and Production Public Company Limited
	January 1, 2016 - September 30, 2018	Director	Energy Complex Company Limited
	January 1, 2016 - September 30, 2018	Director	PTTEP Canada International Finance Limited
	January 1, 2016 - March 19, 2017	Director	PTTEP Australia International Finance Pty Ltd.
	October 20, 2014 - February 1, 2016	Director	PTT Green Energy Pte. Ltd.
	September 1, 2014 - February 1, 2016	Director	PTT Regional Treasury Center Pte. Ltd.

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)	
	Time Period	Position / Organization/ Company
• NIDA-Wharton Executive Leadership Program (ELP), The Wharton School, University of Pennsylvania • Executive Program for Senior Management (EX-PSM), (Class of 3rd), Fiscal Policy Research Institute Foundation • Executive Development Program (EDP) (Class of 2nd), Thai Listed Companies Association • Leadership Development Program (LDP) III, PTT Leadership and Learning Institute (PLLI) • E-learning CFO's Refresher Course 2020, The Stock Exchange of Thailand • The Resilient Leader (TIJ Executive Program on the Rule of Law and Development), RoLD 2020	**Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)**	
	October 1, 2018 - Present	Director/ Member of the Risk Management Committee, Thai Oil Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)	
	-	-
	Other Experiences/ Other Activities (In the Previous Year)	
	October 1, 2018 - Present	Executive Director, Thailand Energy Academy
	January 2019 - Present	Club President, Thai Investor Relations Club
	November 1, 2019 - Present	Member of Vidyasirimedhi Institute of Science and Technology Council For Short: Member of VISTEC Council
	March 3, 2021 - Present	Member of VISTEC Executive Committee
	March 3, 2021 - Present	Chairman of VISTEC Finance and Budget Sub-Committee
	April 27, 2021 - Present	Director/ Member of the Audit Committee, Thai Listed Companies Association (TLCA)

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Mr. Terdkiat Prommool
Senior Executive Vice President, Corporate Strategy and Sustainability
Age (Year) 56

- Appointed as Senior Executive Vice President, Corporate Strategy and Sustainability October 1, 2021
  (Changed the name of the position from Senior Executive Vice President, Corporate Strategy with effect from October 1, 2021)

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
Education • Bachelor of Engineering in Chemical Engineering, Chulalongkorn University • Master of Engineering in Industrial & Manufacturing Systems Engineering, The University of Missouri, Columbia, USA **Certification** • Director Certification Program (DCP 223/2016), Thai Institute of Directors Association (IOD) • Leadership Succession Program (LSP), (Class 10/2019), Institute of Research and Development for Public Enterprises (IRDP)	October 1, 2021 - Present	Senior Executive Vice President, Corporate Strategy and Sustainability (Changed the name of the position from Senior Executive Vice President, Corporate Strategy with effect from October 1, 2021)	PTT Public Company Limited
	October 1, 2020 - September 30, 2021	Senior Executive Vice President, Organization Management and Sustainability	PTT Public Company Limited
	2018 - September 30, 2020	Executive Vice President, PTT, working on a secondment as Managing Director	PTT Digital Solutions Company Limited
	2015 - 2018	Executive Vice President, Planning and Risk Control	PTT Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2020 - Present	Director, Thai Oil Public Company Limited	
	April 23, 2021 - Present	Director/ Member of the Nomination and Remuneration Committee, Thai Oil Public Company Limited	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	**Position**	**Organization/ Company**
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	October 1, 2018 - September 30, 2020, and February 1, 2021 - Present	Committee Member,	PTT Digital Solutions Company Limited
	April 1, 2021 - Present	Chairman,	PTT Digital Solutions Company Limited
	October 1, 2020 - Present	Chairman,	Business Services Alliance Company Limited
	October 1, 2020 - January 31, 2021	Chairman,	Business Professional Solutions Recruitment Company Limited (Former company name: "Business Professional Solutions Company Limited", changed to the current name on December 30, 2020)
	November 3, 2021 - Present	Chairman,	Alpha Com Company Limited
	Other Experiences/ Other Activities (In the Previous Year)		
	November 23, 2021 - Present	Member of the Executive Committee,	Vidyasirimedhi Institute of Science and Technology
	March 3, 2021 - November 17, 2021	Member of the Human Resource Committee,	Vidyasirimedhi Institute of Science and Technology

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Mr. Suchat Ramarch
Senior Executive Vice President,
Organization Effectiveness and Corporate Governance
Age (Year) 53

- Appointed as Senior Executive Vice President, Organization Effectiveness and Corporate Governance October 1, 2021
  (Changed the name of the position from Senior Executive Vice President, Organization Management and Sustainability with effect from October 1, 2021)

(%) of Share Possession
0.000563
(own 0.000563;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering, Rajamangala University of Technology Krungthep • Master of Art (Social Development Administration), National Institute of Development Administration **Certification** • Director Certification Program (DCP 176/2013), Thai Institute of Directors Association (IOD) • Corporate Governance for Directors and Senior Executives of Regulators, State Enterprises and Public Organizations, Class 22/2020, King Prajadhipok's Institute • Top Executive Program, Class 28/2019, Capital Market Academy (CMA) • Leadership Development Program III (2562), PTT Leadership and Learning Institute (PLLI) • Advance Certificate Course in Public Administration and Law for Executives, King Prajadhipok's Institute, Class 13/2014 • Management Development Program III (2013), PTT Leadership and Learning Institute (PLLI) • Advance Management Program II (2013), PTT Leadership and Learning Institute (PLLI) • Executive Development Program (2011), The Stock Exchange of Thailand	October 1, 2021 - Present	Senior Executive Vice President, Organization Effectiveness and Corporate Governance (Changed the name of the position from Senior Executive Vice President, Organization Management and Sustainability with effect from October 1, 2021)	PTT Public Company Limited
	2019 - September 30, 2021	Senior Executive Vice President, Non-Oil Retail Business	PTT Oil and Retail Business Public Company Limited
	2018 - 2019	Senior Executive Vice President, Retail Marketing	PTT Oil and Retail Business Public Company Limited
	2016 - 2018	Executive Vice President, Retail Marketing	PTT Public Company Limited
	2016 - 2020	Director	PTT Retail Management Company Limited
	2016 - 2017	Chairman	PTT Retail Management Company Limited
	2013 - 2017	Director	PTT (Lao) Company Limited
	2013 - 2016	Vice President, Café Amazon Store Business Management	PTT Public Company Limited

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2021 - Present	Director, Thai Oil Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	April 25, 2019 - Present	Director, Business Services Alliance Company Limited	
	November 26, 2021 - Present	Chairman, Business Professional Solutions Recruitment Company Limited (Former company name: "Business Professional Solutions Company Limited", changed to the current name on December 30, 2020)	
	April 25, 2019 - Present	Director, Business Professional Solutions Recruitment Company Limited (Former company name: "Business Professional Solutions Company Limited", changed to the current name on December 30, 2020)	
	March 29, 2021 - September 29, 2021	Director, Pluk Phak Praw Rak Mae Company Limited	
	November 20, 2020 - September 29, 2021	Chairman, Peaberry Thai Company Limited	
	October 29, 2020 - April 5, 2021	Chairman, PTT Retail Management Company Limited	
	September 30, 2020 - September 29, 2021	Chairman, PTTOR China (Shanghai) Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	November 23, 2021 - Present	Member of the Human Resource Committee, Vidyasirimedhi Institute of Science and Technology	

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Miss Peangpanor Boonklum
Senior Executive Vice President, Office of General Counsel
Age (Year) 55

- Appointed as Senior Executive Vice President, Office of General Counsel
  October 1, 2017
  (The person supervising Compliance Unit)

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Laws (Second Class Honor), Chulalongkorn University • Master of Laws (Business Law), Chulalongkorn University • Master of Laws (LL.M.), Columbia University School of Law, New York, USA **Certification** • Director Certification Program (DCP 7/2001), Anti-Corruption: The Practical Guide (ACPG 38/2017), Ethical Leadership Program (ELP 15/2019), Risk Management Program for Corporate Leaders (RCL 18/2019), Board Nomination and Compensation Program (BNCP 7/2019), Thai Institute of Directors Assoction (IOD) • Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 15th), Thailand Energy Academy (TEA) • Leadership Development Program 3 (LDP3) (Class 4/2019), PTT Leadership and Learning Institute (PLLI)	October 1, 2017 - Present	Senior Executive Vice President, Office of General Counsel	PTT Public Company Limited
	May 14, 2019 - December 31, 2020	Member of the Enterprise Risk Management Committee	PTT Oil and Retail Business Public Company Limited
	October 24, 2018 - December 31, 2020	Member of the Nomination and Remuneration Committee	PTT Oil and Retail Business Public Company Limited
	March 9, 2018 - December 31, 2020	Director	PTT Oil and Retail Business Public Company Limited
	2020	Lecturer, “Roles and Involvement of State Enterprises and Private Sectors in Reduction of Fraud”, Anti-Corruption Strategic Management for Senior Executives (Class 11/2020)	Office of The National Anti-Corruption Commission (NACC)
	2020	Advisor, “The Capital Market Regulatory Guillotine Task Force”	The Securities and Exchange Commission, Thailand (SEC)

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• TIJ Executive Program on The Rule of Law and Development (TIJ RoLD 3/2019), Thailand Institute of Justice (TIJ) • TIJ Workshop for Emerging Leaders on the Rule of Law and Policy (Class 3/2019), Thailand Institute of Justice (TIJ) • Certificate in Anti-Corruption Strategic Management for Senior Executives (Class 9/2018), Office of the National Anti-Corruption Commission • TLCA Executive Development Program (Class 1/2008), Thai Listed Companies Association (TLCA)	2019	Lecturer, “Role of the Promotion, Prevention, and Respect for Human Rights”, Certificate of Human Rights for Executives	King Prajadhipok’s Institute
	April 27, 2019 - December 31, 2019	Member of the Corporate Governance Committee	Global Power Synergy Public Company Limited
	April 3, 2017 - December 31, 2019	Director	Global Power Synergy Public Company Limited
	October 30, 2017 - September 30, 2018	Director	East Mediterranean Gas Company S.A.E.
	February 2017 - January 2018	Member - Legal Expert	Finances and Assets Policy Committee, Srinakharinwirot University
	2013 - March 15, 2018	Advisor/ Lecturer	Investment Banking Club, Association of Thai Securities Companies
	July 1, 2017 - September 30, 2017	Executive Vice President, Office of Corporate Legal	PTT Public Company Limited
	February 3 - August 31, 2017	Independent Director/ Audit Committee	Bangkok Commercial Asset Management Public Company Limited
	March 2016 - June 2017	Senior Counsel	Weerawong, Chinnavat & Partners Company Limited (Former Company Name: “Weerawong, Chinnavat & Peangpanor Company Limited”, Changed to the current name on April 3, 2017)
	2009 - February 29, 2016	Partner and Associate	Weerawong, Chinnavat & Peangpanor Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	January 20, 2021 - Present	Director, IRPC Public Company Limited	
	January 20, 2021 - March 31, 2021	Member of the Corporate Governance Committee, IRPC Public Company Limited	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	December 4, 2019 - Present	Director, Energy Complex Company Limited	
	December 4, 2019 - November 23, 2021	Chairman, Energy Complex Company Limited	
	October 21, 2021 - Present	Chairman, Global Renewable Power Company Limited*	
	November 8, 2021 - Present	Director, CU Engineering Enterprise Company Limited**	
	November 8, 2021 - Present	Director, Primate Enterprise Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	June 18, 2019 - August 18, 2021	Vice President, Chulalongkorn University Alumni Association Under the Royal Patronage of His Majesty the King (CUAA) (Term 2019 - 2021)	
	April 27, 2021 - Present	Expert Member, Subcommittee, The National Legal Education Council	
	October 28, 2021 - Present	Chairman, PTT Saving and Credit Cooperative Limited	
	November 19, 2021 - Present	President of Residence of Chulalongkorn University Alumni Association	
	August 31, 2021 - Present	Committee & Head of Legal, Chulalongkorn University Alumni Association Under the Royal Patronage of His Majesty the King (CUAA) (Term 2021 - 2023)	

Remark:

** Owned by CU Enterprise Company Limited 99.97% and CU Enterprise Company Limited owned by Chulalongkorn University 99.99%.*

*** Owned by CU Enterprise Company Limited 99.97% and CU Enterprise Company Limited owned by Chulalongkorn University 99.99%.*

Mr. Wuttikorn Stithit
Senior Executive Vice President, Gas Business Unit
Age (Year) 57

- Appointed as Senior Executive Vice President, Gas Business Unit
  February 1, 2019

(%) of Share Possession
0.000812
(own 0.000494;
spouse 0.000318)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Electrical Engineering), King Mongkut's Institute of Technology Ladkrabang • Master of Science (Industrial and System Engineering), Ohio University, USA • Master of Business Administration (Finance and Banking), Kasetsart University **Certification** • Director Certification Program (DCP 158/2012), Thai Institute of Directors Association(IOD) • Leadership Development Program III (LDP III), PTT Leadership and Learning Institute (PLLI) • Leadership Succession Program (LSP), (Class 9/2018), Institute of Research and Development for Public Enterprises (IRDP) • Senior Executive Education Program, SIBA 2017, College of Management, Mahidol University • Power of the Kingdom, (Class 4/2015) (Bhumipalung Phandin), Chula Unisearch, Chulalongkorn University • Leadership Development Program II, PTT Leadership and Learning Institute • Senior Executive Program (SEP) 2011, Sasin Graduate Institute of Business Administration of Chulalongkorn University (SASIN)	February 1, 2019 - Present	Senior Executive Vice President, Gas Business Unit	PTT Public Company Limited
	2017 - 2019	Director	TTM Sukuk Berhad
	November 1, 2015 - January 31, 2019	Executive Vice President, Natural Gas Supply and Trading	PTT Public Company Limited
	March 30, 2015 - 2019	Chairman	Trans Thai-Malaysia (Thailand) Company Limited
	March 30, 2015 - 2019	Chairman	Trans Thai-Malaysia (Malaysia) Sdn. Bhd.
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	April 1, 2019 - Present	Director, Global Power Synergy Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	September 30, 2019 - Present	Chairman, PTT Natural Gas Distribution Company Limited	
	2019 - Present	Chairman, PTT Global LNG Company Limited	
	September 22, 2021 - Present	Chairman, B.Grimm Power LNG JV Co., Ltd.	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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M.L. Peekthong Thongyai
Senior Executive Vice President,
Downstream Business Group Alignment
Age (Year) 54

- Appointed as Senior Executive Vice President, Downstream Business Group Alignment October 1, 2021

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science (Petroleum Engineering), The University of Texas at Austin • Master of Business Administration (Finance), Sasin Graduate Institute of Business Administration of Chulalongkorn University **Certification** • Director Certification Program (DCP 15/2002), Thai Institute of Directors Association (IOD)	October 1, 2021 - Present	Senior Executive Vice President, Downstream Business Group Alignment	PTT Public Company Limited
	November 1, 2016 - September 30, 2021	Executive Vice President, Downstream Business Group Alignment, PTT, working on a secondment as Acting Managing Director	PTT Tank Terminal Company Limited
	January 28, 2016 - April 26, 2019	Director	PTT Energy Resources Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2021 - Present	Director/ Director to the Risk Management Committee, PTT Global Chemical Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	November 1, 2016 - Present	Director, PTT Tank Terminal Company Limited	
	October 1, 2019 - September 30, 2021	Director, Gulf MTP LNG Terminal Company Limited	
	September 17, 2021 - Present	Director, GPC International Terminal Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Mr. Disathat Panyarachun
Senior Executive Vice President,
International Trading Business Unit
Age (Year) 57

- Appointed as Senior Executive Vice President, International Trading Business Unit October 1, 2018

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor's Degree B.A. in Ed. (Social Science), Silpakorn University • Master's Degree Master of Political Science (M.P.A.), National University, San Diego, USA **Certification** • Director Certification Program (DCP 206/2015), Ethical Leadership Program (ELP 19/2020), Thai Institute of Directors Association (IOD) • Leadership Development Program III, PTT Leadership and Learning Institute (PLLI) • The Executive Program in Energy Literacy for a Sustainable Future, Class 14, Thailand Energy Academy (TEA) • Capital Market Leader Program (Class of 30th), Capital Market Academy (CMA) • Diploma, National Defence College, The National Defence Course Class 63, National Defence College of Thailand (NDC) • Making the CEO's of Thailand, MCOT (Class 2) • Certification of Oil Futures Program, The Oxford Princeton, UK	October 1, 2018 - Present	Senior Executive Vice President, International Trading Business Unit	PTT Public Company Limited
	October 22, 2018 - October 22, 2020	Director to the Corporate Governance Committee	PTT Global Chemical Public Company Limited
	February 1, 2016 - September 30, 2018	Executive Vice President, International Trading	PTT Public Company Limited
	August 1, 2015 - January 31, 2016	Vice President acting as Executive Vice President, International Trading	PTT Public Company Limited
	2012 - 2015	Vice President, PTT, working on a secondment as Managing Director	PTT International Trading Pte. Ltd.
	November 1, 2011 - 2018	Chairman	PTT International Trading DMCC

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	Time Period	Position	Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 22, 2018 - Present	Director,	PTT Global Chemical Public Company Limited
	June 22, 2020 - Present	Director to the Risk Management Committee,	PTT Global Chemical Public Company Limited
	October 8, 2021 - Present	Director,	PTT Oil and Retail Business Public Company Limited
	October 27, 2021 - Present	Director to the Corporate Governance Committee,	PTT Oil and Retail Business Public Company Limited
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	October 24, 2016 - October 8, 2021	Chairman,	PTT International Trading London Ltd. (PTTT LDN)
	November 1, 2012 - Present	Director/ Chairman,	PTT International Trading Pte. Ltd. (PTTT) (Appointed as Acting Chairman from October 3, 2018 - January 8, 2020)
	January 9, 2020 - Present	Chairman,	PTT International Trading Pte. Ltd. (PTTT)
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Dr. Buranin Rattanasombat
Senior Executive Vice President, Innovation and New Ventures
Age (Year) 54

- Appointed as Senior Executive Vice President, Innovation and New Ventures
  October 1, 2021
  (Changed the name of the position from Senior Executive Vice President, Innovation and Digital with effect from October 1, 2021)

(%) of Share Possession
0.00075
(own 0.00075;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science, Prince of Songkhla University • MBA, Chulalongkorn University • Ph.D. (Management), Silpakorn University **Certification** • Director Certification Program (DCP 174/2013), Company Secretary Program (CSP 40/2011), Thai Institute of Directors Association (IOD) • Top Executive Program (Class of 30th), Capital Market Academy (CMA) • Public and Private Chief Innovation Leadership, National Innovation Agency • Advanced Security Management Program, (Class of 10th), The National Defence College Association of Thailand (NDCAT) • PTT Leadership Development Program (IMD Business School), PTT Leadership and Learning Institute (PLLI) • Senior Executive Education Program on Strategy and Innovation, School of Management, MIT • Leadership Succession Program (LDP8), Institute of Research and Development for Public Enterprises (IRDP)	October 1, 2021 - Present	Senior Executive Vice President, Innovation and New Ventures (Changed the name of the position from Senior Executive Vice President, Innovation and Digital with effect from October 1, 2021)	PTT Public Company Limited
	June 1, 2020 - September 30, 2021	Senior Executive Vice President, Downstream Business Group Alignment	PTT Public Company Limited
	2019 - May 2020	Senior Executive Vice President, Corporate Strategy, Innovation and Sustainability and Chief Transformation Officer (CTO)	PTT Oil and Retail Business Public Company Limited
	July 2019 - May 2020	Chairman	PTT (Cambodia) Limited
	2018 - 2020	Secretary General	Marketing Association of Thailand
	August 2018 - June 1, 2019	Chairman	PTTOR China (Shanghai) Company Limited
	October 2015 - March 2019	Chairman	Thai Lube Blending Company Limited

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• CMA-GMS International Program 2016, Capital Market Academy • Foreign Affairs Executive Programme (Class of 7th), Devawongse Varopakarn Institute of Foreign Affairs, Ministry of Foreign Affairs • PTT Leadership Development Program, Harvard Business School, USA • Advance Certificate Course in Public Administration and Law for Executives, King Prajadhipok's Institute (Class of 12th) • Executive Development Program, Thai Listed Companies Association	2018 - 2019	Senior Executive Vice President, Lubricant Business	PTT Oil and Retail Business Public Company Limited
	2016 - 2018	Vice President	Marketing Association of Thailand
	2015 - 2018	Executive Vice President, Lubricant Business	PTT Public Company Limited
	May 2017 - November 2017	Chairman	PTT Oil Myanmar Company Limited
	August 2012 - March 2017	Director	PTT (Lao) Company Limited
	April 2015 - September 2016	Director	PTT Retail Business Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	September 18, 2020 - Present	Director, Thai Oil Public Company Limited	
	September 18, 2020 - April 23, 2021	Member of the Nomination and Remuneration Committee, Thai Oil Public Company Limited	
	April 23, 2021 - May 19, 2021	Member of the Risk Management Committee, Thai Oil Public Company Limited	
	May 19, 2021 - Present	Chairman of the Risk Management Committee, Thai Oil Public Company Limited	
	October 8, 2021 - Present	Director, PTT Oil and Retail Business Public Company Limited	
	October 27, 2021 - Present	Member of the Enterprise Risk Management Committee, PTT Oil and Retail Business Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	December 2020 - Present	Chairman, Innobic (Asia) Company Limited	
	April 2017 - October 1, 2021	Director, Thappline Company Limited (November 2019 - October 2020 as Chairman, Thappline Company Limited)	
	August 25, 2021 - October 8, 2021	Chairman, Nutra Regenerative Protein Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	President Representative in IMT-GT Joint Business Council, Indonesia-Malaysia-Thailand Growth Triangle	
	2020 - Present	Vice President, Industry Promotion Division, The Federation of Thai Industries	
	2020 - Present	Director, Asia Logistics & Supply Chain Council	

Mr. Chansak Chuenchom
Senior Executive Vice President,
Engineering and Infrastructure
Age (Year) 54

- Appointed as Senior Executive Vice President, Engineering and Infrastructure
  October 1, 2021
  (New position, Senior Executive Vice President, Engineering and Infrastructure with effect from October 1, 2021)

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Mechanical Engineering), Khon Kaen University • Master of Business Administration, Kasetsart University **Certification** • Director Certification Program (DCP), Class 211/2015, Thai Institute of Directors Association (IOD) • Leadership Development Program, MDP III Business Management, MDP III People Management, Advanced Management Program (AMP) 3 - Business and People Management, PTT Leadership and Learning Institute • Leadership Develpoment Program II (LDP II), China	October 1, 2021 - Present	Senior Executive Vice President, Engineering and Infrastructure	PTT Public Company Limited
	October 1, 2015 - September 30, 2021	Executive Vice President, Engineering and Project Manangement	PTT Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 1, 2021 - Present	Director/ Member of the Nomination and Remuneration Committee, IRPC Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	April 23, 2019 - Present	Director, Energy Complex Company Limited	
	November 23, 2021 - Present	Chairman, Energy Complex Company Limited	
	April 23, 2018 - October 14, 2021	Director, Combined Heat and Power Producing Company Limited	
	December 21, 2020 - November 30, 2021	Director, Suez Environmental Services Company Limited	
	March 14, 2016 - February 25, 2021	Director, Thaioil Power Company Limited (Liquidation on February 25, 2021)	
	Other Experiences/ Other Activities (In the Previous Year)		
	November 23, 2021 - Present	Member of the Executive Committee, Vidyasirimedhi Institute of Science and Technology	

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Mr. Montri Rawanchaikul
Chief Executive Officer,
PTT Exploration and Production Public Company Limited
Age (Year) 57

- Appointed as Chief Executive Officer, PTT Exploration and Production Public Company Limited October 1, 2021

(%) of Share Possession
0.000224
(own 0.000224;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science (Physics), Chiang Mai University • Master of Applied Science (Exploration Geophysics), University of New South Wales, Australia **Certification** • Leadership Development Program III (LDP III), PTT Leadership and Learning Institute • Certificate, Executive Program in Energy Literacy for a Sustainable Future, Thailand Energy Academy (TEA) • The Corporate Governance: Regulation and Disclosure Training, The Thai Institute of Directors Association • Leadership Development Program II (LDP II), PTT Leadership and Learning Institute • EP LEAD III Leadership Development Program, IMD • CMA31, Capital Market Academy	October 1, 2021 - Present	Senior Executive Vice President, PTT, Reporting to Chief Operating Officer, Upstream Petroleum and Gas Business Group working on a secondment as Chief Executive Officer	PTT Exploration and Production Public Company Limited
	February 1, 2021 - September 30, 2021	Senior Executive Vice President, PTT, Reporting to Chief Operating Officer, Upstream Petroleum and Gas Business Group working on a secondment as President	PTT Exploration and Production Public Company Limited
	October 1, 2020 - January 31, 2021	Senior Executive Vice President, PTT, Reporting to Chief Operating Officer, Upstream Petroleum and Gas Business Group working on a secondment as President and acting as Executive Vice President, Production Asset Group	PTT Exploration and Production Public Company Limited
	January 1, 2020 - September 30, 2020	Executive Vice President, Production Asset Group	PTT Exploration and Production Public Company Limited
	September 13, 2019 - January 8, 2020	Director	PTTEP HK Holding Limited
	October 1, 2017 - December 31, 2019	Executive Vice President, Strategy and Business Development Group	PTT Exploration and Production Public Company Limited
	November 1, 2017 - September 30, 2018	Executive Vice President, Strategy and Business Development Group and Acting Senior Vice President, New Business Unit, and additional assigned as Project Champion, Spend Smart	PTT Exploration and Production Public Company Limited
	October 16, 2016 - September 30, 2017	Acting Executive Vice President, Strategy and Business Development Group	PTT Exploration and Production Public Company Limited
	September 1, 2016 - October 15, 2016	Senior Vice President, International Asset	PTT Exploration and Production Public Company Limited
	July 15, 2016 - August 31, 2016	Senior Vice President, attached to Production Asset and Operations Support Group	PTT Exploration and Production Public Company Limited
	January 1, 2015 - July 14, 2016	Senior Vice President, Australia Asset and seconded as General Manager	PTTEP Australasia Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 2021 - Present	Director/ Chief Executive Officer, PTT Exploration and Production Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	June 22, 2017 - September 30, 2021	Director, PTT Global LNG Company Limited	
	January 8, 2020 - March 1, 2021	Director, PTTEP HK Offshore Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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Dr. Kongkrapan Intarajang
Chief Executive Officer,
PTT Global Chemical Public Company Limited
Age (Year) 54

- Appointed as Chief Executive Officer, PTT Global Chemical Public Company Limited October 1, 2019 (Changed the name of the position to Chief Executive Officer and President, PTT Global Chemical Public Company Limited effective from January 1, 2022)

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Chemical Engineering) (2nd Class Honor), Chulalongkorn University • Ph.D. Chemical Engineering, University of Houston, USA **Certification** • Director Certification Program (DCP 119/2009), Role of the Chairman Program (RCP 21/2009), Thai Institute of Directors Association (IOD) • Breakthrough Program for Senior Executives, IMD Business School • Diploma, The National Defence College of Thailand, (Class of 60th) (NDC 60) • The Executive Program in Energy Literacy for a Sustainable Future, (Class of 14th), Thailand Energy Academy (TEA) • Leadership Development Program III (LDP 3) (Class 4/2019), PTT Leadership and Learning Institute (PLLI)	October 1, 2019 - Present	Senior Executive Vice President, PTT, reporting to Chief Operating Officer, Downstream Petroleum Business Group working on a secondment as Chief Executive Officer (changed the name of the position to Chief Executive Officer and President, PTT Global Chemical Public Company Limited effective from January 1, 2022)	PTT Global Chemical Public Company Limited
	November 2019 - September 2020	Director	Power of Innovation Foundation
	October 2019 - September 2020	Director	Power of Learning Foundation
	November 6, 2019 - October 20, 2020	Director	Global Green Chemicals Public Company Limited
	May 2017 - January 2020	Director	Thai Tank Terminal Limited
	April 2017 - September 30, 2019	Chief Operating Officer - Upstream Petrochemical Business	PTT Global Chemical Public Company Limited
	July 2015 - September 2019	Director/ President & CEO	PTTGC America Corporation
	April 2015 - September 2019	Director	PTTGC Innovation America Corporation
	February 2015 - September 2019	Director	PTTGC International (Netherlands) B.V.
	January 2015 - September 2019	Director	Vencorex Holding
	November 2008 - September 2019	Director	Emery Oleochemical (M) Sdn. Bhd.
	November 2008 - September 2019	Director	Emery Specialty Chemicals Sdn. Bhd.
	October 2014 - March 2017	Executive Vice President - International Business Operations	PTT Global Chemical Public Company Limited
	September 2014 - December 2018	Director	NatureWorks LLC
	September 2014 - December 2018	Director/ Vice President	PTTGC International (USA) Inc.
	Relavant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	October 21, 2020 - Present	Chairman,	Global Green Chemicals Public Company Limited
	October 1, 2019 - Present	Director/ Secretary to the Board of Directors/ Director to the Risk Management Committee/ Chief Executive Officer, PTT Global Chemical Public Company Limited	
	August 15, 2017 - Present	Director/ Member of the Risk Management Committee,	Global Power Synergy Public Company Limited

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	Time Period	Position	Organization/ Company
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	8 December 2021 - Present	Chairman, PTTGC International (Netherlands) B.V	
	September 1, 2020 - Present	Chairman, GC International Corporation (GCI)	
	July 1, 2015 - Present	Chairman, PTTGC America LLC	
	July 1, 2015 - Present	Chairman, PTTGC America Corporation	
	September 1, 2020 - Present	Chairman, PTTGC International Private Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	October 22, 2020 - Present	Director, Association of Capital Market Academy Alumni	
	October 1, 2020 - Present	Advisor of the Member Relations, the Federation of Thai Industries	
	September 30, 2020 - Present	Director, The Federation of Thai Industries	
	August 24, 2020 - March 25, 2021	Committee Member of Sustainable Energy Foundation	
	March 11, 2020 - Present	Vice President (Supporting), Thailand Swimming Association	
	January 30, 2020 - Present	Member of Vidyasirimedhi Institute Council, Vidyasirimedhi Institute of Science and Technology (VISTEC)	
	October 30, 2019 - Present	Member of Trustee, The Petroleum Institute of Thailand (PTIT)	
	October 3, 2019 - Present	Council of Trustee, Thailand Business Council of Sustainable Development (TBCSD)	
	October 1, 2019 - Present	Executive Director, Thailand Energy Academy	
	August 15, 2019 - Present	Director, Kamnoetvidya Science Academy (KVIS)	
	July 2017 - Present	Co-Chairman, France - Thailand Business Forum	
	June 14, 2021 - Present	Director and Member of the Nomination Committee and Remunerating Committee, Thai Institute of Directors Association (IOD)	
	December 29, 2021 - Present	Chairperson of Advisory Committee in relation to its investment in Allnex, PTTGC International (Netherlands) B.V	

Mr. Wirat Uanarumit
Chief Executive Officer and President,
Thai Oil Public Company Limited
Age (Year) 59

- Appointed as Chief Executive Officer and President, Thai Oil Public Company Limited
  September 1, 2019

(%) of Share Possession
0.000599
(own 0.000557;
spouse 0.000042)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Electrical Engineering), Chulalongkorn University • Master of Business Administration, with emphasis in Financial Management, Pennsylvania State University, Pennsylvania, USA **Certification** • Director Certification Program (DCP 8/2001), Director Certification Program Update (DCPU 5/2015), Audit Committee Program (ACP 38/2012), Ethical Leadership Program (ELP 7/2017), Thai Institute of Directors Association (IOD) • GE Global Customer Summit Crotonville • Member, Beta Gamma Sigma (US National Scholastic Honour Society in Business) • Advance Management Programme, INSEAD Business School, Fontainebleau, France • Advanced Management Program (Class of 184th), Harvard Business School, USA • Capital Market Academy Leader Program, (Class of 4th), Capital Market Academy (CMA)	September 1, 2019 - Present	Chief Operating Officer reporting to Chief Operating Officer, Downstream Petroleum Business Group, PTT, working on a secondment as Chief Executive Officer and President	Thai Oil Public Company Limited
	November 2019 - March 2020	Director	Thaioil Solvent Company Limited
	September 2019 - April 2020	Director/ Chairman of the Board	TOP SPP Company Limited
	September 2019 - April 2020	Director/ Chairman of the Board	Thai Lube Base Public Company Limited
	September 2019 - April 2020	Director/ Chairman of the Board	Thaioil Marine Company Limited
	October 1, 2016 - August 31, 2019	Chief Operating Officer, Upstream Petroleum and Gas Business Group	PTT Public Company Limited
	2015 - August 31, 2019	Director/ Member of the Risk Management Committee	PTT Exploration and Production Public Company Limited
	November 30, 2018 - 2019	Director/ Chairman of the Board	PTT LNG Company Limited
	October 2016 - 2019	Director	Sakari Resources Limited

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• The Programme for Senior Executives on Justice Administration, (Class of 16th), Judicial Training Institute, National Justice Academy • Advanced Security Management Program, (Class of 2nd), The National Defence College Association of Thailand (NDCAT) • Executive Development Program (EDP), (Class of 1st), Thai Listed Companies Association (TLCA) • The Joint State - Private Sector Course (Class 2013), National Defence College • Executive Management with Business Development and Investment (Class of 2nd), Institute of Business and Industrial Development (IBID) • Advanced Certificate Course in Politics and Governance in Democratic Systems for Executives, (Class of 20th), King Prajadhipok's Institute • The Rules of Law for Democracy (Class of 6th), College of the Constitutional Court • Certificate, Executive Program in Energy Literacy for a Sustainable Future, (Class of 13th), Thailand Energy Academy (TEA) • Thailand CG Forum: Governance as a Driving Force for Business Sustainability, The Stock Exchange of Thailand • Special Lecture by Dr. Prinya Hom-Anek, Special Consultant to National Cyber Security Committee: "Cybersecurity in the Boardroom"	June 2017 - October 2017	Chairman	PTT Global LNG Company Limited
	2016 - 2017	Chairman	PTT Energy Resources Company Limited
	January - September 2016	Director	Thai Oil Public Company Limited
	May 1, 2014 - September 30, 2016	Chief Financial Officer	PTT Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	September 1, 2019 - Present	Director/ Secretary to the Board of Directors/ Member of the Risk Management Committee/ Chief Executive Officer and President, Thai Oil Public Company Limited	
	September 1, 2019 - Present	Director/ Member of the Risk Management Committee, Global Power Synergy Public Company Limited	
	November 2021 - Present	Director, Ubon Bio Ethanol Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	November 2019 - Present	Director/ Chairman, Labix Company Limited	
	September 2019 - Februaty 25, 2021	Director/ Chairman of the Board, Thaioil Power Company Limited (Liquidation on February 25, 2021)	
	September 2019 - Present	Director/ Chairman of the Board, Thai Paraxylene Company Limited	
	March 2021 - Present	Director/ Chairman of the Board, Top Solvent Company Limited	
	November 2021 - Present	Director, Sapthip Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	2020 - Present	Director, The Federation of Thai Industries (FTI) (Term 2020 - 2022)	
	2020 - Present	Vice President - Economic and Academic Work, The Federation of Thai Industries (FTI)	
	2020 - Present	Director, The Joint Standing Committee on Commerce, Industry and Banking (JSCCB)	
	2020 - Present	Director, National Economic Reform Steering Committee	
	2020 - Present	Advisory Committee, Promoting and Supporting Office of Industries, The Federation of Thai Industries (FTI)	

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Other Experiences/ Other Activities (In the Previous Year)		
	March 24, 2020 - March 24, 2021	Director, Power for Sustainable Future Foundation (PSF)	
	November 2019 - Present	Member of Council, Vidyasirimedhi Institute of Science and Technology (VISTEC)	
	September 2019 - Present	Executive Director, Thailand Swimming Association (TSA)	
	September 2019 - Present	Member of Trustee (as Company Representative), Petroleum Institute of Thailand (PTIT)	
	September 2019 - Present	Council of Trustee, Thailand Business Council of Sustainable Development (TBCSD)	
	September 2019 - Present	Executive Director, Thailand Energy Academy (TEA)	
	August 2016 - Present	Advisor to the President, Association of Capital Market Academy (ACMA)	
	2013 - Present	Director/ Member of Audit Committee, Thailand Management Association (TMA)	
	April 2021 - Present	Director, Thai Listed Companies Association (TLCA)	
	December 2020 - Present	Advisory Committee of the Petroleum and Petrochemical College, Chulalongkorn University	

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Mr. Chawalit Tippawanich
President and Chief Executive Officer,
IRPC Public Company Limited
Age (Year) 59

- Appointed as President and Chief Executive Officer, IRPC Public Company Limited
  December 1, 2020

(%) of Share Possession
0.000035
(own 0.000035;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Electrical - Telecommunication Engineering) (Second-Class Honors), King Mongkut's Institute of Technology Ladkrabang • Master of Engineering (Industrial Engineering and Management), Asian Institute of Technology (AIT) **Certification** • Director Certification Program (DCP 152/2011), Thai Institute of Directors Association (IOD) • Advance Management Program (AMP 187) - Harvard Business School, Executive Education, USA • GE Energy Customer Executive Leadership Program (GE: PTT Executive Leadership) - GE Global Learning Crotonville Leadership Institute, USA • Advanced Certificate Course in Politics and Governance in Democratic Systems for Executives (Batch 23) • Top Executives in the Energy Education Program (Batch 12), Thailand Energy Academy • The Joint State-Private Sector Course (Batch 5), Police College • Leadership Development Program III (Batch 2), PTT Leadership and Learning Institute	December 1, 2020 - Present	Senior Executive Vice President, PTT, reporting to Chief Operating Officer, Downstream Petroleum Business Group working on a secondment as President and Chief Executive Officer	IRPC Public Company Limited
	January 7, 2019 - November 30, 2020	Director	Ratchaburi Power Company Limited
	November 7, 2018 - November 30, 2020	Director	Xayaburi Power Company Limited
	April 23, 2019 - November 30, 2020	Director	Glow Energy Public Company Limited
	March 15, 2019 - November 30, 2020	Director	Glow Company Limited
	March 15, 2019 - November 30, 2020	Director	Glow SPP2 Public Company
	March 15, 2019 - November 30, 2020	Director	Glow SPP3 Company Limited
	March 15, 2019 - November 30, 2020	Director	Glow IPP2 Holding Company Limited
	March 15, 2019 - November 30, 2020	Director	Glow SPP11 Company Limited
	March 15, 2019 - November 30, 2020	Director	Glow IPP Company Limited
	October 1, 2018 - November 30, 2020	Senior Executive Vice President, PTT, reporting to Chief Technology and Engineering Officer working on a secondment as President and Chief Executive Officer	Global Power Synergy Public Company Limited
	October 1, 2018 - November 30, 2020	Director/ Member of the Risk Management Committee/ Secretary to the Board/ President and Chief Executive Officer	Global Power Synergy Public Company Limited
	2017 - September 30, 2018	Executive Vice President, Downstream Business Group Alignment, PTT, working on a secondment as Executive Vice President - Organization Effectiveness	Thai Oil Public Company Limited
	2015 - 2016	Executive Vice President, Downstream Business Group Alignment, PTT, working on a secondment as President	HMC Polymers Co., Ltd. (JV with LyondellBasell)
	Relavant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	December 1, 2020 - Present	Director/ Member of the Risk Management Committee/ Secretary to the Board/ President and Chief Executive Officer, IRPC Public Company Limited	
	December 4, 2020 - Present	Director, UBE Chemicals (Asia) Public Company Limited	

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	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)	
	December 17, 2020 - Present	Chairman, iPolymer Company Limited
	December 22, 2020 - October 27, 2021	Deputy Chairman, PTT Energy Solutions Company Limited
	October 28, 2021 - Present	Chairman, PTT Energy Solutions Company Limited
	December 24, 2020 - Present	Chairman, IRPC Technology Company Limited
	December 24, 2020 - Present	Chairman, IRPC A&L Company Limited
	January 8, 2021 - Present	Chairman, IRPC Polyol Company Limited
	March 17, 2021 - Present	Chairman, IRPC Oil Company Limited
	Other Experiences/ Other Activities (In the Previous Year)	
	April 2021 - Present	Council Member Vidyasirimedhi Institute of Science and Technology
	March 2021 - Present	Advisor to the Thai Volunteer Power Club
	January 2021 - Present	Council of Trustees, Petroleum Institute of Thailand
	December 2020 - Present	Council Member/ Executive Committee, Thailand Business Council for Sustainable (TBCSD)
	December 2020 - Present	Advisory Committee of the Petroleum and Petrochemical College, Chulalongkorn University
	July 2020 - Present	Director, The Federation of Thai Industries (2020 - 2022)

Mr. Worawat Pitayasiri
President and Chief Executive Officer,
Global Power Synergy Public Company Limited
Age (Year) 55

- Appointed as President and Chief Executive Officer, Global Power Synergy Public Company Limited
December 1, 2020

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering (Chemical Engineering), Chulalongkorn University • Master of Business Administration (Management), Thammasat University **Certification** • Director Certification Program (DCP 158/2012), Thai Institute of Directors Association (IOD) • Asia Petrochemical Industry Conference (APIC) (Class 2/2017), Japan Petrochemicals Industry Association • PTT Group VP Leadership Development Program, PTT Public Company Limited • NIDA-Wharton Executive Leadership Program (Class of 2009), The Wharton School of the University of Pennsylvania, USA • Senior Executive Program (Class 26/2012), Sasin Graduate Institute of Business Administration, Chulalongkorn University • Democratic Politics and Governance for High-Level Administrators Program, (Class of 22nd), King Prajadhipok's Institute	December 1, 2020 - Present	Senior Executive Vice President, PTT, reporting to Chief New Business and nfrastructure Officer working on a secondment as President and Chief Executive Officer	Global Power Synergy Public Company Limited
	September 16, 2018 - November 30, 2020	Senior Executive Vice President, Innovation and Digital	PTT Public Company Limited
	September 19, 2018 - November 30, 2020	Director/ Member of Risk Management Committee	IRPC Public Company Limited
	March 3, 2020 - November 29, 2020	Director	Alpha Com Company Limited
	February 27, 2020 - November 29, 2020	Chairman	PTT Raise Company Limited
	September 3, 2019 - November 29, 2020	Director	PTT Digital Solutions Company Limited
	November 11, 2019 - November 29, 2020	Chairman	PTT Digital Solutions Company Limited
	November 2019 - February 17, 2020	Director	InnoSpace (Thailand) Company Limited
	February 28, 2019 - November 30, 2020	Member of the Executive Board	Vidyasirimedhi Institute of Science and Technology
	June 2019 - August 16, 2019	Director	PTT Energy Solutions Company Limited

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	November 27, 2017 - November 4, 2019	Committee	Community Partnership Association
	May 2018 - November 23, 2018	Director	PTT Tank Terminal Company Limited
	October 1, 2016 - September 15, 2018	Executive Vice President, Downstream Business Group Planning	PTT Public Company Limited
	March 31, 2016 - September 30, 2016	Executive Vice President under Senior Executive Vice President, Downstream Business Group Alignment	PTT Public Company Limited
	July 1, 2015 - March 30, 2016	Executive Vice President, PTT, working on a secondment as President	PTT MCC Biochem Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	December 1, 2020 - Present	Director/ Secretary to the Board/ Member of the Risk Management Committee/ President and Chief Executive Officer, Global Power Synergy Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	December 1, 2020 - Present	Director, Xayaburi Power Company Limited	
	December 1, 2020 - Present	Director, Ratchaburi Power Company Limited	
	December 1, 2020 - Present	Director, Glow Energy Public Company Limited	
	December 1, 2020 - Present	Director, Glow Company Limited	
	December 1, 2020 - Present	Director, Glow SPP 2 Company Limited	
	December 1, 2020 - Present	Director, Glow SPP 3 Company Limited	
	December 1, 2020 - Present	Director, Glow IPP 2 Holding Company Limited	
	December 1, 2020 - Present	Director, Glow SPP 11 Company Limited	
	December 1, 2020 - Present	Director, Glow IPP Company Limited	
	January 4, 2021 - Present	Director, Global Renewable Power Company Limited	
	July 13, 2021 - Present	Director, Avaada Energy Private Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	December 1, 2020 - Present	Advisory to the Board of Director, Alpha Com Company Limited	

Miss Jiraphon Kawswat
Acting President and Chief Executive Officer,
PTT Oil and Retail Business Public Company Limited
Age (Year) 59

- Appointed as Acting President and Chief Executive Officer, PTT Oil and Retail Business Public Company Limited July 1, 2018

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Science (Accounting), Kasetsart University • Master of Accountancy (Cost Accounting), Chulalongkorn University • Master of Business Administration (Financial Management), Kasetsart University **Certification** • Director Certification Program (DCP 180/2013), Director Certification Program Update (DCPU 2/2014), How to Develop a Risk Management Plan (HRP 6/2014), Successful Formulation & Execution of Strategy (SFE 21/2014), Director Leadership Certification Program (DLCP 0/2021), Thai Institute of Directors Association (IOD) • Senior Executive Program, London Business School, UK • Leadership Development Program III, (Class 2/2015), PTT Leadership and Learning Institute • Strategic Thinking Through Case • PTT Group VP Leadership Development Program • TLCA Executive Development Program (EDP), Thai Listed Companies Association	July 1, 2018 - Present	Senior Executive Vice President, PTT, reporting to Chief Operating Officer, Downstream Petroleum Business Group working on a secondment as Acting President and Chief Executive Officer	PTT Oil and Retail Business Public Company Limited
	February 14, 2018 - August 20, 2018	Director	IRPC Public Company Limited
	October 1, 2017 - June 30, 2018	Senior Executive Vice President, Oil Business Unit	PTT Public Company Limited
	2015 - October 15, 2019	Chairman	PTT Retail Management Company Limited
	2016 - September 30, 2017	Executive Vice President, PTT, working on a secondment as Managing Director	PTT Retail Management Company Limited
	2012 - 2016	Executive Vice President, Planning, Oil Business Unit	PTT Public Company Limited

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• PTT Group PLLI 3 Leadership Greatness: Great Leaders, Great Teams, Great Results • Top Executive Program (Class of 26th), Capital Market Academy (CMA) • Certificate, Executive Program in Energy Literacy for a Sustainable Future (Class 12/2018), Thailand Energy Academy (TEA) • Executive Program on Rule of Law and Development (RoLD Program 3/2019), Thailand Institute of Justice • Corporate Governance Program for Directors and Executives of State Enterprises and Public Organization (Class 20/2019), King Prajadhipok's Institute	**Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)**		
	2018 - Present	Director/ Secretary to the Board/ Acting President and Chief Executive Officer, PTT Oil and Retail Business Public Company Limited	
	2019 - Present	Member of the Enterprise Risk Management Committee, PTT Oil and Retail Business Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	May 2019 - Present	Executive Director, Thailand Energy Academy	
	July 2020 - February 13, 2022	HR Policy Committee, Chulalongkorn University Council	

Mrs. Chanamas Sasnanand
Executive Vice President,
Group Corporate Finance and Strategy
Age (Year) 52

- Appointed as Executive Vice President, Group Corporate Finance and Strategy January 1, 2021

(%) of Share Possession
0.000455
(own 0.000455;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Administration, Chulalongkorn University • Master of Business Administration University of South Carolina, USA **Certification** • TLCA Executive Development Program, Thai Listed Companies Association • Leadership Development Program II (LDP II), PTT Leadership and Learning Institute • EP LEAD III Leadership Development Program, IMD • Senior Executive Program, Sasin Graduate Institute of Business Administration of Chulalongkorn University • Audit Report Process, Federation of Accounting Professions Under The Royals Patronage of His Majesty The King • Audit process, Federation of Accounting Professions Under The Royals Patronage of His Majesty The King • Advanced Master of Management Program (Class of 7th), National Institute of Development Administration	January 1, 2021 - Present	Senior Vice President, PTT Exploration and Production Public Company Limited, working on a secondment as Executive Vice President, Group Corporate Finance and Strategy	PTT Public Company Limited
	January 2019 - December 2020	Senior Vice President, Finance Division	PTT Exploration and Production Public Company Limited
	April - December 2018	Senior Vice President, Internal Audit Division	PTT Exploration and Production Public Company Limited
	January - April 2018	Acting Senior Vice President, Internal Audit Division	PTT Exploration and Production Public Company Limited
	July 2014 - December 2017	Vice President, Capital and Investor Relations Department	PTT Exploration and Production Public Company Limited
	March 20, 2015 - January 1, 2018	Director	PTTEP Holding Company Limited
	March 20, 2015 - January 1, 2018	Director	PTTEP Offshore Investment Company Limited

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	September 10, 2013 - January 1, 2018	Director	PTTEP HK Holding Limited
	April 22, 2011 - January 1, 2018	Director	PTTEP Romana Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	-	-	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	January 11, 2021 - Present	Director, PTT International Trading Pte. Ltd.	
	January 4, 2021 - Present	Director, PTT Treasury Center Company Limited	
	January 4, 2021 - Present	Director, Alpha Com Company Limited	
	December 17, 2020 - Present	Director, Innobic (Asia) Company Limited	
	January 1, 2019 - Present	Director, AI and Robotics Ventures Company Limited	
	January 1, 2019 - January 1, 2021	Director, PTTEP Treasury Center Company Limited	
	August 1, 2020 - January 1, 2021	Director, PTTEP Business Center Company Limited	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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Miss Wilaiwan Kanjanakanti
Executive Vice President, Group Accounting and Tax Policy
Age (Year) 55

- Appointed as Executive Vice President, Group Accounting and Tax Policy November 1, 2016 (Changed the name of the position from Executive Vice President, Group Finance and Accounting Policy with effect from January 1, 2021)

(%) of Share Possession
0.00013
(own 0.00013)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Accountancy, Chulalongkorn University • Master of Science in Accounting Information System (M.S. in AIS), Faculty of Commerce and Accountancy, Chulalongkorn University **Certification** • Director Certification Program (DCP 234/2017), Thai Institute of Directors Association (IOD) • Leadership Development Program II (LDP 2), Harvard Business School, Shanghai • Executive Development Program, The Stock Exchange of Thailand • Executive Development Program 2012 (Class of 8th) (EDP-MOF 2012), Fiscal Policy Research Institute Foundation • Advanced Management Program 3 (AMP 3), PTT Leadership and Learning Institute (PLLI) • Leadership Development Program III (LDP 3), IMD Singapore • Financial and Fiscal Management for Senior Executive Program (FME-MOF)	November 1, 2016 - Present	Executive Vice President, Group Accounting and Tax Policy (Changed the name of the position from Executive Vice President, Group Finance and Accounting Policy with effect from January 1, 2021)	PTT Public Company Limited
	April 25, 2018 - December 15, 2020	Director	PTT Oil and Retail Business Public Company Limited
	July 16, 2018 - August 4, 2020	Treasurer	Marketing Association of Thailand
	2017 - 2020	Sub-committee of the Accounting Technical Standards Sub-committee	Federation of Accounting Professional, Federation of Accounting Professions under the Royal Patronage of His Majesty the King
	June 1, 2016 - October 31, 2016	Vice President, Treasury	PTT Public Company Limited
	May 1, 2016 - March 31, 2017	Director	PTT Regional Treasury Center Pte. Ltd.
	February 25, 2016 - April 25, 2018	Director	PTT Retail Business Company Limited (Changed company name to PTT Oil and Retail Business Company Limited on December 15, 2016)
	September 1, 2014 - May 31, 2016	Vice President, Managerial Accounting	PTT Public Company Limited
	2014 - 2017	Committee of the Accounting Profession in Management Accounting Committee	Federation of Accounting Professions under the Royal Patronage of His Majesty the King

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Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	September 19, 2020 - Present	Director, Dhipaya Group Holdings Public Company Limited	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	April 24, 2017 - Present	Director, Dhipaya Insurance Public Company Limited	
	February 1, 2017 - Present	Director, PTT Green Energy Pte. Ltd.	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Miss Jaroonsri Wankertphon
Executive Vice President, Global Business Services
Age (Year) 56

- Appointed as Executive Vice President, Global Business Services October 1, 2020 (The person supervising Accounting)

(%) of Share Possession
0.000091
(own 0.000091; spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • B.B.A. (Business Administration), Chulalongkorn University • B.B.A. (Accounting), Krirk University • M.Sc. (Financial Accounting), Thammasat University **Certification** • Director Certification Program (DCP 220/2016), Thai Institute of Directors Association (IOD)	October 2020 - Present	Senior Vice President, attached to Executive Vice President, PTT Exploration and Production Public Company Limited, working on a secondment as Executive Vice President, Global Business Services	PTT Public Company Limited
	March 20, 2015 - October 1, 2020	Director	PTTEP HK Holding Limited

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
• TLCA Executive Development Program, Thai Listed Companies Association • Financial & Fiscal Management Program for Senior Executive (Class 6/2019), The Comptroller General's Department • EP LEAD III Leadership Development Program, IMD **Continuing Professional Development 2020** • TFRSs - CPD (Accounting) 6 hours **Continuing Professional Development 2021** • Shared Service Centre Evolution - Key to agility after the pandemic • Recognizing and evaluating the value of trade account receivable in the "Looking forward concept" and differentiation between PAEs and NPAEs in practice • Estimation of discounted cash-flow for impairment according to TAS36 after relief measurement • TFRS9 IBOR Reformation Phase 2 and Related disclosure • RPA for Digital Accounting • F&A Knowledge Sharing: "M&A: Purchase Price Allocation (PPA) in practices" • PTT New Core Competencies: PTT New Vision • Mentoring Guidelines & Process An Accountant with criteria Specified by the Department of Business Development	January 1, 2018 - October 1, 2020	Director	PTTEP Holding Company Limited
	April 22, 2011 - October 1, 2020	Director	PTTEP Sadang Limited
	February 28, 2019 - September 23, 2020	Director	Energy Complex Company Limited
	January 2019 - September 2020	Senior Vice President, Accounting Division	PTT Exploration and Production Public Company Limited
	October - December 2018	Senior Vice President, Accounting Division and Acting Vice President, Financial Accounting Department	PTT Exploration and Production Public Company Limited
	July 2016 - September 2018	Senior Vice President, Accounting Division	PTT Exploration and Production Public Company Limited
	October 2015 - June 2016	Vice President, Accounting Policy and Solution Department, and Acting Senior Vice President, Accounting Division	PTT Exploration and Production Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	-	-	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

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Mr. Nisit Phongvutiprapant
Company Secretary
Age (Year) 51

- Appointed as Company Secretary October 1, 2020
- Appointed as Executive Vice President, Company Secretary and Corporate Relation October 1, 2020

(%) of Share Possession
0.000003
(own 0.000003;
spouse 0)

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Economics (Development Economics), Bangkok University **Certification** • Director Certification Program (DCP 195/2014), Company Secretary Program (CSP 113/2020), Thai Institute of Directors Association (IOD) • Advanced Management Program II (Batch 1/2018), PTT Leadership and Learning Institute • Leadership Development Program I (2013), PTT Leadership and Learning Institute • Bain Academy Asia Pacific 2019 Program, Bain & Company SE Asia, Inc., Singapore	October 1, 2020 - Present	Senior Executive Vice President, PTT Oil and Retail Business Public Company Limited, working on a secondment as Executive Vice President, Company Secretary and Corporate Relation	PTT Public Company Limited
	June 1, 2020 - September 30, 2020	Senior Executive Vice President, Corporate Strategy, Innovation and Sustainability	PTT Oil and Retail Business Public Company Limited
	June 5, 2020 - September 30, 2020	Director	Modulus Company Limited
	June 22, 2020 - September 30, 2020	Director	PTT (Cambodia) Limited
	November 29, 2019 - September 30, 2020	Director	Brighter Energy Company Limited (JV Terminal)
	August 30, 2019 - May 31, 2020	Director	Brighter PTT Oil and Retail Business Company Limited
	August 29, 2018 - January 31, 2020	Director	PTT Oil Myanmar Company Limited
	February 1, 2020 - May 31, 2020	Vice President, Strategy and Portfolio Management Department	PTT Oil and Retail Business Public Company Limited
	May 1, 2019 - January 31, 2020	Vice President, PTT Oil and Retail Business Public Company Limited, working on a secondment as Managing Director	PTT Oil Myanmar Company Limited
	July 1, 2018 - April 30, 2019	Vice President, International Business Development and Planning Department	PTT Oil and Retail Business Public Company Limited
	May 17, 2017 - April 30, 2019	Director	PTT Philippines Corporation
	2012 - April 30, 2019	Director	PTT (Lao) Company Limited
	January 1, 2017 - June 30, 2018	Vice President, International Business Development and Planning Department	PTT Public Company Limited
	September 1, 2013 - December 31, 2016	Division Manager, PTT Public Company Limited, working on a secondment as Managing Director	PTT (Lao) Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	-	-	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	November 1, 2020 - Present	Committee Member, Thai Company Secretary Club, Thai Listed Companies Association	
	November 17, 2021- Present	Vice Chairman and Treasurer, Power of Innovation Foundation	
	November 23, 2021 - Present	Member of the Executive Committee, Vidyasirimedhi Institute of Science and Technology	
	1992 - 2021	Managing Partner, Phuluang Kasetrungrueng (1992) Limited Partnership	

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Details of Directors and Subsidiaries

Positions Held by The Management and Authorized Controllers of PTT Public Company Limited, Subsidiaries, Joint Ventures, Associates and Other Related Companies for 2021

Company* (As of December 31, 2021)			PTT Executive (As of December 31, 2021)	1 Professor Dr. Thosaporn Sirisumphand	2 POL. GEN. Rungroj Sangkram	3 Mr. Don Wasantapruek	4 GEN. Teerawat Boonyawat	5 Mr. Danucha Pichayanan	6 M.L. Chaydid Kridakon	7 Mr. Krishna Boonyachai	8 Associate Professor Dr. Chaydom Sabhasri	9 Mr. Payong Srivanich	10 Mr. Krisada Chinavicharana	11 Mr. Jatuporn Buruspat	12 Mrs. Premrutai Vinaiphat	13 Mr. Phongsthorn Thavisin	14 Associate Professor Dr. Narongdech Srukhost	15 Mr. Auttapol Rerkpiboon	16 Mr. Atikom Terbsiri	17 Mr. Kris Imsang	18 Mr. Noppadol Pinsupa	19 Miss Pannalin Mahawongtikul	20 Mr. Teerikiat Prommool	21 Mr. Suchat Ramarch	22 Miss Peangpanor Boonklum	23 Mr. Wuttikorn Sithit	24 M.L. Peekthong Thongpai	25 Mr. Disathat Panyarachun	26 Dr. Burairin Rattanasombat	27 Mr. Chansak Chuenchom	28 Mr. Monthri Rawanchaikul	29 Dr. Kongkiapan Intarajang**	30 Mr. Wirat Uanarumit	31 Mr. Chawalit Tippawanich	32 Mr. Worawat Pitayasiri	33 Miss Jiraphon Kwowat	34 Mrs. Chanamas Sarsanand	35 Miss Wilawan Kanjanakariti	36 Miss Janoesri Wankerdphon
PTT Plc.			PTT	X	/	/	/	/	/	/	/	/	/	/	/	/	/	*0	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//
Subsidiaries	E&P Business	1	PTT Exploration and Production Plc.	PTTEP															/	/												*/							
	Gas	2	PTT Natural Gas Distribution Co., Ltd.	PTTNGD																							X												
		3	PTT LNG Co., Ltd.	PTTLNG																X																			
		4	PTT Global LNG Co., Ltd.	PTTGL																							X												
	International Business	5	PTT Green Energy Pte. Ltd.	PTTGE																																		/	
		6	PTT Energy Resources Co., Ltd.	PTTER																																			
		7	PTT Global Management Co., Ltd.	PTTGM																																			
	Oil	8	PTT Oil and Retail Business Plc.	OR															X		/									/	/					*0/			
	Petrochemical & Refining	9	PTT Tank Terminal Co., Ltd.	PTT TANK																X										/									
		10	PTT Global Chemical Plc.	GC		/															/									/	/			*/					
		11	Thai Oil Plc.	TOP																		/	/	/						/			*0/						
		12	IRPC Plc.	IRPC																X					/				/				*0/					
	Trading	13	PTT International Trading Pte. Ltd.	PTTT																							X										/		
		14	PTT International Trading London Ltd.	PTTT LDN																																			
		15	PTT International Trading USA Inc.	PTTT USA																																			
	Others	16	Business Services Alliance Co., Ltd.	BSA																				X	/														
		17	PTT Treasury Center Co., Ltd.	PTT TCC																																		/	
	New Business and Infrastructure	18	Global Power Synergy Plc.	GPSC															/		/									/					/	/	*0/		
		19	PTT Digital Solutions Co., Ltd.	PTT DIGITAL																					X														
		20	Energy Complex Co., Ltd.	EnCo																						/						X							
		21	PTT Energy Solutions Co., Ltd.	PTTES																																	X		

Company* (As of December 31, 2021)			PTT Executive (As of December 31, 2021)	1 Professor Dr. Thosaporn Sirisumphand	2 POL. GEN. Rungroj Sangkram	3 Mr. Don Wasantapruek	4 GEN. Teerawat Boonyawat	5 Mr. Danucha Pichayanan	6 M.L. Chaydid Kridakon	7 Mr. Krishna Boonyachai	8 Associate Professor Dr. Chaydom Sabhasri	9 Mr. Payong Srivanich	10 Mr. Krisada Chinavicharana	11 Mr. Jatuporn Buruspat	12 Mrs. Premrutai Vinaiphat	13 Mr. Phongsthorn Thavisin	14 Associate Professor Dr. Narongdech Srukhost	15 Mr. Auttapol Rerkpiboon	16 Mr. Atikom Terbsiri	17 Mr. Kris Imsang	18 Mr. Noppadol Pinsupa	19 Miss Pannalin Mahawongtikul	20 Mr. Teerikiat Prommool	21 Mr. Suchat Ramarch	22 Miss Peangpanor Boonklum	23 Mr. Wuttikorn Sithit	24 M.L. Peekthong Thongpai	25 Mr. Disathat Panyarachun	26 Dr. Burairin Rattanasombat	27 Mr. Chansak Chuenchom	28 Mr. Monthri Rawanchaikul	29 Dr. Kongkiapan Intarajang**	30 Mr. Wirat Uanarumit	31 Mr. Chawalit Tippawanich	32 Mr. Worawat Pitayasiri	33 Miss Jiraphon Kwowat	34 Mrs. Chanamas Sarsanand	35 Miss Wilawan Kanjanakariti	36 Miss Janoesri Wankerdphon
Joint Ventures, Associates and Other Related Companies	Gas	22	Trans Thai-Malaysia (Thailand) Co., Ltd.	TTM(T)																																			
		23	Trans Thai-Malaysia (Malaysia) Sdn. Bhd.	TTM(M)																																			
		24	Map Ta Phut Air Products Co., Ltd.	MAP																																			
	Others	25	Dhipaya Group Holdings Plc.	TIPH																																			/
		26	Sarn Palung Social Enterprise Co., Ltd.	SPSE																																			
		27	Suez Environmental Services Co., Ltd.	SES																																			
	New Business and Infrastructure	28	District Cooling System and Power Plant Co., Ltd.	DCAP																																			
		29	InnoSpace (Thailand) Co., Ltd.	InnoSpace																																			
		30	Baania (Thailand) Co., Ltd.	Baania																																			
		31	HG Robotics Co., Ltd.	HG Robotics																																			
		32	Sunfolding, Inc.	Sunfolding																																			
		33	Luminar Technologies, Inc.	Luminar																																			
		34	Ample, Inc.	Ample																																			/

Notes:

- *Symbol X = Chairman - = Vice Chairman * = CEO O = President / = Director // = Executive*
- *The first four executives, excluding the President & CEO, under SEC's Annoucement are Mr. Atikom Terbsiri, Mr. Kris Imsang, Mr. Noppadol Pinsupa, and Miss Pannalin Mahawongtikul.*

** The Company has classified new subsidiary in according to the International Financial Reporting Standards No. 10 Consolidated Financial Statement, effective since January 1, 2015.*

*** The position of "Chief Executive Officer" has been changed to "Chief Executive Officer and President" under PTT Global Chemical Plc. effective from January 1, 2022.*

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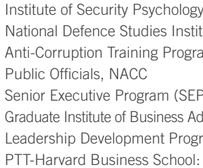

Mr. Chadil Chavanalikikorn
Executive Vice President, Office of Corporate Audit
Head of the Office of Corporate Audit
Age (Year) 55

(%) of Share Possession
-None-

Family Relationship among Directors and Executives
-None-

Education/ Certification	Working Experiences in the 5 Preceding Years (As of December 31, 2021)		
	Time Period	Position	Organization/ Company
Education • Bachelor of Engineering, Kasetsart University • Master of Business Administration, Kasetsart University • Certified Internal Auditor (CIA): The Institute of Internal Auditors **Certification** • Successful Formulation & Execution of Strategy (SFE 17/2013), Anti-Corruption the Practical Guide (ACPG 2/2013), Company Secretary Program (CSP 65/2015), Independent Observer Program (IOP 1/2016), Thai Institute of Directors Association (IOD) • Senior Energy Executive, Thailand Energy Academy, Ministry of Energy • Administrative Psychological Operation: Institute of Security Psychology, National Defence Studies Institute • Anti-Corruption Training Program for Public Officials, NACC • Senior Executive Program (SEP): SASIN Graduate Institute of Business Administration • Leadership Development Program II, PTT-Harvard Business School: PLLI • Leadership Development Program III, PTT-IMD: PLLI • Leadership Succession Program (LSP): IRDP	2019 - Present	Executive Vice President, Office of Corporate Audit	PTT Public Company Limited
	2018 - 2019	Executive Vice President, Corporate Governance	PTT Public Company Limited
	2017 - 2018	Executive Vice President, Sustainability Management	PTT Public Company Limited
	2016 - 2017	Vice President, Internal Audit Department	PTT Public Company Limited
	Relevant Important Positions in Listed Companies – The Stock Exchange of Thailand (In the Previous Year)		
	-	-	
	Relevant Important Positions in Non-Listed Company/ Other Organizations (In the Previous Year)		
	-	-	
	Other Experiences/ Other Activities (In the Previous Year)		
	-	-	

Attachment 4

Business Assets and Details on Asset Valuation

-None-

Attachment 5

Corporate Governance, Ethical Standards and Code of Business Ethics Handbook of PTT Public Company Limited, including Authorities, Duties and Responsibilities of the Board and Duties and Responsibilities of Specific Committees of PTT Public Company Limited

1. Corporate Governance, Ethical Standards and Code of Business Ethics Handbook of PTT Public Company Limited

PTT Public Company Limited (PTT) has defined the corporate governance policy for the Board of Directors, all executives, and employees to adhere to as a guiding principle in their work, to promote PTT as a company with efficient business operations, excellent corporate governance and management, integrity, transparency, and auditability.

PTT has announced its corporate governance principles and formulated the Corporate Governance, Ethical Standards and Code of Business Ethics Handbook (CG Handbook) for the acknowledgement and adoption of the Board of Directors, all executives, and employees as their practical guidelines at work. The Handbook is publicized on PTT's Intranet and web site.

Further details related to PTT's corporate governance and Corporate Governance, Ethical Standards and Code of Business Ethics Handbook can be studied from PTT's website www.pttplc.com.

https://www.pttplc.com, Good Corporate Governance Section or in the links below.
https://www.pttplc.com/th/About/Corporate-Governance.aspx and
https://www.pttplc.com/uploads/CG/Publication/CGHandbookforOneReport/PTTCGHandbook_Revision5_EN.pdf

2. Charter of the Board of Directors and Charters of Specific Committees of PTT Public Company Limited

2.1 Charter of the Board

(Details are reported under Section 2 "**7.2.3 Roles and Duties of the Board.**")

2.2 Charters of the Audit Committee/ Nominating Committee/ Remuneration Committee/ Corporate Governance Committee and Enterprise Risk Management Committee

(Details are reported under Section 2 "**7.3 Information about Specific Committees.**")

Attachment 6

Report of the Audit Committee

Details are reported on page 306 - 309.

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About This Report

12.6

Part 3: Driving Business for Sustainability
Section 1: Business Operations and Performance

PTT has continuously disclosed information on sustainability performance to stakeholders through the Annual Report, Sustainability Report, and corporate website at www.pttplc.com in the section of Sustainability on an annual basis. In 2021, PTT disclosed sustainability performance to stakeholders in "2021 Annual Registration Statement/ Annual Report (56-1 One Report)" by merging the 56-1 Form, Annual Report, and Sustainability Report into a single report. This is the 2nd consecutive year. The information on sustainability performance presented in Part 3: Driving Business for Sustainability, Section 1: Business Operations and Performance covers sustainability management strategy in 3 dimensions, namely Environmental, Social, and Governance. The information is disclosed on the corporate website at www.pttplc.com under the section of Sustainability.

Reader Feedback Survey

Readers can click or scan the QR Code in Part 3: Driving Business for Sustainability, Section 1: Business Operations and Performance of the 2021 Annual Registration Statement/ Annual Report (56-1 One Report) for further details of each topic, as well as visit www.pttplc.com on Sustainability section for PTT's sustainability performance.

Reporting Scope

The information presented in Part 3: Driving Business for Sustainability, Section 1: Business Operations and Performance in "2021 Annual Registration Statement/ Annual Report (56-1 One Report)" covers sustainability performance from January 1st to December 31st December 2021 in all business groups of PTT. This comprises Upstream Petroleum and Natural Gas Business, Downstream Petroleum Business Group, New Business and Infrastructure Business Group, and Business Support Unit, as well as the performance of PTT Group companies, namely PTT Exploration and Production Public Company Limited (PTTEP), PTT Global Chemical Public Company Limited (GC), Thai Oil Public Company Limited (TOP), IRPC Public Company Limited (IRPC), Global Power Synergy Public Company (GPSC) and PTT Oil and Retail Public Company (OR), as specified in the content of each topic. Relevant domestic and international reporting guidelines have been applied to determine the materiality and the presentation of the content, as follows;

56-1 ONE REPORT	Manual for preparing the Annual Registration Statement/ Annual Report (56-1 One Report) of the Securities and Exchange Commission or the SEC
GRI	Global Reporting Initiative (GRI) Sustainability Reporting Standards aligning with relevant indicators (2016, 2018, 2020) and Sector Standard Project for Oil and Gas (GRI 11: Oil and Gas Sector 2021), with the content's comprehensiveness meeting the "In accordance" criteria per Core disclosure
IIRC	Reporting co-creation of organization value per International Integrated Reporting Council (IIRC)
UNGC	Reporting performance progress on the 10 principles of the United Nations Global Compact (UNGC) at Advanced level
TCFD	Reporting performance on climate change through the application of Recommendation of the Task Force on Climate-related Financial Disclosures (TCFD)
SDGs	Reporting performance progress supporting Sustainable Development Goals (SDGs)
WEF	Reporting co-creation of sustainability value per key indicators of Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation of World Economic Forum (WEF)

Report Assurance

Sustainability performance information in all three dimensions, comprising environmental, social, and governance (ESG), disclosed in Part 3: Driving Business for Sustainability, Section 1: Business Operations and Performance of "2021 Annual Registration Statement/ Annual Report (56-1 One Report)," has been approved by the senior management of relevant departments. Material sustainability issues have been verified by an independent assurer for the 11th consecutive year in order to reassure stakeholders that the information disclosed is accurate, complete, correct, credible, consistent with the business operations, and traceable to the information source.

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Independent limited assurance report

To the Directors of PTT Public Company Limited ("PTT")

Conclusion

Based on the procedures performed, as described below, nothing has come to our attention that causes us to believe that the selected subject matters ("Subject Matters") identified below and included in the 56-1 One Report 2021 (the "Report") or referred to in the Report by way of hyperlinks to PTT's corporate website ("the Website"), for the year ended 31 December 2021 , together with the disclosures regarding their adherence to the three AccountAbility Principles of Inclusiveness, Materiality and Responsiveness under AA1000APS (2018), and reliability of Subject Matters, are not, in all material respects, prepared in compliance with the reporting criteria (the "Criteria").

Our Responsibilities

We have been engaged by PTT and are responsible for providing a limited assurance conclusion in respect of the Subject Matters for the year ended 31 December 2021 to be included in the Report and the Website as identified below.

Our assurance engagement is conducted in accordance with the International Standard on Assurance Engagements ISAE 3000 *Assurance Engagements other than Audits or Reviews of Historical Financial Information* and ISAE 3410 *Assurance on Greenhouse Gas Statements*. We have also conducted our engagement in accordance with the Accountability Assurance Standard of Sustainability AA1000AS (2008) at moderate level that corresponds to a limited assurance as per ISAE 3000 with a Type 2 engagement, which covers not only the nature and extent of the organisation's adherence to the AA1000APS (2018), but also evaluates the reliability of Subject Matters as indicated below.

These standards require the assurance team to possess the specific knowledge, skills and professional competencies needed to provide assurance on sustainability information, and that we plan and perform the engagement to obtain limited assurance on whether the Subject Matters are prepared, in all material respects, in compliance with the Criteria. We have complied with the independence and other ethical requirements of the International Ethics Standards Board for Accountants' *International Code of Ethics for Professional Accountants (including International Independence Standards)* (IESBA Code), which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. The firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

We have not been engaged to provide an assurance conclusion on any other information disclosed within the Report and the Website.

Subject Matters

Subject Matters comprised of the following data expressed numerically or in descriptive text for the year ended 31 December 2021:

- GRI 302-1 Energy consumption within the organization
- GRI 302-3 Energy intensity
- GRI 303-3 Water withdrawal (2018)
- GRI 303-4 Water discharge (2018)
- GRI 305-1 Direct (Scope 1) GHG emissions
- GRI 305-2 Energy indirect (Scope 2) GHG emissions
- GRI 305-3 Other indirect (Scope 3) GHG emissions
- GRI 305-4 GHG emissions intensity
- GRI 305-7 Nitrogen oxides (NOx), Sulphur oxides (Sox), and other significant air emissions (Volatile Organic Compounds: VOCs)
- GRI 306-3 Waste generated (2020)
- GRI 306-4 Waste diverted from disposal (2020)

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- GRI 306-5 Waste directed to disposal (2020)
- GRI 306-3 Significant Spills (2016)
- GRI 403-9 Work-related injuries (2018)
- GRI 403-10 Work-related ill health (2018)
- GRI 404-1 Average hours of training per year per employee
- GRI 405-2 Ratio of basic salary and remuneration of women to men
- GRI 201-1 Direct economic value generated and distributed – Community Investment
- OGSD – OG4 Number and percentage of significant operating sites in which biodiversity risk has been assessed and monitored
- OGSD – OG6 Volume of flared and vented hydrocarbon
- OGSD – OG13 Number of process safety events, by business activity

Criteria
The Subject Matters were assessed according to the following criteria:

- The Sustainability Reporting Standards of the Global Reporting Initiative ("GRI Standards");
- The Oil and Gas Sector Disclosures ("OGSD") of the Global Reporting Initiative; and
- AA1000 AccountAbility Principles Standard (2018) ("AA1000APS (2018)").

Directors' and management's responsibilities
The directors and management of PTT are responsible for the preparation and presentation of the Subject Matters, specifically ensuring that in all material respects the Subject Matters are prepared and presented in accordance with the Criteria. This responsibility also includes the internal controls relevant to the preparation of the Report and the Website to ensure they are free from material misstatement whether due to fraud or error.

Procedure performed
In forming our limited assurance conclusion over the Subject Matters, our procedures consisted of making enquiries and applying analytical and other evidence gathering procedures including:

- Interviews with senior management and relevant staff at corporate and operating sites;
- Inquiries about the design and implementation of the systems and methods used to collect and process the information reported, including the aggregation of source data into the Subject Matters;
- Inquiries about managements practices and procedures related to identifying stakeholders and their expectations, determining material sustainability matters and implementing sustainability policies and guidelines;
- Remote site visit to 3 sites; Khanom Gas Separation Plant, Khao Bo Ya Gas Terminal, and Region 11 Pipeline Operations Center, selected on the basis of risk analysis including the consideration of both quantitative and qualitative criteria;
- Agreeing the Subject Matters to relevant underlying sources on a sample basis to determine whether all the relevant information has been included in the Subject Matters and prepared in accordance with the Criteria.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement and consequently the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. Accordingly, we do not express a reasonable assurance opinion.

Inherent limitations
Due to the inherent limitations of any internal control structure it is possible that errors or irregularities in the information presented in the Report and the Website may occur and not be detected. Our engagement is not designed to detect all weaknesses in the internal controls over the preparation and presentation of the Report and the Website, as the engagement has not been performed continuously throughout the period and the procedures performed were undertaken on a test basis.

Restriction of use of our report
Our report should not be regarded as suitable to be used or relied on by any party wishing to acquire rights against us other than PTT, for any purpose or in any other context. Any party other than PTT who obtains access to our report or a copy thereof and chooses to rely on our report (or any part thereof) will do so at its own risk. To the fullest extent permitted by law, we accept or assume no responsibility and deny any liability to any party other than PTT for our work, for this independent limited assurance report, or for the conclusions we have reached.

KPMG Phoomchai Audit Ltd.

KPMG Phoomchai Audit Ltd.
Bangkok

7 March 2022

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Powering Life with Future Energy and Beyond

PTT adheres to the principle of powering every life, promoting Thailand's steady progress by generating continuous business growth with excellent performance, as well as enhancing society and community well-being, and valuing environmental sustainability with good governance by focusing on future energy businesses and creating next growth in new businesses beyond energy.

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PTT NEWS
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This report uses environmentally friendly paper.